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OUR CLIENT-FOCUSED PRACTITIONERS APPLY RELIABLE AND SUSTAINABLE SOLUTIONS TO THE INVESTIGATION, EVALUATION, AND REMEDIATION OF SEDIMENT SITES TO MANAGE HUMAN HEALTH AND ECOLOGICAL RISK ON BEHALF OF ALL STAKEHOLDERS.
About Geosyntec

Recognized for technical excellence and outstanding quality, Geosyntec excels in working with the private and public sectors on new ventures and complex problems involving the environment, natural resources, and civil infrastructure. Founded in 1983 as a specialized consulting and engineering firm, Geosyntec has a staff of approximately 1200 engineers, scientists, and related technical and project support personnel located in 85 offices throughout the United States and select international locations.

We are known for our technology leadership, broad experience, and exceptional client service. Our professionals continue to develop new technology applications and capabilities that advance the state of the practice. Our applied research partnerships with leading universities, NASA, USEPA, Department of Defense and others are producing better methods for the in situ remediation of recalcitrant chemicals in the environment; management of urban watersheds to reduce pollutant loadings; protection of endangered species from the impacts of stormwater runoff; design of industrial and municipal waste disposal facilities; and geotechnical and seismic analysis for design of earthen structures and other critical facilities.

Our private sector clients represent a variety of industrial and professional service sectors including chemical, aerospace, oil and gas, mining, pharmaceutical, diversified manufacturing, advanced technology, power and utility, real estate, law, and environmental management. Our public sector clients include municipal, state/regional and national governments. We deliver solutions through Geosyntec and our wholly owned, specialty affiliates: MMI Engineering, SiREM, Savron, Green Harbor Energy, Geosyntec Europe, and Geosyntec Asia.

Geosyntec is annually recognized by the Engineering News Record as a top global environmental firm, and by Zweig Group for steady organic growth and profitability.
Geosyntec Contaminated Sediment Services

Our Contaminated Sediment Management Practitioners offer a broad range of specialties for evaluating, designing, and implementing remedies for sites with contaminated sediments and surface waters:

- Sediment / Site Characterization / Remedial Investigation
- Biological Assessment and Monitoring
- Human Health and Ecological Risk Assessment
- Natural Resource Damage Assessment (NRDA)
- Feasibility / Treatability and Pilot Studies
- Hydrodynamic and Sediment / Chemical Transport Modeling
- Remedial Design
- Active / Passive Capping
- Specialized In Situ Treatment Technologies
- Permitting, Compliance and Regulatory Support
- Geotechnical Engineering
- Construction Services
- Litigation Support

Other services Geosyntec offers:

- Contaminated Site Assessment and Cleanup
- Environmental Planning and Management
- Building Health Evaluations and Rehabilitation
- Air Quality Management and Air Pollution Control
- Water and Natural Resources Assessment, Management, and Restoration
- Water and Wastewater System Planning, Engineering, and Design
- Waste Management Planning, Engineering, and Design
- Civil Site Engineering and Design
- Geotechnical and Geoenvironmental Analysis, Modeling, and Engineering
- Structure and Fluid Analysis, Modeling, and Engineering
- Facility Hazard Definition and Risk Management
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SECTION 2 | Qualifications Overview
Geosyntec applies innovative methods and strategies to address project challenges:

- Streamlining remediation to position properties for redevelopment
- Minimizing long-term cost exposure through alternative remedies
- Assessing actual risk levels
- Allocating costs and supporting client litigation
- Designing facilities for operational cost savings

Qualifications Overview

Parties responsible for sites with contaminated sediments and surface waters have benefitted from our broad range of capabilities in this practice area. We provide comprehensive and value-added solutions to the management of marine, estuarine, and riverine systems where sediments have been impacted by contaminants from multiple sources.

Our world-class engineering and scientific staff brings together the expertise and resources to meet and resolve the most complex sediment projects. Geosyntec has extensive experience with all aspects of sediment site management including: remedial investigation, risk assessment, laboratory treatability and pilot testing, feasibility studies, remedy design, regulatory negotiations, and remedy implementation. We conduct these activities with the ultimate goal of developing a remedy that will provide risk reduction with minimal disruption and costs. We assess the overall environmental impacts and sustainability of different remedies as part of the process in selecting the remedial approach that best meets the objectives of all stakeholders.

Assessing True Risk and Delivering Cost-Effective Solutions

Clients come to us for effective solutions to help minimize long-term remediation cost exposure while sustaining productive relationships with regulators and other stakeholders. Our clients are presented with solutions that are practical, readily accepted by regulators, economically efficient, and sustainable. By applying our significant experience in remedial investigations and feasibility studies (RI/FS) and our rigorous risk assessment approach, we address the true risk in the process of determining appropriate remedial alternatives. At Geosyntec, we look beyond the conservative default assumptions to help identify realistic, cost-effective remedies.
**Succeeding with Project Regulatory Matters**

The complexity of sediment sites and the need to focus on risk requires specialized knowledge, acute, up-to-date familiarity with state and federal regulations, and effective working relationships with regulators. Our excellent regulatory relationships contribute to the success of our clients’ projects. Nationwide, Geosyntec is well respected by regulators because of our notable project work and development of guidance documents for USEPA, Federal Highway Administration, and other government and research organizations, including manuals on monitored natural attenuation; design of RCRA/CERCLA final cover systems; bioremediation; and urban, industrial and highway runoff stormwater monitoring, management, and treatment.

**Assessing Liability and Supporting Client Litigation**

As a trusted technical resource, we work directly with legal counsel, providing sediment-related strategic technical support to assess potential liabilities and cost allocation. We provide RI/FS services that often include identifying possible contaminant sources, quantifying source contribution, and evaluating contribution assessments. Geosyntec also provides expertise in environmental management, compliance enforcement, toxic tort, and other litigation.

**Managing Site Complexities**

Sediment sites present complex challenges. With Geosyntec, clients discover a depth of knowledge and experience that includes some of the nation’s leading experts on site assessment methods and remediation technologies applicable to impacted sediments. Fostering innovation, our multidisciplinary approach brings together nationally recognized in-house specialists in engineering, ecology, water quality, risk assessment, applied toxicology, and geoenvironmental sciences who work collaboratively to solve clients’ difficult contaminated sediment problems.

Our Contaminated Sediment Management Practice Group specializes in site characterization, engineering design, and construction-related services for remedial actions and site development. By combining technology leadership, customized strategies, and personalized client service, we deliver consistently excellent results.

**Approaching Remedial Projects Strategically**

Having performed over 10,000 projects worldwide including some of the most challenging remediation projects in the U.S., our collective experience has shown that no one remedial approach is the most cost-effective and does not necessarily address the actual risk. At Geosyntec, we specialize in comprehensive remedial planning and negotiation, and develop mitigation strategies through a combination of measures.
SECTION 3 Contaminated Sediment Management Services
Contaminated Sediment Management Services

Our contaminated sediment management practice’s assessment, design, and remediation expertise has been utilized by Fortune 500 companies and government agencies on complex sites across the U.S. and in international locations. With our proven technical capability in all aspects of sediment programs, clients benefit from our comprehensive experience and core services provided to expedite the best solution.

Service Areas

- Sediment / Site Characterization / Remedial Investigation
- Biological Assessment and Monitoring
- Human Health and Ecological Risk Assessment
- Natural Resource Damage Assessment (NRDA)
- Feasibility / Treatability and Pilot Studies
- Hydrodynamic and Sediment / Chemical Transport Modeling
- Remedial Design
- Active / Passive Capping
- Specialized In Situ Treatment Technologies
- Permitting, Compliance and Regulatory Support
- Geotechnical Engineering
- Construction Services
- Litigation Support
Site Characterization/Remedial Investigation

**Understanding your site is the first step**

Sediment sites pose unique management challenges due to the breadth and complexity of sources, pathways, and receptors. Sources may include discharge points, non-point sources, and groundwater/surface water interaction; pathways may include surface water, groundwater seepage, and biological uptake; and receptors involve human health and sensitive ecological species.

The first step in managing complex sediment sites is a sound program of site characterization and Conceptual Site Model (CSM) development. We characterize not for the sake of science but to focus specifically on:

- characterization of relevant risk scenarios that are driven by site conditions as opposed to regional conditions,
- identification of remedial needs for these scenarios, and
- informed analysis of viable management alternatives.

Site characterization is rooted in the understanding of the site-specific physical, chemical, and biological interactions that occur at a sediment site. At each stage in the process, we weigh the relevance of each data collection endeavor to determine a final management strategy. Our studies include comparisons to regional conditions to place site impacts in the context of regional stressors that typically prevail in industrialized corridors.

Geosyntec characterizes the physical system through our in-house hydrodynamic characterization skills and equipment (Acoustic Doppler Current Profiling and water quality logging), specialized groundwater surface water interaction toolkit, customized sampling methods for sediment geochronology, and our extensive skill set in 1-D, 2-D, and 3-D numerical modeling for simulating hydrodynamics, sediment transport, and chemical fate and transport. With a sound physical understanding of the site and larger system, we evaluate the stability of site conditions and the implications for future transport potential of constituents. We characterize the chemical setting through a full suite of analytical sampling expertise, including biologically active zone and deep sediment coring, automated and manual surface water monitoring, groundwater flux evaluations, passive and active sediment pore water sampling, and biological residue sampling of benthic macroinvertebrates, insects, and fish tissue. Our chemical characterization also addresses critical geochemical factors, such as nutrients, redox conditions, and organic carbon degradability, so that we can explain not just what chemicals are there but also their significance and environmental fate. Lastly, we develop an understanding of the biological setting through habitat surveys, fish community studies, and specialized studies of watershed human use. This is the last critical piece in the puzzle to understand the significance of site constituents to potential receptors.

Biological Assessment and Monitoring

**Addressing the ecological endpoints**

Geosyntec’s biological assessment and monitoring creates an accurate picture of the affected environment. Our services provide a reliable evaluation of the health of streams, rivers, lakes, and ocean environments and can offer a less expensive alternative to complex chemical testing programs. Geosyntec’s team offers a high
degree of experience to evaluate the ecological health of a given environment and show how organisms integrate the effects of varied stressors at a site over time. This means Geosyntec can characterize the long-term ecological issues and the status of highly valued biological communities. By examining a variety of species, their life stages, their survival, and their health, Geosyntec deciphers and then informs clients on the complex relationships among habitat, bioregion, and ultimately water and sediment quality.

Geosyntec’s experienced biologists efficiently conduct fish and invertebrate collection for both site investigations and National Pollutant Discharge Elimination System (NPDES) permit compliance. We partner with industry-leading laboratories to perform sample analyses, compile all metric scores and data in a project database, and utilize GIS capabilities to define spatial relationships and ensure data consistency and comparability.

For more than a dozen clients, Geosyntec has monitored the concentrations of chemicals found in fish tissue over a period of many years. Often, the fish community is exposed to chemicals via direct or indirect uptake from contaminated sediments. By monitoring the fish tissue concentrations over time, the effectiveness of a sediment remedy is evaluated. Additionally, biota-sediment accumulation models are developed and refined to support informed management decisions. This approach has been applied to both active remedies (e.g., dredging) and passive remedies (e.g., monitored natural recovery (MNR)). These monitoring data provide our clients and the regulatory agencies with an accurate picture of the affected environment.

Risk Assessment and Natural Resource Damage Assessment

Clearing away assumptions and uncertainties with solid analysis

The complex nature of sediment sites poses significant challenges. By developing realistic estimates of risk, the uncertainty and conservatism of cleanup levels are reduced, resulting in more cost-effective remedial solutions. Our collective experience in sediment sites has shown that a “removal first” approach is not always cost-effective, often fails to address the actual risk from impacted sediments, and may ultimately result in more ecological harm to the environment. Geosyntec’s approach is to identify the risk and develop an adaptive management strategy to address this risk through a combination of MNR, removal, capping, and institutional control measures.

We also recognize the importance of restoration in addressing remedial impacts as well as providing value through the NRDA process. This comprehensive approach provides a cost-effective solution and addresses the true risk, resulting in effective remediation.

The complexity of these sites and the need to focus on risk, both to support investigation and selection of remedial methods as well as potential NRDA claims, requires an excellent working relationship and technical reputation with regulators. While USEPA’s mandate is to focus on risk mitigation, at the local level it is often a challenge to build consensus for innovative remedies. Geosyntec personnel have
the experience necessary to work with state regulators and USEPA to develop logical and effective remedial approaches that cost-effectively and efficiently mitigate current and future site risk. We help clients achieve regulatory approval through our skillful negotiating capabilities and by leveraging our depth of experience in implementing proven approaches.

Our experience in sediment site characterization provides our practitioners with a better understanding of the exposure potential in sediment environments, resulting in a more accurate characterization of potential risks.

**Feasibility Studies**

**Identifying cost-effective, sustainable remedies**

Geosyntec recognizes the environmental complexities and processes associated with sediment remediation, and we develop feasibility studies that are based on the unique, site-specific factors that need to be taken into account for successful remedy evaluation and implementation. We apply our expertise in the physical, biological, and chemical characterization of sediments, upland watersheds, surface waters, marshes, and biota to assess potential risks to ecological systems and human health; and we evaluate remedies that meet the client and regulatory objectives for remediation and restoration.

Our feasibility study experience spans a broad geographic range, as well as estuarine, riverine, and lacustrine settings. Geosyntec feasibility studies have addressed a range of contaminants, including mercury and other metals, PCBs, polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). The more complex feasibility study efforts performed by Geosyntec staff have included multiple alternatives, addressing as many as eight contaminated sediment management units at one time. We maintain close relationships with university researchers to provide peer review support and our staff has a thorough understanding of U.S. Army Corps of Engineers research and guidance documentation to guide project technical evaluations.

**Treatability and Pilot Studies**

**Supporting optimal remedy design**

For over a decade, Geosyntec has operated a treatability laboratory supporting design and evaluation of conventional and innovative technologies to address chemicals in sediments, groundwater, and other media. Treatability testing is conducted by SiREM, a division of Geosyntec dedicated to providing laboratory services to support the design of effective remedies for challenging environmental problems. Site-specific treatability studies conducted in our laboratory provide valuable data that help identify the physical, chemical, and biological processes that can be used to mitigate potential risks associated with chemicals in the environment and to advance remedy design. These studies are critical for understanding and demonstrating attenuation processes that can occur in sediment for various management approaches, such as: (i) natural conditions are maintained; (ii) cap material is placed on top of sediment; or (iii) amendments are added to the sediment or cap material.

Geosyntec's laboratory treatability testing services provide a scientific basis for the selection of a sediment remedy and can reduce management costs by enabling
optimized design that targets contaminants most effectively. Laboratory treatability testing is used to screen a variety of amendments to measure their ability to degrade or sequester contaminants. These site-specific data are used to support the design of full-scale remedies or of larger-scale field pilot tests. Lab testing can assess site-specific natural and enhanced processes including: (i) biological transformations such as methylation of mercury and biodegradation of organic contaminants; (ii) adsorption of contaminants on activated carbon amendments or natural organic matter; (iii) precipitation of metals and other sequestration processes; and (iv) redox shifts following sediment manipulation. Laboratory treatability testing can provide key analytical data on the impact of natural processes and amendments on the speciation of contaminants (such as total mercury versus methyl mercury), porewater concentrations of contaminants, total concentrations in sediments, and bioavailability.

**Numerical Modeling**

**Understanding the fate and transport of sediments and chemicals of concern**

Geosyntec has extensive experience in hydrodynamic, sediment transport, and chemical fate and transport modeling. Geosyntec’s numerical modelers routinely address the specific requirements for a variety of project types, such as RI numerical modeling to support conceptual site model development in the CERCLA or RCRA process; FS numerical modeling to evaluate remedial alternatives; remedial design modeling to assess cost-effective strategies and implementation sequencing for ROD remedial design goals; allocation modeling to support source identification and allocation of costs for cleanup or litigation proceedings related to cost recovery; and fate and transport modeling to support NRDA studies. Geosyntec’s numerical modelers have the knowledge and depth of experience to address the project requirements. Our expertise encompasses:

- 1-D, 2-D, and 3-D hydrodynamic, sediment transport, and chemical fate and transport modeling
- Ecosystem modeling, including eutrophication and habitat-oriented output
- Computational Fluid Dynamic (CFD) modeling
- Surface water modeling (fresh and saline) in rivers, reservoirs, lakes, and estuaries
- Upland pollutant load modeling from urban (residential, commercial, and industrial) and agricultural land uses
- Bank erosion modeling
- Bioaccumulation modeling
- Watershed loading and sediment recontamination modeling (hydrology and stormwater modeling)
- Evaluation of remedial actions
- Expert witness/litigation support
- NPDES/CERCLA/RCRA strategic regulatory and permitting support
- Strategic technical reviews
Remedial Design

Developing designs to meet stakeholder needs

Geosyntec recognizes the environmental, engineering, and regulatory stakeholder intricacies associated with sediment remediation projects. Our first step is to work with our clients, technical personnel, and legal counsel to develop strategic goals and a conceptual remedial design that meets client objectives.

We have learned the importance of working with all stakeholders, including regulators, throughout development of the remedial design. This approach is important to ensure remedial goals are met and that they align with the financial status of the client during the timeline of the project execution. Similarly, it is important to educate the regulators during the design process on the remedial approaches that are being developed so that regulatory approval and acceptance is a smooth process. Our clients gain time- and cost-efficiencies through our stepwise approach through the remedial design phase. The key elements in developing a cost-effective remedial design include:

- **Understanding Site Characteristics** – We develop a robust characterization of the sediments to minimize the contaminated sediment volumes that need removal, capping, treatment, or cause disturbance to the natural habitat. Our scientists and engineers develop an in-depth understanding of the hydrology and hydraulics of the water bodies to select appropriate remedial methodologies that minimize resuspension, release, and residual contamination.

- **Detailed Design** – Clients receive full-service turnkey design services that integrate value engineering, quality assurance, and client review at each step of the process. Using collaborative internet-based technologies, we facilitate cost-effective reviews to streamline the client and regulatory approval process. For example, we have developed password-protected cloud-based data repositories that provide easy access for clients and regulators.

- **Plans and Specifications Preparation** – We have several sets of ‘standard’ design details, allowing us to quickly produce site-specific plans, specifications, and engineering cost estimates.

- **Design Constructability Reviews** – Our seasoned construction services group provides constructability input and reviews during the design process, providing a valuable practical perspective. We also consult with sediment remediation contractors to further substantiate our designs.

- **Monitoring and Closure Planning** – We put forth our best efforts to seamlessly integrate validation and monitoring into all stages of the remedial design. Through experience we know that upfront regulatory approval of monitoring and closure plans provides quicker regulatory closure and reduces the potential for costly long-term monitoring.

- **Cost Estimating** – Our staff prepare detailed cost estimates as part of the design process.
Permitting, Compliance, and Regulatory Support

Negotiating the best solution and most economical remedy for you

Geosyntec’s engineering and environmental permitting teams have in-depth knowledge of federal, state, and local environmental laws and regulations pertaining to contaminated sediment management. We work extensively with various regulatory agencies at the federal level including USEPA, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, and with permitting agencies at the state and local levels. We excel in keeping our clients’ facilities and sites in compliance with changing regulations, and anticipate shifts in policy which could affect compliance, business operations, or strategic new projects. We have been successful at limiting adverse permitting requirements for our clients and achieving favorable permit conditions through our proactive, scientific-based research and data collection; environmental documentation; innovative engineering; and one-on-one relationships with key decision-makers within the various agencies.

Geosyntec’s staff has thorough knowledge and understanding of the following federal and state permitting laws and regulations on contaminated sediment management:

- CWA Section 304 (water quality standards), Section 401 (water quality certification), and Section 404 (dredge and fill)
- Section 10 of the Rivers and Harbors Act
- Essential Fish Habitat Provisions of the Magnuson-Stevens Fisheries and Conservation Act
- Endangered Species Act (ESA) Section 7 Biological Assessments
- Marine Protection, Research, and Sanctuaries Act
- Fish and Wildlife Coordination Act
- NEPA and related state laws
- Section 106 of the National Historic Preservation Act

With detailed working knowledge and experience with the laws and regulations listed above, Geosyntec provides the following professional consulting services for our clients:

- CWA Section 10/404/401 permitting (maintenance dredging for fill-related projects)
- Federal and State agency consultation and negotiations
- Wetland delineation and jurisdictional determination support
- Protected species surveys
- Water quality sampling and analysis, aquatic chemistry, and biological surveys
- Stream, wetland, and salt marsh mitigation assessment, design, and permitting
- NPDES and Land Disturbing Activity (LDA) permit applications
GEOTECHNICAL SERVICES

- Sediment and sedimentation analyses
- Shoreline protection maintenance
- Upland confined disposal facility (CDF) dike stability condition and mudline surveys

Geotechnical Engineering

Stabilizing complex sediment sites

We apply our expertise in geotechnical engineering design as part of sediment monitoring, containment, and removal remedies at subaqueous and upland sites. Geosyntec has long been recognized as a leader in the field of soft soil geotechnical design. We have demonstrated experience in site characterization and developing sound engineering solutions for sites with extremely soft foundations. We have applied this expertise to the evaluation of sediment stability in the assessment of capping and dredging. For example, our work at Onondaga Lake in Syracuse, New York encompassed sediment stability analysis and the design of a sediment consolidation area to hold more than 2.5 million cubic yards of dredged lake sediment containing heavy metals and other contaminants. This design also resulted in significant cost savings.

Our geotechnical engineering professionals are engaged at difficult and challenging sites where the development of dependable, cost-effective foundations and other geotechnical solutions are critical to the success of the project. Our professionals have responded to the challenges of increasingly unfavorable site conditions, such as those typically found in dredge disposal and soft sludge disposal sites, by developing and applying sophisticated approaches to investigate and characterize sites; analyzing foundation behavior; altering the engineering characteristics of the soil and rock through soil improvement; and remediating sites.

Construction Services

Saving time and money

Geosyntec was the first company to offer construction quality assurance (CQA) services for environmental projects in the United States. We have provided construction management or construction oversight on more than 750 projects nationwide, maintaining our position of industry leadership by developing many of the methods, standards, and procedures in use today. Our primary construction service areas include the following:

- Construction management
- Construction oversight
- Resident engineering
- CQA

Our clients have saved time and money during construction projects through the efforts of our skilled and accomplished construction team. For example, on one project, when steel prices rose unexpectedly, we saved our client hundreds of thousands of dollars during construction by quickly re-engineering the design from a steel sheetpile cutoff wall to a geomembrane cutoff. On another project, inconsistencies in the construction documents prepared by others had resulted in several...
potential change orders; Geosyntec negotiated on behalf of our client to reduce the potential costs of the change order claims by 33%.

Litigation Support

Providing the legal community with reliable results

As a trusted technical resource to leading law firms throughout the United States, Geosyntec provides the specialized expertise necessary for lawyers to counsel their clients and advocate for client interests on a wide range of matters related to environmental management, compliance and enforcement, toxic tort, and general litigation matters. Our staff are valued members of litigation support teams due to our sensitivity to the legal process and our ability to develop strategies that respond to legal, public relations, and business concerns.

Law firms choose Geosyntec because of our comprehensive qualifications and capabilities to address the most challenging problems related to contaminated sediment management, including sediment assessment, remediation, and restoration of natural and man-made waterways, marshes, and wetland sites. Geosyntec works one-on-one to provide sediment-related strategic technical support to assess potential liabilities and cost allocation. We provide remedial investigations and feasibility studies that often include identifying possible contaminated sources, quantifying source contribution, and evaluating contribution assessments. Our practitioners are adept at quickly grasping the scope and implications of key issues and sharing sound, defensible, technical insight with clients.

Our testifying experts prepare Expert Reports and are available to testify both in deposition and at trial. They are familiar with the nuances of civil trials in both state and federal court. We understand that the communication, technical analyses, and supporting materials used in developing the testifying experts’ opinions are subject to discovery. Geosyntec technical experts may serve as technical consultants to counsel, rather than testifying experts, providing privileged and confidential technical analyses, strategy development, and work products for exclusive use by counsel; these materials are generally not considered discoverable. We maintain strict separation between communication and work produced by testifying experts (discoverable) and litigation consultants (confidential). Geosyntec is often retained prior to the filing of litigation as a confidential litigation consultant to help the plaintiff client develop a case or to assist the defendant client in preparing for the onset of litigation.

LEADING LAW FIRMS THROUGHOUT THE U.S. CONSIDER GEOSYNTEC A TRUSTED RESOURCE BASED ON THE TECHNICAL EXPERTISE AND REPUTATIONS OF OUR SENIOR PRACTITIONERS.
SECTION 4 | Experience
RI/FS at the Berry’s Creek Superfund Site
BERGEN COUNTY, NEW JERSEY

Geosyntec has performed comprehensive RI/FS services for the Berry’s Creek Study Area (BCSA), a sediment mega-site in the New Jersey Meadowlands, across the Hudson River from New York City. Berry’s Creek is a tidal tributary of the Hackensack River, and with its watershed, encompasses 12 square miles and 26 river and tributary miles. The site is impacted with organic and inorganic constituents (COPCs) arising from numerous point and non-point sources. Geosyntec has provided a broad range of services, including the following:

- program management for our own personnel and 40 subcontractors;
- leadership of varied field campaigns over eight years, encompassing more than 100 tasks addressing abiotic and biotic media characterization requirements;
- leadership of multiple site characterization and feasibility study reporting efforts;
- development, design, and implementation of multiple laboratory treatability and pilot studies addressing thin cover alternatives for impacted sediments; and
- agency interaction and client advocacy, including more than two dozen presentations to USEPA, New Jersey Department of Environmental Protection (NJDEP), and multiple resource trustees.

Geosyntec successfully developed and implemented numerous field efforts addressing challenging site conditions and data quality objectives. We safely negotiated a range of implementation challenges, including difficult site access over an expansive site in an urban estuary and a full range of field conditions, including hurricane-targeted sampling, winter events, and overnight monitoring. We developed and deployed customized sampling equipment and methods addressing a broad range of atypical surface water, pore water, sediment, and biota sampling requirements; we also negotiated streamlined approaches to data validation throughout the RI.

Working in a multi-consultant team, Geosyntec identified and developed several key demonstrations of the CSM of sediment transport and natural recovery. Tidally synchronized sampling events for marsh-waterway interaction demonstrated the stability of the Phragmites marshes and their benefit to the system
as a sequestering agent for COPCs. We implemented and continually refined methods of high-resolution sediment coring and geochronology using COPCs and multiple ambient radioisotope markers. The intensive data collection and analysis efforts further demonstrated the clear stability of the marshes and the variations in deposition and resuspension conditions in selected waterway segments. Additionally, we led several components of mercury geochemistry CSM development, including (i) high-resolution marsh cores to evaluate methylation/demethylation controlling factors, (ii) sequential extraction to characterize the relative mobility/bioavailability of mercury compartments, and (iii) voltammetric microelectrode studies to characterize mercury biotransformations. These studies helped the client group to target remedial actions and forecast the effects of potential alternatives on the mobility/bioavailability of mercury.

For the FS, Geosyntec deployed our in-house treatability testing laboratories to develop and implement novel tests of sediment amendment performance for mercury, methyl mercury, and PCBs. After testing several dozen amendment combinations and identifying the most promising solutions for the primary COPCs, Geosyntec performed engineering design, construction quality assurance, and performance monitoring for two years of successful field pilot testing of thin-cover solutions.

Geosyntec is currently leading a multi-consultant team in the writing of a Phase 1 source control FS, which will evaluate a range of cover and removal alternatives for select waterways and marshes.
Gowanus Canal Superfund Site

BROOKLYN, NEW YORK

Geosyntec is the prime technical consultant and Engineer of Record to conduct the remedial design, lead regulatory negotiations related to the design, and provide overall technical direction for this Superfund site located in a canal in a major urban center. The canal is a large sediment mega-site regulated by USEPA Region 2 under CERCLA with an existing Record of Decision (ROD).

The Superfund site is a man-made waterway almost 2 miles long; its construction dates back to the 1860s. The adjacent waterfront is primarily commercial and industrial, and includes concrete plants, warehouses, and parking lots. The site is near several current and planned residential neighborhoods. Multiple manufactured gas plants (MGPs) operated along the canal dating back to the 18th century, in addition to other legacy industrial operations. The canal also receives discharges from several combined sewer overflows from local stormwater and wastewater collection systems, and from a variety of permitted and non-permitted point sources.

Geosyntec’s role as the primary technical consultant and Project Coordinator for the Gowanus Canal Remedial Design Group (the Group) is in support of the overarching goal of establishing a remedial design that is constructible, sustainable, cost-effective, and permanent. Geosyntec’s services have encompassed the following:

• Refining the conceptual site model by compiling several data sources into a single integrated and comprehensive data visualization package;

• Developing and implementing more than 25 pre-design investigations including assessment of: groundwater to surface water discharge; NAPL mobility in the sediments; bulkhead structural integrity; capping treatability studies; geotechnical conditions; and debris management;

• Leading regulatory interactions on all technical and permitting matters;

• Providing project optimization and strategic technical direction for the Group under dynamic circumstances;

• Overseeing hydrodynamic and sediment transport model refinements;

• Performing detailed evaluation and design of remedial components that are described only conceptually in the ROD; and

• Scoping and planning for a holistic Pilot Study of the remedy to optimize overall remedial design.

Geosyntec provides excellent project management for the Group as Project Coordinator and developed or continues to develop:

• Master Project Schedule integrating pre-design field investigations and design elements in a fast-paced project;

• Real-time cost projections and spend curves for the anticipated lifetime of the project;

• Comprehensive Quality Assurance Project Plan (QAPP fully compliant with Uniform Federal Policy);

• Refined and expanded database integrating several data sources into a four-dimensional visualization of Non-Aqueous Phase Liquid (NAPL) and COPC distribution in distinct sediment layers; and

• Detailed evaluations and construction recommendations for the geotechnical stability of potentially impacted bulkheads and similar waterfront structures as part of source control requirements of the ROD.
Newtown Creek Superfund Site

BROOKLYN, NEW YORK

Geosyntec is providing professional engineering services, technical expertise, and creative strategies related to the Newtown Creek Superfund Site for which National Grid has been listed as a Potentially Responsible Party (PRP). This Superfund site is a large sediment mega-site, and is regulated by USEPA Region 2 under CERCLA. The Site is currently in the RI/FS stage of the CERCLA process, and Geosyntec serves as the primary technical consultant for National Grid, directly supporting their efforts as part of the larger PRP group in the development of field investigation programs, data analyses, data interpretation, and development of project and remedial strategies.

The site is almost four miles long and was one of the busiest hubs of industrial activity in the mid-1800s. More than 50 industrial facilities were located along its banks, including oil refineries, petrochemical plants, fertilizer and glue factories, sawmills, and lumber and coal yards. Numerous industrial facilities still operate along the creek. As a result of the extensive historical industrial activity along the creek, the site is currently considered one of the nation’s most polluted waterways.

Phase 1 and 2 field investigations have been completed, and the RI Report is currently under development. The RI report is expected to be submitted in late 2016. Major elements of the field efforts have included: surface water and sediment sampling, point source discharge sampling (storm sewers, combined sewers, and other discharges), groundwater sampling, sampling and toxicity testing of ecological resources such as fish and crab, and sampling in selected background areas outside of the site. The completed RI will identify the nature and extent of contamination throughout the site and the potential human and ecological risks posed by the COPCs. The FS will then evaluate reasonable remedial alternatives to address the identified risks. Geosyntec is National Grid’s technical representative on all aspects of both the Remedial Investigation and the FS.

Geosyntec is providing extensive technical review and analysis of existing datasets for the site. We are also evaluating approaches for optimizing future investigations to assure that essential information is collected in a cost-effective, efficient, and safe manner. The benefit of Geosyntec’s efforts on behalf of National Grid is expected to be the issuance of a comprehensive RI/FS that will be used by USEPA to prepare an ROD that incorporates a well-thought-out, constructible, sustainable, cost-effective, and permanent remedy for the site.
Activated Carbon Pilot Study Puget Sound Naval Shipyard

BREMERTON, WASHINGTON

The US Navy, funded through the Environmental Security Technology Certification Program (ESTCP), conducted a pilot study to evaluate the potential effectiveness of an innovative remedial technology at Pier 7 of the Puget Sound Naval Shipyard and Intermediate Maintenance Facility. The goals of the pilot were to determine the feasibility and effectiveness of activated carbon (AC) in reducing the bioavailability of PCBs in remediated contaminated sediment, and to document the long-term performance and stability of the AC remedy under active Navy pier conditions. AC amendments have the potential benefit of reducing the bioavailability of PCBs by actively sorbing contaminants from sediment, enabling a cost-effective remedy in conditions where capping or dredging may not be feasible.

Geosyntec staff participated in a multi-investigator demonstration of the remedial project. Staff evaluated changes in availability of PCBs in sediment via environmental chemistry modeling and measurement of PCBs in porewater using in situ Solid Phase Microextraction fibers, assessed ecological responses of benthic macroinvertebrate communities to reactive amendment addition, and monitored placement and stability of the activated carbon amendment. Geosyntec staff were key team members in the project, participating in the remedial design scoping, field monitoring, data analysis and reporting, and communication of the results; and presenting key aspects of the study at national scientific conferences. Annual project monitoring for 3 years after AC amendment has confirmed the successful stability, coverage, and penetration of the AC amendment, achievement of target rate increases in total organic and black carbon content in sediment, a 70-90% reduction in PCB availability as a result of the amendment, and no significant changes in the native benthic infaunal community (i.e., absence of ecological side effects).
Enhanced Natural Recovery/Activated Carbon Pilot Study Lower Duwamish Waterway

SEATTLE, WASHINGTON

The Lower Duwamish Waterway Group (LDWG) is conducting a pilot study to evaluate the potential effectiveness of an innovative remedial technology in the Lower Duwamish Waterway (LDW). The goals of the pilot are to determine whether enhanced natural recovery (ENR) amended with activated carbon (AC) can be successfully applied to reduce the bioavailability of PCBs in remediated contaminated sediment as compared to ENR without AC. The purpose of the ENR and ENR+AC treatments is to reduce the exposure of aquatic organisms to contaminants of concern, including PCBs. ENR+AC may have the potential added benefit of reducing the bioavailability of PCBs by actively sorbing contaminants from sediment. Both remedial treatment options offer many advantages over traditional sediment remedies such as dredging and capping, including cost-effectiveness, demonstrated risk reduction, sustainability, and logistical effectiveness.

Geosyntec staff have been working with LDWG, LDW stakeholders, and other team members to design and implement the pilot study. A key part of this work included the design of a monitoring study involving a variety of measurements to gauge the placement, resilience, and performance of the ENR and ENR+AC remedies over the 3-year monitoring period. As a part of the planned monitoring work, Geosyntec designed and configured innovative porewater passive samplers to achieve sensitive detection capabilities necessary to monitor low levels of PCBs in sediment and remedy layer porewater before and after remedy placement. Additionally, Geosyntec provided support in design of the remedy, evaluating the expected effectiveness of the selected design through advanced AC modeling and addressing potential ecological concerns associated with the ENR and ENR+AC materials. Technical deliverables have included presentations to USEPA and other stakeholders as well as monitoring and design documents. Geosyntec will continue to work with LDWG in planning and executing the monitoring programs, interpreting remedy performance data, and communicating results to stakeholders.

Geosyntec’s support in the remedy design and pilot study monitoring plan has helped the project to stay on track and address numerous challenging questions from USEPA and other stakeholders. Through advanced statistical power modeling, Geosyntec staff helped maintain optimal levels of sampling design to address pilot study questions without unnecessary oversampling. Using innovative fate modeling, Geosyntec staff also demonstrated optimal configurations for the AC treatment that will enable reductions of PCBs to be detected within the 3-year post-remedy study period, reducing uncertainty and potentially ineffective over-application of expensive AC treatments. Geosyntec staff also reconfigured a passive sampling deployment device to meet the challenging deployment environment, saving over $20,000 in equipment costs.
Onondaga Lake Sediment Remediation
SYRACUSE, NEW YORK

Geosyntec is providing technical expertise and creative strategies to support remediation of Onondaga Lake, a sediment mega-site in upstate New York. The selected remedy combines targeted dredging of more than 2.5 million cubic yards of sediment contaminated with heavy metals and organic contaminants, placement of dredge materials in a sediment consolidation area (SCA), thin layer isolation capping, and monitored natural recovery.

Geosyntec designed an innovative sealed sheet pile barrier wall, nearly 1.5 miles long, to cut off migration of contaminated groundwater from an upland site. The barrier wall is essential to limiting sediment recontamination after lake dredging and capping. Geosyntec’s extensive geotechnical analyses demonstrated the technical feasibility of constructing an SCA over the soft materials of a former Solvay wastebed. Geosyntec spearheaded stakeholder and regulatory discussions that ultimately allowed the SCA to be considered equivalent in status to a non-mixed waste landfill. This critical strategy eliminated the need for costly subgrade stabilization and gave more design flexibility, resulting in significant construction cost savings.

Geosyntec also conducted extensive biodegradation treatability testing to better understand the natural biodegradation of organic contaminants that will take place in the sediment and sediment cap. This information was critical in developing and substantiating the design of the reactive cap and MNA for the site.

Portland Harbor Superfund Site Studies
PORTLAND, OREGON

Portland Harbor is a 12-mile-long industrial stretch of the Willamette River that has been impacted by multiple sources of contamination from over 100 PRPs. Geosyntec is assessing potential CERCLA Superfund liabilities related to historical shipyard operations, with a focus on impacts to sediment, water quality, and ecological resources. Our work on this complex sediment mega-site has involved extensive site assessment and due diligence research of PRP historical operations to develop a predictor of potential liabilities and allocation of costs for the potential remediation. We are also assessing NRD issues in the Willamette River, working with legal counsel to evaluate the potential allocation of NRD liabilities and develop the technical case to negotiate with the Natural Resource Trustees. Geosyntec has been leading the evaluation and defensibility of the Habitat Equivalency Analysis and the Discount Service Acre-Year credit and debit calculations, as well as evaluation of Trustee-proposed restoration sites based on implementability, cost, scale, and long-term viability for species improvements.
SECTION 4 | Experience

Feasibility Evaluation of a Subaqueous Sediment Cap

PALOS VERDES PENINSULA, CALIFORNIA

As a result of Geosyntec’s risk assessment and the implementation of an alternative method of remediation, a joint defense group saved millions of dollars and met their goal of mitigating the impact of DDT- and PCB-contaminated ocean floor sediment. USEPA had proposed in situ capping of a 37-square-mile area of the sea floor, 130 to 170 feet deep, off Palos Verdes Peninsula in Southern California. The cap was to be placed by dumping dredged sand or crushed rock from hopper barges.

Geosyntec applied technical expertise and experience to evaluate the geotechnical feasibility of the capping remedy. Our scope of evaluations included slope stability, consolidation settlement, potential resuspension of impacted sediment, and seismically-induced sediment and cap liquefaction. We also analyzed geotechnical challenges that might occur during the placement process, including segregation of cap materials, bearing failure of the underlying sediment, turbidity flows, and squeezing of the sediment into the cap. Given the uncertainties associated with construction of the remedy and associated environmental impacts, Geosyntec recommended implementation of institutional controls, such as a prohibition on fishing in the area, together with monitored natural recovery. Our staff demonstrated to regulators that the more intensive and far more expensive capping method would do more damage than good to the DDT-impacted sediments, habitats, and surrounding natural communities. The Geosyntec-recommended approach was accepted and implemented.

PCB-Impacted Sediment Remediation

SAN DIEGO, CALIFORNIA

The stormwater conveyance system at a former manufacturing site was contaminated by PCB-impacted sediments. Geosyntec delineated the extent of contamination on the surface and within the system, and completely cleaned the system, including appropriate disposal of decontamination wastewater and solids. This remediation minimized the potential for mobilization of the sediments into the nearby bay. Our stormwater pollution prevention plan (SWPPP) included installation of best management practices (BMPs) and routine stormwater compliance sampling. Long-term monitoring of BMP performance indicated the BMPs performed as designed and were successful in preventing further migration of impacted sediments into the stormwater system.
Bolsa Chica Wetlands Restoration

HUNTINGTON BEACH, CALIFORNIA

Geosyntec provided total project solutions to support restoration of wetland ecosystems to the Bolsa Chica Lowlands, as well as the engineered systems needed to protect ongoing oil production infrastructure. The site encompasses 1,250 acres of degraded coastal wetland that has been affected by oil field activities for over 80 years. Geosyntec performed a wide range of investigation, technical evaluation and modeling, design, and construction services as part of the investigation and remediation phase, Geosyntec planned and implemented remediation of oil-impacted sediments across nearly 1,000 acres. There were more than 100 individual excavation sites, with excavation volumes of 100 to 10,000 cubic yards, and three excavation crews working simultaneously. Impacted materials consisted of crude oil, refined products, metals, and PCBs. Geosyntec oversaw and managed all operations, and developed a unique field database tool to centralize detailed tracking of volumes, progress, and other data. This tool allowed streamlined regulatory reviews; certain areas received closure within days of submitting the site documentation.

The wetlands restoration involved massive amounts of excavation and construction to establish a direct connection with the Pacific Ocean and build full tidal and muted tidal habitats. Geosyntec's detailed geotechnical and hydrogeological investigations supported the design of levees, tidal basins, culverts, and a 5,000-foot-long subsurface shallow groundwater barrier and saltwater intrusion control system to protect the existing neighborhood from restoration impacts. We provided construction CQA for nearly three million cubic yards of sediment excavation, construction of 4 miles of reinforced levees, 1.5 miles of Pacific Coast Highway realignment, and placement of 370,000 cubic yards of disposed sediments to build nesting habitats. Geosyntec planned and designed the operations to be extremely responsive to the needs of the client and other stakeholders in this high profile project. Significantly, oil production was able to continue during the sediment remediation, enabling the client to continue generating revenue. The nesting habitats were constructed over a core of disposed oil-impacted sediments, saving millions of dollars in off-site disposal costs.
Marsh Sediment Removal Action and Risk Assessment

BRUNSWICK, GEORGIA

One of the most complex CERCLA remediation projects in USEPA Region 4, the LCP Chemicals Site, is adjacent to an ecologically-sensitive estuarine marsh in coastal Georgia. Geosyntec applied technical expertise and advanced analytical methods to support a two-tiered sediment remedy. For a time-critical removal action in the 450-acre saltwater marsh, we used a mass removal efficiency approach to demonstrate that a far less costly sediment removal program (13 acres) than originally conceived would meet the short-term remedial objectives and quickly restore local fisheries. Next, Geosyntec’s baseline ecological risk assessment entailed geostatistical and other specialized analyses of data from 700 sampling locations. Area-weighted averaging was performed across five study domains defined by hydrologic boundaries to provide representative exposure point concentrations. Monte Carlo simulations and Selective Sequential Extraction analyses for mercury speciation were used to provide additional, more realistic inputs of contaminant loading and biological exposure. We provided support in negotiations with federal and state regulatory agencies, and it was ultimately agreed that a marsh monitoring program would be more appropriate than additional sediment removal in the estuary. The monitoring program, currently in its 13th year since the completion of removal activities, allowed the Georgia Department of Natural Resources to significantly relax fish consumption advisories.

Passive Bioremediation at Aberdeen Proving Ground

ABERDEEN, MARYLAND

Geosyntec partnered with the US Geological Survey to develop and install a new treatment technology to biodegrade solvents in high velocity groundwater seeps into tidal wetlands. The team worked collaboratively to devise a passive treatment system that could be installed with minimal disruption to the wetland and no maintenance requirements. The system, a thin mat bioaugmented with a dehalogenating microbial consortium, involved several technical innovations: development of the bioaugmentation culture; design and lab testing of the bioreactive mat matrix; invention of a solid state hydrogen detection device to measure environmentally significant concentrations of dissolved hydrogen; and modification of techniques to sample water within and below the mat. Geosyntec installed the first of its kind bioreactive mat system. Monitoring demonstrated contamination concentration reductions in excess of 99% and complete degradation of solvents. The reactive mat remained stable in the tidal wetland and proved to be exceptionally successful, continuing to remediate groundwater beyond the first year with no ongoing maintenance.
Ecological Risk from MTBE at a National Wildlife Refuge

SEAL BEACH NAVAL WEAPONS STATION, CALIFORNIA

Seal Beach National Wildlife Refuge is a 965-acre wetland and estuary habitat contained within the Naval Weapons Station. The Navy planned full-scale active remediation to clean up methyl tert-butyl ether (MTBE) compounds in groundwater and sediments. Geosyntec conducted a detailed ecological risk screening and concluded that there was no significant threat to the Refuge from the contaminants. We recommended a confirmation round of groundwater sampling to evaluate monitored natural attenuation (MNA) as the most feasible method to achieve regulatory goals for the site. This conclusion and recommendation were based on our thorough understanding of federal and state regulatory guidance, our own prior studies, and expertise in the use of MNA to remediate MTBE. Regulators agreed with Geosyntec’s evaluation, saving the Navy the significant cost ($300,000) of active remediation and preventing the Refuge from being disrupted. Geosyntec’s value engineered approach provided closure of the site within 2 years of our analysis.

Ecological Risk Assessment of Little Vermilion River

LASALLE, ILLINOIS

Several hundred thousand cubic yards of zinc slag material is present along the banks of and within the Little Vermilion River and is of interest in ongoing CERCLA activities related to a former zinc processing facility. Geosyntec conducted a biological assessment to evaluate potential adverse effects to the aquatic community in this segment of the river. Our bioassessment consisted of four major tasks: evaluation of aquatic habitats, fish community surveys, benthic macroinvertebrate surveys, and tissue analyses of aquatic organisms. The sampling and assessment were conducted in accordance with Illinois Department of Natural Resources and Illinois Environmental Protection Agency (IEPA) field collection and data analysis protocols. Geosyntec’s biological assessment firmly demonstrated that the biotic integrity of fish and macroinvertebrate communities is good and comparable to unaffected areas of the river, and provided a weight-of-evidence component to the ecological risk assessment. This risk assessment is a key component of an ongoing FS effort. The results of the risk assessment demonstrate that slag material in the river does not create an unacceptable risk to the environment; therefore river dredging is not necessary. Furthermore, the risk assessment is a central part of the argument that the mass of the slag pile along the banks of Little Vermilion does not need to be removed if stabilized and covered to prevent future surface erosion and stormwater runoff into the river. USEPA and IEPA agreed with this assessment. The Proposed Remedial Action Plan (PRAP) does not include costly sediment remediation. The remedial action is focused on upland activities to prevent future degradation of the river.
Sediment Removal at a Gas-Fired Energy Plant

PORT WASHINGTON, WISCONSIN

Geosyntec developed and implemented sediment removal plans for several critical path projects at the We Energies Port Washington power generating facility on the shore of Lake Michigan. For an intake and discharge tunnel removal project, the selected method was to isolate tunnel segments and dewater and solidify the sediment in place. We worked with the offsite disposal facility to develop an appropriate field solidification testing program to ensure that the solidified sediment met landfill acceptance criteria. This prevented the need for temporary on-site storage of the solidified material. For an emergency intake tunnel, the sediment was removed from the tunnel and mixed with a polymeric additive within geotubes to facilitate the dewatering and solidification process prior to offsite disposal. We assisted with the dredging permit, including evaluation of polymer toxicity/dosage and discharge water quality criteria. The sediment removal was critical to plant reconstruction activities and continued operations. Geosyntec worked with the client through several feasibility iterations to develop practical removal plans that caused the least disruption to plant operations and met the criteria of the Wisconsin Department of Natural Resources permits, the on-site water treatment facility, and disposal facilities. Our unique and creative approach to each sediment removal effort resulted in significantly reduced project time and cost.

Terry and Dupree Creek Sediment Remediation

BRUNSWICK, GEORGIA

Through detailed site investigation and close delineation of contamination, Geosyntec implemented a streamlined and effective sediment remediation program while safeguarding sensitive receptors along the creeks. The site includes four source areas, three dredge spoil disposal areas (the largest about 70 acres), and an outfall ditch, all impacted by toxaphene from years of nearby industrial discharge. Our removal action work plan included sediment excavation and dredging of 35,000 cubic yards, steel sheet pile to delineate and stabilize dredge areas, and sediment dewatering and stabilization for offsite disposal. Geosyntec prepared the bid package and provided construction management, construction quality assurance, and GIS data management services during removal operations. We developed customized sampling devices using vacuum extraction and a real-time, statistically driven tracker of removal goal attainment to guide construction decision-making. Geosyntec continues to provide biannual fish tissue sampling to monitor remedy effectiveness.
Pipeline Stream Stabilization Carolina Gas Transmission

AIKEN, SOUTH CAROLINA

Geosyntec assisted Carolina Gas Transmission (CGT) with Federal Energy Regulatory Commission (FERC) permitting and compliance, environmental permitting and agency consultations, and performed a geomorphic assessment and instability analysis for an 8-mile pipeline replacement. The work included ecological and wildlife surveys, a SWPPP, erosion control design and permitting, environmental inspection, stream stabilization design, and construction oversight. Geosyntec evaluated stream stabilization design alternatives for 155 linear feet of stream crossing within CGT’s pipeline easement for this active gas pipeline replacement project. The stream maintains a 5% gradient through the project area over disturbed cohesive and non-cohesive coastal plain soils, with sand as the primary sediment load in the system.

A geomorphic analysis included an evaluation of the dimension, pattern, and profile of the severely eroding stream and upstream reaches to characterize instability, channel evolution, and design hydrology. These data enabled development of a sustainable stabilization design for the channel that would protect the pipeline crossing, adjacent roadway, and nearby property from continued erosion. Vertical stability for stabilization design was addressed through the installation of two permanent constructed riffles and one boulder cascade. Lateral stability of the meandering channel was addressed through boulder toe protection on meander bends and a reinforced bank wrap along each bank to strengthen the soils and promote native vegetation establishment, which accommodates the shear stress produced by the high-gradient channel and promotes long-term sustainability.

Geosyntec maintained the client’s aggressive schedule and project budget. Notably, CGT and the FERC regulators have commended Geosyntec’s attention to detail in the design of this stream stabilization project, craftsmanship in the final product, ecological benefits, and aesthetics.

Hunter River Sediment Remediation

NEW SOUTH WALES, AUSTRALIA

Geosyntec staff performed engineering, environmental, and regulatory negotiation and permitting services for the Hunter River Sediment Remediation program on a site adjacent to the former BHP Billiton Newcastle Steel Mill. The project encompassed the dredging, treatment, and disposal of 1.5 million cubic yards of sediment, of which 960,000 cubic yards were contaminated with PAHs. The remedial design had five major elements: mechanical dredging using environmental clamshell buckets; landside development for offloading, dewatering, storage, and handling; sediment treatment with cement to stabilize and solidify the PAHs; transport of treated sediments for nearby offsite disposal; and landfill design. The process design included installation of sheet pile walls to stabilize the river bank and prevent contaminant migration to the river.
Hydrodynamic, Sediment, and Fate and Transport Modeling Litigation Support

KALAMAZOO RIVER, MICHIGAN

A confidential client sought expert litigation support and potential expert witness testimony for a cost recovery trial relating to current and future cleanup costs along the Kalamazoo River, specifically Operable Unit 5 of the Allied Paper/Portage Creek/Kalamazoo River CERLCA site. The client was interested in better understanding the fate and transport of PCBs from their facility along the Kalamazoo River system during a limited discharge time period. In addition the client needed expert technical support to review numerical modeling (Delft3D) and other analyses conducted by other parties in the case, who were also evaluating the fate and transport of PCBs along the river.

Geosyntec developed a two-dimensional hydrodynamic, sediment transport and PCB fate and transport model of Portage Creek. The model, developed using the Environmental Fluid Dynamics Code (EFDC) framework, was calibrated and validated against flow, water level, velocity, total suspended solids, and PCB data, and then utilized to predict the fate of PCB releases occurring from the 1950s to 1970s. Geosyntec also developed a hydrology model of the Kalamazoo River Basin and analyzed bank erosion (in particular, from former impoundments upon the drawdown of three dams). Model assumptions, development and results were documented in a suite of expert reports that were submitted to the judge for consideration. Geosyntec also conducted technical reviews of modeling work conducted by other parties, including a detailed review of the model documentation as well as focused reviews of the model input and output files.
Site Investigation, Feasibility Study, and Sediment Remediation

MILLVILLE, NEW JERSEY

This 48-acre site has a long history of industrial use, primarily for glass manufacturing. Alcan was identified as the responsible party for conducting the remediation of the property under the New Jersey Department of Environmental Protection Industrial Site Recovery Act and is engaged in environmental investigation/remediation at this site. Geosyntec’s specific role on the project was to assist Alcan in addressing the remediation of the Ada Pond system. This system is a 2.9-acre pond with three smaller connected ponds. The system received non-contact cooling water and stormwater runoff and also served as a source of water for fire protection.

Geosyntec completed investigation activities within the Ada Pond system. This included sampling and analysis of surface water, sediments, and stormwater. Two distinct layers of geologic material (Stratum 1 and Stratum 2) were identified beneath Ada Pond. Stratum 1 consisted of fine-grained deposits containing elevated levels of extractable petroleum hydrocarbons (EPH), PAHs, PCBs, and metals. Stratum 2 consisted of native sand with elevated concentrations of EPH, PAHs, PCBs, and metals in isolated areas. Geosyntec completed a remedy alternatives evaluation, and Alcan selected a remedy for implementation in Ada Pond that involved the removal of all of Stratum 1 and areas identified as “hot spots” in Stratum 2 followed by placement of a 6-inch thick sand cap. Geosyntec prepared a combined Remedial Investigation Report/Remedial Action Work Plan, identifying five remedial alternatives including a low cost bioremediation solution. Dewatering tests and treatability testing were also conducted to evaluate possible dewatering approaches to be used during the dredging operation as well as stabilization requirements for disposal. Staff prepared design and bid documents to be used for contractor selection.
Hydrodynamic, Sediment, Fate and Transport, and Food Web Model Litigation Support

LOWER FOX RIVER, WISCONSIN

A confidential client sought analysis of the scientific viability of the remediation alternatives selected for PCBs for this CERLCA site. As part of the evaluation of a potential remedy challenge, the client sought an independent review of the one-dimensional hydrodynamic, sediment transport, and PCB fate and transport models; the underlying assumptions; and how the models were used in determining the selected remedial alternative, given more recent information and understanding of how the original work was conducted. A second phase of work was conducted to review a three-dimensional hydrodynamic, sediment transport, and PCB fate and transport model developed using the Environmental Fluids Dynamic Code (EFDC) framework for apportionment models commissioned by one of the potentially responsible parties.

Geosyntec conducted a detailed review of the model used in developing remedial action alternatives, and the model used in apportionment analyses, their formulation, the analyses to support the model development modeling assumptions, model documentation, the various remedial alternatives evaluated by the agencies, and the assumptions used. Analogous analyses were conducted related to food web modeling for the remedial action alternatives. Geosyntec’s model review included review of the model documentation, model re-creation, sensitivity analyses, and a detailed review of source code (for the remedial alternatives model only), model input and output files, and post-processing and pre-processing codes.

The Geosyntec team developed draft opinions and provided strategic regulatory support to the client for potential negotiations with the state and federal regulatory authorities. In a second phase of work, Geosyntec provided expert testimony in the form of deposition and trial testimony. Geosyntec provided a robust and detailed expert review of hydrodynamic, sediment transport, and fate and transport models focused on PCBs in the water column and sediments, and food web modeling. The review resulted in concise expert information to guide the client in the process of assessing remedial alternatives.
Sediment Investigation and Remedial Action Implementation

SOUTHERN CALIFORNIA

This project involved the assessment and remediation of marine sediment adjacent to a storm drain outfall which historically drained an aeronautical manufacturing site. Following completion of upland remediation activities, PCB impacts were identified in near-shore sediments adjacent to a former storm drain outfall. The project objective was to define the extent of these impacts and to design, permit, and implement a cost-effective remedial action to address the residual impacts.

Following an extensive storm drain clean out and disconnection from potential upgradient sources, the extent of PCB impacts at the storm drain outfall was identified across a one-acre area in the adjacent embayment. Through cooperative negotiation with the Regional Water Quality Control Board (RWQCB), an enhanced monitored natural recovery (EMNR) remedy was established as the preferred remedial alternative. The remedy involved limited excavation over a 30-foot by 80-foot area adjacent to the shoreline and placement of 6 inches of sand cover mixed with an activated carbon layer to reduce potential bioaccumulation from residual PCB impacts. This combination of clean sand and activated carbon in the upper 6 inches of sediment will reduce total PCB concentrations and bioavailability of PCBs to benthic invertebrates. Geosyntec’s related scope included development of bench-scale treatability testing to demonstrate the ability of activated carbon to reduce PCB bioavailability, benthic community evaluation, regulatory negotiation, and EMNR design, permitting, and implementation.

Through extensive negotiation with the RWQCB, a focused investigation was approved to evaluate the lateral extent of contaminant impacts. Using these data, the RWQCB concurred that our client’s area of impact did not overlap with those of other parties and could be handled separately from the larger investigation of the embayment. The proposed EMNR remedy and the streamlined investigation process developed a new and quicker path to closure for managing sediment sites in San Diego Bay. Bench-scale pilot studies demonstrated a 98% reduction in PCB bioavailability with application of a 3% activated carbon amendment to the sand layer. The RWQCB concurred that the reduction of bioavailability could be factored into the evaluation of the final remedy, setting a final remediation goal of achieving an “equivalent bioavailable PCB concentration” equal to or below the regional PCB background concentrations in the bay.
Sweetwater Marsh Sediment Streamlined Risk Evaluation San Diego Bay National Wildlife Refuge

CHULA VISTA, CALIFORNIA

The Sweetwater Marsh Unit of the San Diego Bay National Wildlife Refuge managed by US Fish & Wildlife Service, is a 135-acre wetland and uplands area impacted with several chemicals, primarily metals, associated with circa-1900 burn ash and landfill wastes. The objectives for the site were to assess and restore areas physically and chemically impacted by burn ash and associated chemicals, while preserving available terrestrial and aquatic habitat, home to several Special-Status Wildlife Species.

Geosyntec conducted a Streamlined Risk Evaluation (SRE) to identify the needs and scope of remediation at Sweetwater Marsh. We conducted several rounds of chemical sampling at the site, including advanced geochemical sampling (e.g., SEM-AVS) to understand the availability of metals associated with burn ash and nearby aquatic sediment. We also evaluated several years of US Fish & Wildlife Service sediment, bioaccumulation, and ecological data to aid in the SRE. Multiple lines of chemical, biological, and physical evidence were incorporated into the site-specific SRE to identify sediment-associated ecological and human health risks. Additionally, Geosyntec derived spatially- and site-specific risk-based remedial goals to provide strategic guidance in balancing risk of remedy with existing wetlands and uplands ecological resources. Geosyntec designed a remedial approach that targeted areas of potentially unacceptable chemical risks.

The SEM-AVS analysis enabled a better understanding of metal availability in sediment, demonstrating that burn-ash associated metals in sediment were mineralized and unavailable for uptake by biological receptors. This evaluation provided confidence that many areas of the site did not require remediation, despite the presence of concentrations of metals that were above sediment screening levels and geological background ranges. Spatially-explicit risk assessment techniques also streamlined the remedial footprint derivation process and resulted in a remedy approach that more accurately protects risk on a site-wide basis, while minimizing impacts to valuable natural resources and sensitive habitat areas that did not present chemical risks.
Houston Ship Channel Remedial Design

GREENS BAYOU, HOUSTON, TEXAS

Greens Bayou, a part of the Houston Ship Channel system, and its tributaries have been contaminated through decades of industrial discharge. Geosyntec initially evaluated the site conditions and dynamics of this complex system. Our comprehensive data review employed advanced geostatistics, environmental chemistry and forensics, and data visualization techniques to construct a GIS. We then created a detailed CSM to characterize soil, sediment, and groundwater conditions, and describe site-specific mechanisms for sediment transport and contaminant transport via groundwater and stormwater runoff. We also conducted extensive geotechnical analyses related to planned remedial dredging of the bayou to evaluate the stability of waterfront structures and a dredge spoil disposal area during and after dredging. Using the CSM, Geosyntec developed practical soil, sediment, and groundwater remediation plans focused on preventing recontamination of the bayou after dredging. Methods included excavation and containment of impacted upland soils, hydraulic containment cutoff walls, groundwater extraction and treatment, and sediment excavation and capping. Our remedial design became part of a court-ordered remedy to restore water quality in the bayou, remediate contaminated sediment, and prevent recontamination of sediment by groundwater.

Solutions for Navigation and Dredged Material Management

ELBA ISLAND, SAVANNAH HARBOR, GEORGIA

At the Southern Liquid Natural Gas terminal at Elba Island, Geosyntec designed a ship turning basin that involved dredging four million cubic yards of material and placement of 4,500 linear feet of shore protection to control erosion. We also designed subgrade improvement measures for relocation of a dike over soft marsh and dredge spoils. The basin enables natural gas ships to turn adjacent to their own docks, eliminating the need to go farther into the busy Savannah Harbor. Geosyntec also developed an innovative long-term dredged material management plan, a critical issue for continued operation of the terminal. The plan incorporated dredging quantities based on river sedimentation studies, modeling of the desiccation and consolidation of the dredged sediment, measures to promote dewatering, and a schedule of periodic dike raisings using in-place dredged sediments as fill material. This plan optimizes storage capacity and design life of the confined disposal facility, providing capacity for the next 30 years of operation, and resulted in significant ongoing operational cost savings.
### Representative Projects

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<td>Onondaga Lake Superfund Site Syracuse, New York</td>
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<td>Portland Harbor Superfund Site Portland, Oregon</td>
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<td>Terry and Dupree Creek Brunswick, Georgia</td>
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<td>Houston Ship Channel Greens Bayou, Houston, Texas</td>
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<td>Bolsa Chica Wetlands Huntington Beach, California</td>
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Howard Cumberland

CONTAMINATED SEDIMENT MANAGEMENT, REMEDIAL DESIGN, PRP/LITIGATION STRATEGIC SUPPORT

Howard Cumberland is a Marine Scientist with more than 25 years of experience focused on remedial strategies for clients as well as developing and implementing remedial investigation, design, and restoration solutions associated with contaminated sediments and waterfront development activities.

Howard routinely works with senior management and legal counsel on strategic planning during negotiations with regulatory agencies and negotiations among PRPs with divergent interests. Focusing on waterfront properties, Howard provides strategic consulting services to owners and tenants for the evaluation, design, and permitting of near shore, in-water activities such as contaminated sediment investigation and remediation, maintenance dredging planning, and permitting for waterfront redevelopment. He has in-depth training and experience related to the ecological impacts associated with contaminated sediments and surface waters. He also has familiarity and experience with numerous state and federal regulatory programs that govern dredged material and contaminated sediments projects. During his career, Howard has managed, designed, permitted, and implemented remedial investigations, feasibility studies, removal actions, remedial and post-removal actions, and remedial action monitoring for a variety of industrial, port, and public sector clients working under federal and state regulatory programs. He has successfully completed projects across the United States, and in Mexico, Guam, and Australia.

Christopher Greene, PE

GEOENVIRONMENTAL ENGINEERING AND SEDIMENT REMEDIATION

Chris Greene is a Senior Project Manager with 18 years of experience in investigation, design, and construction for Fortune 500 companies, Army Corp of Engineers, and PRP Groups within the CERCLA program. His focus is on developing innovative remediation solutions for complex projects.

Chris’ experience includes managing, designing, and constructing major remediation projects. His experience includes all project phases of hazardous waste sites, excavations, sediments, landfills, groundwater collection trenches, caps, cut-off walls, and bioremediation. He also has experience with a variety of contract types including firm fixed price, lump sum, unit price, and cost reimbursable.

As the Project Manager/Technical Director for one of the PRP members on the Berry’s Creek Study Area (BCSA) Superfund Site in New Jersey, he was responsible for technical support and strategic planning. Chris led a team that designed and implemented pilot studies in tidal marshes to evaluate in situ treatments (e.g., activated carbon) for PCBs, methyl-mercury, and mercury.

Chris was the Project Manager for the Fisherville Mill Site Sediment Remediation project for the MADEP in Grafton, Massachusetts. He was responsible for environmental investigations, design, and construction oversight for the remediation of PCB- and petroleum-impacted soils and sediments in the Blackstone Canal. He was also responsible for the evaluation of sediment remediation options with cost estimates for various options and permitting to implement the remedial tasks. The final remedy included removal of approximately 2,000 cubic yards of sediment using vacuum excavation and long reach excavators.
Tom Krug, PEng
CHEMICAL AND ENVIRONMENTAL ENGINEERING, BIOLOGICAL AND GEOCHEMICAL PROCESSES

Tom Krug evaluates natural and enhanced biological and geochemical processes to develop in situ approaches to reduce risks associated with contaminants in sediment and other media.

Tom has over 30 years of experience in the evaluation, engineering design, and implementation of processes for treatment of contaminated groundwater, surface water, soil, and sediment. He has directed and been the subject matter expert on multiple sediment remediation projects, evaluating natural and enhanced biodegradation processes and the use of amendments to sequester contaminants in reactive caps. This work has included evaluating the impact of biogeochemical conditions on the biodegradation of chlorobenzenes, PAH, and other hydrocarbons; and amendments on sequestration and/or biodegradation processes for PAH, PCBs, dioxins, mercury, and other contaminants. Mr. Krug has also evaluated the impact of geochemical conditions and biological processes on the methylation of mercury sediments. He works closely with our SIREM Laboratory to develop and implement treatability testing to provide site-specific data to support natural and enhanced attenuation process for sediment sites.

Tom also has extensive experience with in situ treatment of groundwater to control the potential migration of chemicals moving from groundwater to sediment.

Gregory M. Gibbons, PE
ENVIRONMENTAL ENGINEERING, REMEDIAL ENGINEERING, FEASIBILITY STUDIES, PROJECT MANAGEMENT

Greg Gibbons is a Principal Engineer with more than 35 years of environmental consulting experience in engineering studies and design. He focuses on the investigation and remediation of sediment sites with project experience in the Great Lakes and Northeast Regions.

His work has included investigations, feasibility studies, and remedial design for sediment sites including Onondaga Lake in upstate New York and the Berry’s Creek Study Area in the New Jersey Meadowlands. He has also provided project management and engineering-during-implementation services for the remediation effort in the Upper Midwest under a Great Lakes Legacy Act cost-share program project. His assessment and feasibility study work focuses on finding cost-effective solutions to mitigate risk in sediment and upland sites. This has included developing assessments that have demonstrated that residual impacts do not pose an aquatic risk precluding the need to remediate sediments in two separate CERCLA sites within USEPA Region 5, saving his clients millions of dollars.

Greg’s technical experience includes dredging, capping, and active capping remedial approaches. His project experience has included on-the-water dredging and capping efforts and onshore sediment processing and disposal and dredge water treatment. He also has extensive experience in regulatory agency and stakeholder group liaison and litigation support. Greg serves as a company-wide resource on sediment projects and was a founding member of Geosyntec’s Sediment Action Group.
Darrell Nicholas, PE  
SEDIMENT INVESTIGATION, REMEDIAL DESIGN, REMEDIAL ACTION

Darrell Nicholas is a Civil Engineer with more than 35 years of experience in engineering design, construction management, and quality assurance for a wide range of complex, multiple stakeholder projects.

Darrell has performed as a lead technical manager for more than $3 billion worth of projects during his career, including those for private industry clients, local and state governments, and federal agencies including the U.S. Environmental Protection Agency, U.S. Department of Energy, and U.S. Department of Defense. His experience spans the project life cycle from project planning, conceptual design, and cost estimating to detailed design, field inspection, construction quality assurance, and compliance monitoring. Applying his problem-solving skills and knowledge of mechanical and hydraulic dredging technology, he has supported remediation of more than 2 million cubic yards of contaminated sediment during his career.

Darrell has played a lead role in the design and management of some of the largest, most complex sediment remediation projects completed in the United States and overseas. This experience includes his role as the design manager for the BHP Billiton Hunter River Sediment Remediation Project in Newcastle, Australia, one of the largest sediment remediation projects in the world. Darrell is known for moving CERCLA sediment projects from remedial design to successfully implemented remedial action. Many of the projects where he played a leading role have earned national and international awards. The Hunter River Sediment Remediation Project won a United Nations award for environmental remediation, and the Sheboygan River Remediation Project directed by Mr. Nicholas won the 2013 Engineering News Record Midwest Region Award for Best Environmental/Water Resources project.

SPECIALTIES
- Multimedia Site Characterization and Remediation
- Sediment Management
- Environmental Chemistry and Forensics
- Litigation Support

EDUCATION
- Ph.D., Civil & Environmental Engineering, UCLA, 1997
- M.S., Chemical Engineering, UCLA, 1994
- B.S., Biomedical Engineering, Northwestern University, 1991
- B.S., Chemical Engineering, Northwestern University, 1991

Jen Wilkie, PhD, PE  
CONTAMINATED SEDIMENT INVESTIGATION AND MANAGEMENT

Jen Wilkie is a Principal Engineer with more than 20 years of experience in environmental research and consulting focused on providing multidisciplinary services and support to clients.

Jen’s practice spans a wide range of disciplines including site characterization and the remediation of sediment, soil, groundwater, surface water, and air; sediment management; environmental chemistry and forensics; and litigation support. Jennifer has supported industrial, federal, and private clients at sites ranging in size from small commercial facilities to large Superfund sites, helping her clients effectively navigate the regulatory frameworks of CERCLA, RCRA, and state cleanup programs.

Over her career, Jen has successfully managed, designed, and/or implemented remedial investigations, feasibility studies, and removal/remedial actions at a number of large sediment sites including the Lower Passaic River, Kalamazoo River, Gowanus Canal, San Francisco Bay, Upper Trenton Channel, and Chicago River.

Jen has demonstrated a talent for communication to both technical and non-technical audiences. These characteristics, coupled with her broad engineering background, have enabled her to successfully support her clients in a variety of environmental litigation matters. Jennifer has provided expert witness testimony in deposition and trial and has been tendered as an expert witness in state and federal courts.

SPECIALTIES
- Contaminated Sediments
- Hazardous and Mixed Waste Remediation
- Mining and Reclamation
- Stormwater and Erosion Control
- Water and Wastewater Treatment
- Water Resources

EDUCATION
- M.S., Civil Engineering, University of Kentucky, 1979
- B.S., Civil Engineering, Tennessee Technological University, 1978
Pete de Haven, PE

**SITE ASSESSMENT AND REMEDIATION, HYDROGEOLOGY, ENVIRONMENTAL AND GEOTECHNICAL DATA MANAGEMENT**

Pete de Haven is a Senior Principal based in North Carolina with 20 years of experience focused on site characterization, data analysis, and conceptual and final remedial design. His work has encompassed multidisciplinary activities and client and regulatory interaction through long-term client-site assignments, synthesis of disparate investigative methods, strategic planning, and communication to technical and non-technical project stakeholders.

Pete addresses investigative and remedial administrative orders under CERCLA and other regulatory frameworks. He has planned, managed, and executed field tasks covering a broad range of surface, subsurface, and waterway investigations and remedial pilot testing. His work includes the development and leadership of sediment characterization investigations in estuarine, riverine, and lacustrine settings. He has performed biotic and abiotic media assessment, sediment geochronology and natural recovery assessments, geochemical assessments, and conceptual site model development using geographic information systems and relational databases.

Pete is a registered Civil Engineer and is the author of several conference and poster presentations on the use of wetland hydrology assessments, sediment characterization and geochronology, GIS and databases, optimized characterization programs, and geostatistical evaluations.

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J.F. Beech, PhD, PE

**SEDIMENT REMEDIATION, GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, WASTE CONTAINMENT**

Jay Beech is a Senior Consultant with over 35 years of experience in geotechnical engineering, waste containment, civil site design, and sediment remediation. He routinely works on large projects, taking them from conception through construction.

Jay’s geotechnical engineering expertise includes design of containment systems, retaining structures, structures on soft soils, and foundation improvement. Throughout his career he has interfaced with various state and federal regulatory agencies to demonstrate the technical viability of proposed remedies. Jay also has experience with the design and construction of Low Level Radioactive Waste (LLW) disposal facilities, which provides him with good insight into the associated long-term performance requirements.

Jay has been involved in sediment projects in coastal marshes, large inland lakes, and man-made waterways. Elements of these projects have included construction over soft sediments, marsh removal and restoration design using geotextile tube containment systems, sediment management and disposal, sheet pile walls, dredge and cap stability, debris removal, sediment processing, and dredge water treatment.
Dave Himmelheber, PhD, PE
AQUATIC BIOGEOCHEMISTRY

Dave Himmelheber is a Senior Engineer with 15 years of contaminated sediment experience focused on site investigations and remedial design for complex, multiple stakeholder projects.

Dave’s experience has included leading complicated site investigations and managing complex remedial design projects. His PhD work focusing on biogeochemistry and contaminant fate in capped sediments has been directly applied to several project sites including modeling of contaminant fate and transport within caps and evaluations of mercury fate following cap placement. He has been actively involved in the development of Geosyntec’s treatability study services and development of passive sampling tools.

Dave has been actively engaged in the Berry’s Creek Study Area RI/FS in New Jersey, including managing RI field sampling programs, designing and managing treatability study and pilot study efforts, and managing pore water evaluations. Key contributions include the development of a mercury fate and transport CSM, assessment of redox conditions via voltammetry, design and execution of thin-layer capping pilot studies evaluating active caps, and FS screening of remedial technologies. Dave has been extensively involved in the management and technical design for the remediation of the Gowanus Canal in Brooklyn, NY. He has overseen the development, implementation, and reporting of several pre-design field investigations and has been the technical lead for the cap design while balancing the dynamic nature of the project schedule and regulatory interactions. Dave excels at providing top-level technical expertise combined with sensible project management skills for clients with complicated sites subject to many challenges.

Jim Brinkman, PE
SEDIMENT MANAGEMENT

Jim Brinkman’s extensive experience in leading large, complex sediment remediation projects includes both domestic and international projects and spans all phases of design and construction.

Jim has developed project strategies, conducted bench- to-full scale evaluations, evaluated remedial alternatives, and performed conceptual design. He has also developed detailed design plans and specifications, estimated construction costs, and conducted scheduling, procurement, and program management. He has specific technical expertise in dredging, dewatering, stabilization, material handling, capping, and water treatment.

Jim’s specific sediment-related experience includes managing the dredging works and sheet pile removal for the $800 million Hunter River Remediation Project in Newcastle, Australia, one of the largest projects of its kind in the world. His efforts on the Hunter River Remediation Project contributed to earning the project the 2012 Australian National Engineering Excellence Award.

He also served as the Engineer of Record on a time-critical removal action on the Lower Passaic River in New Jersey, where 16,000 cubic yards of sediment contaminated with dioxin, PCBs, and mercury were dredged and a reactive cap was subsequently placed.

Jim’s additional sediment-related experience includes the New Bedford Harbor Superfund Project in Massachusetts and the Fox River Project in Wisconsin. He regularly presents at U.S. and international sediment-related conferences.
Robert Annear, PhD, PE
WATER QUALITY MODELING, FATE AND TRANSPORT AND HYDROLOGY

Robert Annear is a Principal with extensive water quality modeling experience. He has over 18 years of experience focused on the development and calibration of water quality models throughout the U.S.

As a Water Resources Engineer, Robert is principally involved in hydrodynamic and water quality modeling with a focus on regulatory permits and requirements; surface water system assessments; Total Maximum Daily Loads development and implementation; Endangered Species Act (ESA), CERCLA, RCRA, and NRDA studies; FERC relicensing of hydropower facilities; and water quality management for water supply and recreational uses. He has over 18 years of experience in the development and calibration of hydrodynamic and water quality models (1-D, 2-D, and 3-D).

Robert has been involved in several CERCLA projects involving groundwater, surface water, sediment transport, and fate and transport processes. His experience includes reviewing 1-D, 2-D, and 3-D hydrodynamic and sediment transport and fate and transport models of riverine and estuarine systems. He is also experienced in developing hydrodynamic and petroleum spill models for NRDA assessments.

Jason Conder, PhD
AQUATIC TOXICOLOGY AND CHEMISTRY, RISK ASSESSMENT, CONTAMINATED SEDIMENT MANAGEMENT

Jason Conder has more than 12 years of research and consulting experience in sediment assessment and management, environmental toxicology, ecological and human health risk assessment, bioaccumulation and bioavailability of environmental contaminants, environmental chemistry, passive sampling and advanced environmental monitoring technology, ecology, and statistics.

Jason has provided technical expertise in sediment assessment and management and risk assessment to multinational clients, addressing environmental liability and risk issues associated with contaminated sites including several large, multi-stakeholder contaminated sediment sites in North America, Europe, and Asia. As a part of these efforts, Jason led large-scale sediment investigations, conducted risk assessments, evaluated data and performed a variety of fate modeling, evaluated remedial designs and conducted remedial feasibility studies, and designed and executed risk-based monitoring for remediated sites. Jason has also conducted a variety of evaluations to document and understand allocation issues for multi-party contaminated sediment sites, including historical evaluations, fate modeling, risk- and remediation-based apportionment approaches, and chemical forensics. He has published more than 20 peer-reviewed articles on environmental toxicology and chemistry, presented technical work at numerous international scientific conferences, served on and co-chaired several technical workshops, and served as an expert witness on matters related to contaminated sediment sites.
Robert Veenstra
ENVIRONMENTAL ENGINEERING, ENVIRONMENTAL SCIENCES

Bob Veenstra has served as the Project Manager for a variety of sediment investigation and remediation projects, addressing sediments impacted with dioxins, PAHs, PCBs, and chlorinated organics. These projects have involved sediments located in large waste lagoons, small tributary creeks, mid-sized streams, and large rivers, including the Columbia and Mississippi Rivers.

Bob was Project Manager for the pilot testing, design, construction, and start-up of a materials removal and handling plant to dredge, dewater, and dry 650,000 cubic yards of dioxin-contaminated sediments from a series of industrial wastewater treatment ponds.

At an MGP site, Bob served as the Project Manager for a sediment removal and bank stabilization project under CERCLA. MGP wastes were identified in the sediments of an urban creek adjacent to a historical MGP waste disposal area. As part of the remedial action, all flow in the creek was diverted through temporary piping around the remediation area, allowing the removal of waste material and impacted sediments in the creek bed.

Bob is currently Project Manager for strategic direction and technical review/analysis support to one of five major PRPs on the Newtown Creek Superfund Site in Brooklyn, NY. The study area consists of a 4-mile-long waterway with a history of over 100 years of heavy industrial activity and manufacturing, resulting in up to 20 feet of impacted sediment. Bob manages multiple teams of experts assessing sampling methodologies, data analysis, data interpretation/visualization, geochemistry and forensic analyses, hydrodynamic and sediment transport modeling, and litigation support.

Keith Kroeger
AQUATIC TOXICOLOGY

Keith Kroeger is an Aquatic Toxicologist, specializing in evaluating the ecological impacts posed by contaminated sediments. The majority of his 17 years of experience has centered on ports and harbors. He performs water quality, and ecological studies related to contaminated and maintenance dredged sediment, designs, source control for stormwater discharges, and manages environmental permitting of waterfront development projects.

Keith is knowledgeable and thoroughly familiar with regulatory and analytical requirements associated with the dredging of contaminated sediments, such as those administered by the U.S. Army Corps of Engineers, USEPA (including CERCLA and NEPA projects), and various state and local programs. His regulatory knowledge has assisted clients with strategic planning in response to state-mandated cleanup actions at waterfront properties.

Specific recent experience includes technical support to assist legal counsel in preparation of environmental documentation for upcoming Portland Harbor Superfund Site allocation proceedings and evaluation of potential environmental liabilities related to two upland properties and historic impacts to the Willamette River. For the U.S. Navy, Keith has served as project manager for Tier 1 and Tier 2 Ecological Risk Assessment and Supplemental Remedial Investigations at the Jackson Park Housing Complex, Operable Unit OU2 in Bremerton, Washington. He also has extensive experience with the Port of Portland and USACE Portland District projects throughout Oregon, Washington, and Idaho.
## Practitioners

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<th>Practitioners</th>
<th>Site Characterization and Assessment</th>
<th>Feasibility/Treatability and Pilot Studies</th>
<th>Remedial Design</th>
<th>Hydrodynamic and Sediment Chemical Transport Modeling</th>
<th>Risk Assessment and Natural Resource Damages</th>
<th>Biological Assessment and Monitoring</th>
<th>Geotechnical Engineering</th>
<th>Construction Services</th>
<th>Permitting and Regulatory Support</th>
<th>Litigation Support</th>
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Geosyntec Consultants is a leading consulting and engineering firm that operates throughout North America, Asia, Australia, and Europe. We address new ventures and complex challenges involving our environment, natural resources, and civil infrastructure through high-value services, first-to-field deployment of emerging technologies, and innovative solutions for our private and public clients.

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Sediment Assessment and Remediation