environmental science and engineering services

statement of qualifications

Municipal Research and Services Center (MRSC) of Washington
August 2011





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August 2, 2011

Re: MRSC Consultant Services Roster

To Interested Public Agencies:

Windward appreciates your interest in learning more about our firm's qualifications. Founded in 2000, Windward is a Seattle-based environmental science and engineering consulting firm that specializes in environmental and engineering consulting services for clients in the regulated community. Core services provided by Windward's 45-person staff include contaminated sediment assessment and management; site characterization, remediation analysis, and source control; stormwater and surface water planning and management; habitat restoration; risk assessment; natural resource damage assessment; sampling programs and field surveys; regulatory compliance support; and geographic information system analysis, data management, and spatial analysis. The enclosed Statement of Qualifications presents Windward's expertise in these service areas.

To learn more about Windward or to discuss project opportunities, please contact:

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Again, Windward thanks you for your agency's interest in our firm. Please feel free to contact us any time.

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Tad Deshler
Partner and Project Manager

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Wind Ward environmental LLC

firm profile

Windward Environmental LLC (Windward) is a Seattle-based firm that specializes in environmental and engineering consulting services for clients in the regulated community. With a strong foundation in scientific and engineering principles, we use an interdisciplinary approach to meet our clients' needs and provide strategic insight.

Windward's staff of 45 professionals includes senior personnel who are highly respected in their fields, both regionally and nationally. Windward's six partners each have an average of 22 years of experience. Established in 2000, Windward has a history of fostering positive working relationships with local, state, and federal regulators and has extensive experience in the interpretation and application of environmental regulations. We strive to develop the most cost-effective approach for each site, incorporating proven tools and innovative methodologies in investigation planning, field program design, and remediation services. Our goal is to ensure that the data collected are defensible and support ongoing decision-making and program strategy. As a consequence, our work is given serious consideration by all involved parties – even in the most contested situations.

The following pages provide an overview of our capabilities and areas of expertise.

locations

- Seattle, WA (headquarters)
- Bellingham, WA
- Monterey, CA

year established

- 2000

staff size

- 45

areas of expertise

- Biological assessment
- Brownfields assessment, remediation, and development
- Chemical fingerprinting
- Contaminated sediment assessment and management
- Criteria development and interpretation
- Data management
- Feasibility studies and remediation services
- Field surveys, sampling, and monitoring
- Fisheries
- Geographic information systems (GISs) and spatial analysis
- Habitat assessment and restoration
- Liability management
- Litigation support
- Natural resource damage assessment
- Regulatory compliance and permitting support
- Remedial investigation and site characterization
- Risk assessment – ecological and human health
- Source control evaluation
- Stormwater and surface water management services
- Waterfront planning and development
- Wildlife ecology

remedial investigations and site characterization

Windward has completed remedial investigations (RIs) and site characterization programs at industrial, commercial, and hazardous waste sites throughout the United States. These projects have varied in scope from small-scale, independent assessments for private entities to complex, long-term, multi-million-dollar investigation and remediation programs at high-profile urban waterway Superfund sites. With a focus on client goals, we have managed these projects from strategic planning and investigation design through agency approval and implementation.

Windward's goal is to provide solutions that make both environmental and economic sense for all parties involved. Our comprehensive understanding of the regulatory environment and our long-standing relationships with the US Environmental Protection Agency (EPA) and state agencies have contributed greatly to the success of our site characterization and remediation program efforts. This broad experience provides Windward staff with the knowledge and resources necessary to support any potential site characterization and remediation program.

contaminated sediment assessment and management

Sediment evaluation and management are integral components of many Windward projects, and our strong background in this area is the result of over 80 years' combined experience on the part of key Windward staff managing projects that have involved sediment assessment, remediation, and monitoring. Our scientists and engineers combine their extensive knowledge of sediment, water quality, and chemistry to develop a comprehensive understanding of the potential effects of contaminated sediment on an ecosystem. Windward's sediment management experience includes:

- Managing assessments of aquatic sites under both federal and state cleanup programs
- Developing site-specific sediment quality guidelines
- Conducting risk-based assessments of the ecological and human health impacts associated with exposure to contaminated sediments
- Using bioassessment techniques to identify the factors responsible for sediment toxicity
- Developing strategies for the remediation of contaminated sediment sites
- Designing post-remediation monitoring programs

In addition, Windward scientists have been instrumental in the development of regional strategies for assessing sediment quality (Washington's Sediment Management Standards) and evaluating dredged material (Puget Sound Dredged Disposal Analysis Program) and regularly participate in meetings designed to refine these evaluation standards.

project examples

Lower Duwamish Waterway RI – Seattle, WA

East Waterway Supplemental RI – Seattle, WA

Harbor Oil RI/Feasibility Study (FS) – Portland, OR

Lower Passaic River RI - Newark, NJ

remedial investigations and site characterization (continued)

field investigation

Windward's strengths include the effective design of complex, multi-faceted field investigations and our ability to implement these programs under aggressive schedules. We design each sampling program to promote efficiency and cost savings in the overall process while ensuring that quality data are being collected in order to meet specific data quality objectives. Depending on the project-specific goals, we apply our risk assessment expertise in the early stages of the project to focus data collection efforts, fine tune project objectives, and limit direct and indirect characterization and process costs.

Windward has extensive experience conducting upland and aquatic field investigations, surveys, and multi-media sampling efforts. We are well versed in the collection of surface sediment, subsurface sediment, surface water, seep, porewater, tissue, air, groundwater, soil, and source samples using a variety of techniques and we have decades of experience in the collection and interpretation of benthic invertebrate community surveys and toxicity testing. Sampling efforts conducted under a variety of environmental conditions have ranged in size from several days' work for a 2-person field crew to 6 months of continuous sampling, involving the coordination of half a dozen boats and the activities of more than 20 people.

As a result of this broad experience, our field crews are skilled in the use of a range of specialized environmental sampling equipment, including Niskin samplers, piezometers, and peepers for the collection of surface water, porewater, and groundwater samples and hand augers, grab samplers, and coring devices for the collection of soil and sediment. We have used trawl and seine nets and backpack and boat electrofishing units to collect fish; bongo nets, Schindler traps, benthic sledges, and multiplate samplers to collect zooplankton and invertebrates; and pit and Sherman traps to collect amphibians and small mammals. In support of these efforts, Windward field crews routinely employ electronic *in situ* data collection equipment, such as global positioning systems, multi-parameter probes, and Hydrolab® units.

We have also conducted surveys to document the on-site presence of bird, fish, amphibian, reptile, plant, and mammal species and compared the findings with regional biological community data. Our plant community surveys have involved the identification of herbaceous plants and trees and the estimation of vegetation abundance and dominance, with particular attention to the presence of non-native or invasive species and overall plant community vigor.

Windward's talented teams of data managers, chemists, statisticians, and graphics analysts work in concert with our project managers, task leads, contract laboratories, and clients to ensure that the data collected and analyzed meet each project's overall goals. Data quality control, including the incorporation and usability of historical data, is a top priority for Windward throughout the planning and implementation of every RI and site characterization program.

In addition to collecting data designed to meet data quality objectives, Windward's seasoned professionals understand how to put the information gathered into context and meet regulatory reporting needs by expertly conveying important information so it is clear to the reader. Windward is also proficient in nature and extent characterization, potential source identification, and risk-based goal derivation.

Our staff include engineers and scientists with extensive experience in evaluating, selecting, designing, and implementing a wide range of remediation methods and technologies. Windward understands that the selection of appropriate remedies must consider long-term maintenance and monitoring requirements along with source control and the potential for recontamination.

feasibility analysis, remediation, and long-term site monitoring

Windward engineers and scientists have a broad range of experience in selecting, implementing, and monitoring site cleanup and restoration projects in a variety of unique settings. Our staff are skilled in preparing engineering evaluations, feasibility studies (FSs), cost estimates, and designs for the remediation of contaminated media.

Our FSs and cost estimates for the remediation and redevelopment of contaminated facilities have involved upland soil removal, shoreline bank replacement, groundwater management, and in-water sediment dredging and capping. Windward has also provided oversight and documentation for projects involving hazardous materials remediation, including lead, radon, and soil vapor mitigation projects.

Windward's groundwater remediation support includes the assessment of impacted groundwater, performance of aquifer dynamics and contaminant dispersion analyses, and evaluation of groundwater interaction with other media, including the influx of stormwater. For example, our services for a government project in Alaska included groundwater remediation at a former laundry site contaminated with persistent chlorinated solvents. Windward understands how to match the analysis of contaminated media and remedial alternative selection with regulatory agency expectations regarding the performance and long-term reliability of the recommended approach.

Windward specializes in remedial measures for sites that include both terrestrial and in-water components, and we are experienced in addressing and integrating cleanup requirements as they pertain to each environment. Integrating sediment and shoreline restoration into remedial actions can provide a cost savings as compared with implementing each action separately. For example, Windward recently negotiated habitat restoration elements on a shipyard cleanup project with the natural resource trustees, and liability credit was granted for the habitat restoration elements that were not required by EPA as part of the remediation program.

Windward uses presumptive remedies that can be readily implemented, as well as the application of innovative technologies, to help ensure a cost-effective approach to site management. We prepare life cycle cost analyses so that owners can fully understand the pros and cons of alternative remedial approaches. Windward also provides long-term site monitoring and inspection services to meet post-remediation needs.

project examples

Eugene Former Manufactured Gas Pland Site ERA and Focused FS – Eugene, OR

Woodard Bay Natural Resource Conservation Area Restoration FS – Thurston County, WA

Harbor Oil RI/FS – Portland, OR

Port of Seattle Long-term Commitments – Seattle, WA

human health and ecological risk assessment

Risk assessment is an integral part of most RI and remediation projects. It involves the evaluation of impacts that result from stressors, including, but not necessarily limited to, hazardous substances. Current risk evaluation regulations focus on hazardous substances, but Windward scientists and engineers also understand the role of non-chemical stressors in both risk characterization and risk management, and in potential ecosystem restoration, recovery, or redevelopment. Windward tailors the complexity of the risk assessment to be as simple as possible and still meet our clients' project-specific needs. In some cases, a screening-level assessment is all that is warranted to support a remedial action or no-action decision. In other cases, more detailed estimates of risk are needed to determine risk-based goals in order to define the appropriate remedial actions for a site. By customizing the risk assessment process in this way, Windward always provides a net benefit to our clients.

human health risk assessment

Human health risk assessments (HHRAs) must consider site-specific exposure pathways based on current and future site usage. The principal driver of risk management and cleanup decisions at aquatic sites is often the consumption of contaminated fish and shellfish. Windward has developed specialized expertise in assessing human health risks from the consumption pathway (in both freshwater and marine environments); our staff have prepared guidance documents for conducting fish consumption surveys and developed study design strategies to evaluate fish contaminant data for use in fish consumption advisories. Windward also has considerable experience in developing realistic sediment, water, and vapor exposure scenarios in shoreline settings. These scenarios can incorporate constraints to limit exposure beyond what is required by the standard guidance used to address remediation at upland sites.

Although HHRAs are more prescriptive than ecological risk assessments (ERAs), Windward's risk assessors understand where the regulations and guidance have some flexibility to address site-specific conditions and existing or proposed land uses. We also understand how uncertainties in the data or assumptions used in the risk assessment can influence the risk process and ultimately the decisions regarding the need for and extent of cleanup. Windward focuses on quantitative uncertainty analyses, often using probabilistic analyses, to help identify the variables primarily responsible for the assessment conclusions. These analyses provide keen insights to aid in risk management decisions and also facilitate the identification of areas where additional data collection might be warranted to develop a more reasonable risk estimate, which may potentially reduce the need for or scale of remediation.

Windward's risk assessors are adept at communicating both the technical and policy implications of decisions to a diverse audience, including legal counsel, agency risk assessors and PMs, and public and private stakeholders. Our chemists, data managers, and GIS analysts help ensure that the source and quality of the information used in risk assessments are well documented, which helps to support reliable and effective risk management decisions.

Our approach has resulted in a reduction in the estimation of risk as compared to generic risk assessments – with a commensurate reduction in remediation costs to the client.

human health and ecological risk assessment (continued)

ecological risk assessment

Windward's ecologists, ecotoxicologists, statisticians, and chemists take an interdisciplinary approach to ERA. We are experienced in all levels of assessment, from relatively simple ERAs, which are based on conservative exposure estimates and literature-based toxicity information, to more site-specific and complex ERAs, which rely more on site-specific data to support realistic exposure, toxicity, and risk estimates. The level and details of the assessment are tailored to meet regulatory requirements and each client's objectives. We are experts in using risk information, together with either mechanistic or statistical bioaccumulation models, to develop remedial goals that can be applied directly to an analysis of alternatives in an FS, and in translating risk issues into engineered solutions to meet risk reduction goals.

Windward's senior scientists have developed risk guidance in concert with regulatory agencies and have provided peer review at contested sites. We understand the nuances of guidance and how the decisions at each step of the process may affect the outcome of the risk assessments and the need for any subsequent remedial actions. Windward is prepared to explain to regulators and other stakeholders why a particular approach is appropriate, and we consistently produce clear and concise risk assessments using readily understandable and defensible approaches. Our work with regulatory agencies and natural resource trustees has enabled us to design and implement assessment approaches that balance agency mandates with client objectives for a given project. The degree of difficulty in reaching consensus varies widely from project to project, depending in large part on the working relationships among the parties involved. Throughout our projects, Windward strives to build strong working relationships with all parties as a foundation for effective communication, trust, and, ultimately, reasonable risk management decisions.

project examples

Lower Duwamish Waterway RI (ERA and HHRA) – Seattle, WA
Lower Passaic River RI (ERA) – Newark, NJ
West Waterway Sediment Operable Unit HHRA – Seattle, WA
East Waterway Supplemental RI (ERA and HHRA) – Seattle, WA
Eugene Former Manufactured Gas Plant ERA – Eugene, OR
Portland Harbor ERA – Portland, OR
Beaverton Creek ERA – Beaverton, OR
Harbor Oil RI/FS (ERA and HHRA) – Portland, OR
St. Helen's ERA and HHRA – St. Helens, OR

natural resource damage assessment

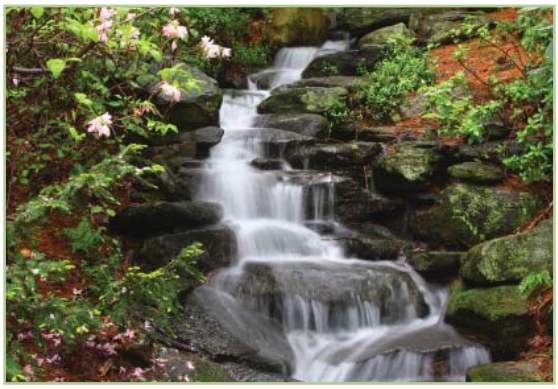
Since Windward's founding in 2000, our personnel have conducted more than 25 natural resource damage assessments (NRDAs). The focus of Windward's NRDA work has been on baseline determination, injury determination and quantification, the establishment of causation, apportionment of injury, compensatory restoration planning, settlement negotiations (including negotiation for restoration credits), restoration project design, habitat construction permitting, construction oversight, and post-construction monitoring.

approach

Windward's primary goal in developing natural resource damage (NRD) cases is to provide clients with the knowledge, information, and technical tools necessary to understand their potential NRD liability and resolve any claims made by natural resource trustees. Unlike the Superfund RI/FS process, which includes prescriptive tasks with clear scopes, NRDA procedures can vary widely between sites. There is no "one-size-fits-all" approach. Therefore, we typically present the range of options for resolving potential NRD liability, discuss the pros and cons for each option, and perform targeted technical analyses, as needed, to develop various scenarios. Our experience in resolving these claims has included the development of restoration-based solutions, cash payouts for claims, and participation in litigation when a settlement resolution was not possible. Not all cases can or should be resolved through negotiation; in some cases, it may be prudent to litigate. We work with each client to determine if litigation is the best route to resolution.

restoration-based settlement

Recent trends in NRD settlement have focused on restoration-based agreements in which potentially responsible parties undertake restoration projects directly or provide funding to trustees to construct restoration projects scaled to the parties' liability. Windward has successfully used habitat restoration for the resolution of NRD claims and has developed a streamlined approach for identifying restoration opportunities and scaling alternatives. Once the preferred restoration scenario has been identified, Windward can prepare detailed restoration plans. These plans place our clients in strong negotiating positions and serve as the foundation for a cooperative approach to remediation — one that maximizes benefits for the ecosystem as well as for stakeholders. Windward staff also have experience in obtaining all relevant permits and preparing and implementing monitoring surveys and management plans.



project examples

Lower Passaic River NRDA – Newark, NJ
Gould Superfund Site NRDA – Portland, OR
Portland Harbor NRDA – Portland, OR
Grand Calumet River NRDA – Northwest IN

regulatory compliance and permitting support

Environmental regulatory compliance and permitting, especially in aquatic and waterfront areas, has become one of the most difficult challenges facing developers today. Windward's staff understand the regulatory decision-making process, from the perspective of both the agency and the applicant. This understanding comes from firsthand experience in writing and administering land use guidelines and regulations, as well as from working with public agencies, local officials, and citizen groups.

Windward's approach to addressing compliance issues involves an integrated assessment of local, state, and federal regulations, permitting thresholds, and case law combined with an ability to identify the objectives behind the regulations and develop a plan that meets those objectives. Windward staff have the experience to develop project plans that minimize or eliminate potential regulatory obstacles, rather than merely anticipating regulatory responses. Through our well-established, long-standing relationships with regulatory staff and meticulous pre-application research, agency meetings and negotiations become a more open, collaborative exchange of ideas and goals, resulting in a more cooperative approval process.

Many of our clients seek regulatory approval for types of development projects that have been difficult to permit historically. Through our comprehensive understanding of the regulatory process and rigorous pre application research, we can often identify and recommend specific project enhancements – such as habitat restoration – as an incentive for permit approval. Including these enhancements helps to generate interest on the part of agencies, civic leaders, stakeholders, and the local community, and makes the regulatory pathway more predictable and efficient.

Our understanding of the regulatory decision-making process, from the perspective of both the agency and the applicant, comes from firsthand experience in writing and administering land use guidelines and regulations, as well as from working with public agencies, local officials, and citizen groups.

regulatory experience

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Resource Conservation and Recovery Act (RCRA)
Clean Water Act (CWA)
Endangered Species Act (ESA)
National Environmental Policy Act (NEPA)
Rivers and Harbors Act
Water Resource Development Act (WRDA)
National Historic Preservation Act (NHPA)
Equivalent state and local regulations and guidance

stormwater and surface water management services

Industry and government agencies continue to focus on the management of stormwater-related issues, especially as discharge limits tighten, monitoring requirements increase, existing infrastructure ages, and urban development spreads. In addition, local, state, and federal stormwater management requirements are evolving rapidly. As a result, surface water and stormwater runoff present facility owners and local governments with a range of compliance, monitoring, and source control challenges, all of which can be overcome with the broad array of services that Windward provides clients. Windward's knowledge and understanding of surface water and stormwater management ensure that our clients receive the most innovative and effective services available.

stormwater and surface sater planning

Surface water and stormwater contaminants can originate from on-site sources (via industrial and municipal discharges), airborne deposition, and various urban and rural sources (e.g., roads, parking lots, and pesticides and herbicides). Windward's surface water and stormwater expertise and experience include projects of wide-ranging spatial scales, from watershed-level analyses to site-specific stormwater investigations.

At the watershed scale, Windward provides basin and stormwater comprehensive planning services that evaluate surface water and stormwater runoff in the context of the man-made and natural environments. Our goal in providing these services is to identify integrated management approaches that will meet multiple objectives, including reduced flooding and improved receiving waters aquatic habitat and water quality. These interdisciplinary projects involve geomorphic assessment, ecological evaluation, water quality assessment, infrastructure assessment, land use analysis, hydrologic and hydraulic modeling, stormwater facility conceptual design, public involvement and facilitation, and policy and programmatic alternative development.

At the facility scale, the assessment of potential sources of stormwater contamination is an important component of Windward's client support. We regularly develop source characterization programs to determine potential sources of stormwater contaminants. These source-tracing projects involve stormwater infrastructure mapping and evaluation using geographic information system (GIS) and computer-aided drafting analysis, in-line and catch basin sediment sampling, and site-wide source control evaluation. Windward then develops alternative

approaches for managing stormwater contaminants, including operational and structural source control, infrastructure upgrades, and water quality treatment.

stormwater system assessment and management

A systematic approach to achieving identified goals is key when conducting cost-effective stormwater system assessment and management. Windward's stormwater engineers have great depth of experience and expertise in stormwater assessment and management, and we have successfully helped many private and public clients in achieving their goals. Important stormwater assessment tasks can include reviewing existing information (e.g., water quality monitoring data), developing comprehensive drainage maps, identifying potential physical sources of target pollutants, assessing the condition of the drainage infrastructure, evaluating existing best management practices (BMPs) and source control program elements, and identifying data gaps that need to be filled. Using the results of the stormwater assessment, Windward develops short- and long-term stormwater management strategies, ranging from early action planning and implementation to feasibility analyses and engineering design, permitting, and construction. Alternative stormwater management strategies may include operational and source control BMPs; conveyance modifications; passive and active water quality treatment; low-impact development (LID) applications; non-structural solutions, including stormwater pollution prevention education and training; and stormwater facility retrofits. Windward also routinely prepares plans and other documentation supporting stormwater system management, including stormwater pollution prevention plans (SWPPPs), spill control and countermeasures plans (SPCCs), and stormwater engineering reports.

stormwater and surface water management services (continued)

stormwater and receiving water quality monitoring and characterization

Windward has proven experience in providing surface water and stormwater monitoring and characterization services to help clients meet National Pollutant Discharge Elimination System (NPDES) permit and other applicable regulations. Our staff have successfully supported and led numerous local and national water quality monitoring projects for a variety of private and public clients, and our expertise includes year-round, round-the-clock on-call response monitoring using both grab and automated sampler techniques. Windward's services include develoing quality assurance project plans (QAPPs), monitoring plans, and sampling protocol; tracking weather forecasts and precipitation; conducting monitoring procedures, including sampling and field water quality measurements; reviewing and evaluating analytical data results; and preparing characterization and data reports, including discharge monitoring reports (DMRs). Our staff are also experienced in developing and implementing hydrologic, groundwater, in-stream biological, and sediment monitoring programs, as well as in situ surface water toxicity testing.

stormwater compliance and regulatory Support

Permit assistance and regulatory compliance support are integral to Windward's surface and stormwater projects. Services include SWPPP and SPCC development, receiving water studies to evaluate appropriateness of permitted benchmarks, mixing zone studies, stormwater monitoring, site inspection services, agency negotiation and coordination, and compliance strategy development. These services are tailored to meet our clients' specific operational and compliance needs. For clients whose operations are governed by numerous regulations, Windward also prepares materials that integrate various reporting requirements into a single, concise document that is easy to revise and update as facility operations and regulations change over time.

NPDES permitting support

When necessary as a means of meeting discharge limits, Windward works with clients to select, implement, and maintain stormwater treatment systems. Our engineers and scientists are well versed in the range of candidate technologies used to manage construction stormwater, as well as long-term treatment of industrial and municipal discharges. Our philosophy includes selecting highly reliable treatment approaches that minimize long-term maintenance costs.

source identification, characterization, and control

The assessment of potential sources of contamination of stormwater is also a large component of Windward's client support activities. We regularly develop source characterization programs to help determine potential sources of stormwater contaminants. Our experience with a broad range of potential source materials and industrial activities helps make our programs properly focused and cost-effective. Previous source-tracing projects have involved stormwater infrastructure mapping and evaluation using GIS software, in-line and catch basin sediment sampling and maintenance, and site-wide source control evaluation. Source tracing work performed by Windward has ranged from simple dry flow and illicit connection surveys to more complex evaluations of groundwater influx, bed load transport/ leaching, and atmospheric deposition. We can draw upon our interdisciplinary staff of experienced chemists, scientists, and engineers to make sure the client receives a thorough evaluation that will help them meet targeted compliance benchmarks.

project examples

Seattle-Tacoma International Airport Construction Stormwater Monitoring – SeaTac, WA

East Waterway Remedial Investigation – Seattle, WA

Storm and Surface Water Comprehensive and Basin Plans (various municipalities)

Los Alamos National Laboratory NPDES Stormwater Permit Implementation – Los Alamos, NM

environmental liability assessment and management

Windward has earned a reputation for using cost-effective solutions and innovative approaches to assess and manage environmental liabilities at industrial facilities and hazardous waste sites. At the start of each project, Windward works with the client to thoroughly define project goals, specific business concerns driving the effort, and potential risks that will most significantly affect the client's business. Once these factors have been identified, we can develop a strategy to manage environmental liabilities that is consistent with client goals. This approach ensures that clients' needs are met, whether the project is a Phase I Environmental Site Assessment or a Superfund allocation.

Windward's experience includes assisting property owners when they're considering the sale or transfer of contaminated properties, with or without the transfer of the associated environmental liabilities. Corporate asset value can often be increased by the sale of a property if the value exceeds the cost of the potential environmental liability. Understanding how environmental liabilities, such as contamination, affect local and regional natural resources and are perceived by the local community and stakeholders is key to developing successful liability management strategies.

Environmental liabilities frequently require responsible parties to develop costly remediation strategies. Traditionally, these liabilities are addressed by regulators using a relatively inflexible, ad hoc approach that considers each site individually, instead of within a larger context, and narrowly restricts remediation options. Through our understanding of the regulatory framework, strong relationships with regulators, and expertise in the application of innovative methods, Windward is often able to implement appropriate solutions that create value for all involved parties.

litigation support

In the current regulatory environment, companies of all sizes can be faced with the challenge of having to litigate environmental issues. These lawsuits can involve actions brought against state and federal agencies, insurance policy coverage, or issues related to third-party contributions. Two critical factors in successful litigation are the development of strong, defensible technical positions and the ability to translate critical technical information and make it easily accessible to lay audiences.

Windward scientists and engineers have experience in supporting clients in all facets of environmental litigation. As testifying experts, we have written expert reports as well as testified at deposition. As litigation consultants, we have worked closely with clients to develop overall case strategies and identify the appropriate experts to testify at trial. Under either scenario, Windward's strength resides in the combined experience of our staff and our range of expertise.

We use a variety of forensic tools to support our client's position in matters of litigation. We search historical archives for relevant aerial and site photographs, site maps, documentation of site activities, environmental investigation datasets, and scientific literature. Windward staff research the history of chemical use in specific industrial applications and compare that information with site activities. We examine the detected concentrations of chemicals in affected media to develop a contamination timeline, use modeling to spatially delineate areas where chemicals are present, then define the proximity of these chemicals to the client's site.

Overall, the focus of our approach is to provide our clients with comprehensive, cost-effective solutions to their potential liabilities – solutions that place them in strong negotiating positions with regulatory agencies.

habitat restoration

Increasingly, habitat restoration is increasingly a component of redevelopment projects and considered during the development of remediation strategies. Habitat restoration has become a popular option for providing compensation for contamination that resulting in a loss of habitat resources, or for offsetting or mitigating anticipated changes in land use resulting from redevelopment. Windward's expertise includes both shoreline and inland restoration projects, and our depth of knowledge ensures that the resources required to promote project success are available to support our clients' diverse needs.

The application of innovative and cost-effective solutions is at the center of Windward's approach to habitat restoration, and our staff are highly skilled in developing effective strategies and alternatives. Our approach focuses on assessing both the historical and current conditions of potential restoration sites. Primary consideration is given to the larger, overall context of how the restoration project will complement and benefit the conservation goals of the local government and foster goodwill within the local community. Windward then develops a design that best suits the current conditions and constraints of a site while ensuring long-term restoration success.

Windward's approach to developing restoration opportunities includes the following four steps:

1. Habitat resources and species of interest are identified, and the factors that limit the resources or species, including contamination or land use changes resulting from development, are researched.
2. Habitat enhancement or restoration opportunities are identified based on the types of habitat that may be limited locally or regionally.
3. Habitat types are evaluated based on the preferences of the species of interest, such as nesting habitat for shorebirds or spawning habitat for salmon.
4. Conceptual designs for habitat restoration are developed for each site, and the feasibility and cost-efficiency of the designs are assessed in order to identify the alternative that will offer the maximum benefit with the greatest potential for success.

Once the preferred alternative has been selected, Windward develops the conceptual site model into the final design, addresses the multi-jurisdictional permitting requirements, provides construction oversight, and develops monitoring and maintenance plans to meet the project-specific regulatory requirements.

Windward is also experienced in determining the possible benefits (e.g., restoration or mitigation credits) of habitat restoration at potential sites, and in negotiating these benefits with regulatory agencies to satisfy our clients' regulatory requirements. Whether habitat restoration is implemented to mitigate land use changes or as compensation for potential contamination, it can provide favorable incentives in the negotiation process with regulatory agencies. In fact, in some cases, additional restoration credits can be "banked" for future use or sold to other entities in search of mitigation options.

project examples

Todd Shipyard Sediment Remediation – Seattle, WA

Woodard Bay Restoration Feasibility Study – Thurston County, WA

Hylebos Natural Resouce Damage Assessment Restoration – Tacoma, WA

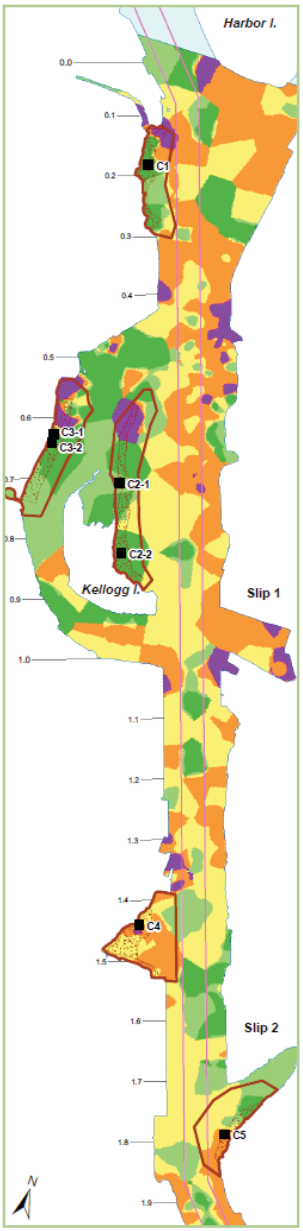
GIS and computer-aided drafting services

Complex investigation and remediation programs can generate a staggering amount of data. Windward's use of GIS and computer-aided drafting (CAD) software offers an efficient and easily accessible way to display those data and translate them into valuable tools for decision making.

Using ESRI® GIS software (including ArcView, Spatial Analyst, Geostatistical Analyst, and ArcPublisher) and AutoCAD® design software, Windward's GIS and CAD analysts can interpret, quantify, and contextualize complex datasets for a wide variety of analyses ranging from the identification of potential remediation alternatives to the quantification of relationships among chemical distributions and potential sources. Our GIS and CAD services provide our clients with a full range of data management tools for spatial analysis, contamination assessment, and decision support, as well as the rapid production of sophisticated digital maps and engineering drawings. In addition, these tools enable us to convey complex information in a clear, easy-to-understand format that is accessible to all parties.

Windward's GIS analysts can integrate information on historical land use and contamination with data on existing conditions, site infrastructure, and chemistry analytical results. This capability supports the development of realistic strategies and the identification of areas where additional data collection is warranted. Windward is skilled at using GIS to provide spatial variables for risk assessment and fate and transport models to identify potential remedial alternatives. This allows our clients to visualize the geographic distribution of impacts under different scenarios and potentially detect patterns that might not otherwise be discernable.

Windward's use of AutoCAD® software facilitates the design and documentation of site facilities and infrastructure; allows the generation of cross sections to display geological information and groundwater flow characteristics; and simplifies the coordination, sharing, and delivery of topographic data, maps, and imagery. Windward's analysts are able to import 3D images and terrain information to help in profiling, remediation system design, volume calculations, and overall presentation. We also use CAD to generate bid packages to support our clients' infrastructure management programs. Together, these tools provide Windward's clients with exceptional resources that can efficiently support project planning, decision making, and strategy development.



Our GIS and CAD capabilities build on our scientific expertise, allowing us to tailor our data presentations to suit a wide range of environmental and engineering services applications.

data management

Windward's years of experience in planning and implementing complex data collection programs have provided our staff with a comprehensive understanding of the issues associated with the management of diverse environmental information. Using EQuIS™ software as a base, we can customize our environmental data management system to meet the specific needs of individual clients or projects to ensure that end users receive project data quickly and efficiently. Data flow control begins at project initiation and is carefully maintained throughout the project's life cycle to final reporting and archiving.

Windward's team of data management professionals independently check, track, and confirm the accuracy of project data and oversee data flow from field formats to project-specific reporting formats. Years of programming and database design experience – as well as laboratory management experience – on the part of Windward data management staff have provided us with an excellent basis for working with laboratory-produced analytical information and a keen understanding of laboratory practices. Windward's data management system can even be used to convert third-party data to more updated data management formats, thereby facilitating its incorporation into project databases. Furthermore, our data management team works closely with our GIS and CAD professionals to support the visual presentation and interpretation of environmental data.

On several larger projects, Windward has collaborated with other consulting firms to create inter-consultant data management teams. These team efforts have enabled us to make better use of the combined data resources available throughout the larger project team, streamlining data management and availability and providing our clients with added value in the form of reduced data management costs.

Years of programming, database design, and laboratory management experience have provided Windward staff with an excellent basis for working with laboratory-produced analytical information and a keen understanding of laboratory practices.

relevant project experience

WindWard environmental LLC

lower duwamish waterway remedial investigation

Windward was retained by the four-member Lower Duwamish Waterway Group (LDWG) to develop a comprehensive technical strategy to address environmental and human health issues associated with sediment contamination within the Lower Duwamish Waterway (LDW) in Seattle, Washington. The LDW is the lower portion of the Duwamish River that flows into Elliott Bay; it serves as a waterway for numerous industries and over the years has been substantially modified to accommodate barge traffic and materials-handling activities. Oversight was provided by EPA and the Washington State Department of Ecology (Ecology).

The LDW RI was conducted in two phases. Phase 1, which included scoping-phase ecological and human health risk assessments, was completed in 2003. These risk assessments used site-specific exposure scenarios and existing chemistry data to prioritize candidate sites for early remedial action and to identify data needs for Phase 2. Seven early action areas were ultimately recommended. An extensive work plan for Phase 2 was completed in 2004 and provided a clear scope regarding data collection and the analysis methods to support baseline risk assessments as well as a comprehensive RI. Numerous Phase 2 data collection efforts were conducted between 2004 and 2007. These multi-media investigations used many innovative sampling techniques and involved the collection of juvenile Chinook salmon, benthic invertebrates, fish, crabs, clams, seep water, porewater, surface sediment, and sediment cores.

A primary goal of the RI was to facilitate the risk management process by providing an understanding of the major processes governing the movement and distribution of chemicals in the LDW, as well as potential exposure pathways for people and animals using the site. To meet this goal, a conceptual site model was developed to address three key components: hydrodynamic and sediment transport processes, chemical distribution patterns, and the exposure of human and ecological receptors to chemicals. This information was clearly depicted in GIS maps based on a robust database.

Windward consistently focused data collection efforts on clearly stated objectives, made possible in part by the comprehensive work plan and the data gap analysis report, which together provided a precise road map for all data to be collected during the project. In addition, technical meetings were held as needed so all parties could reach agreement on the scope and objectives for data collection. As key technical questions arose based on data collected during the initial rounds of investigation, Windward identified and implemented specific study designs to best address these issues. These supplemental studies were conducted in the same strategic and collaborative manner as that established for the original surveys outlined in the work plan.

One of the technical challenges for the project has been to establish a quantitative link between chemical concentrations in tissue and those in sediment, which will be addressed through remedial action.

location

- Seattle, WA

key services

- Human health and ecological risk assessments
- Remedial investigation
- Multi-media data collection (sediment, tissue, porewater, and seep water)
- Bioaccumulation modeling
- Database management and GIS
- Potential source analysis
- Risk communication
- Risk-based concentration threshold identification
- Residual risk analysis

lower duwamish waterway remedial investigation

(continued)

Windward developed a bioaccumulation model that incorporated site-specific data for sediment, water, and aquatic organisms, with literature-based data on chemical properties and biodynamics. The model was used to determine sediment concentrations associated with specific risk-based tissue concentrations and will be one of the tools available for the feasibility study (FS) to determine the potential benefits of specific remedial actions.

The risk assessments were finalized in 2007; the RI was finalized in July 2010. The comprehensive RI report included the baseline human health and ecological risk assessments, a robust conceptual site model for sediment dynamics, detailed information regarding the nature and extent of contamination, an overview of potential sources and ongoing source control efforts, additional information regarding specific potential source areas, and tissue and sediment data from locations outside the LDW to aid in the determination of background concentrations. The RI also presented the derivation of risk-based threshold concentrations in sediment and tissue for chemicals that are driving risks, based in part on a calibrated food web model. Windward also designed and implemented resource use surveys, including a survey of human access locations and a survey of spotted sandpiper habitat, to aid in the human health and ecological risk assessments. The design and interpretation of each of the RI elements has been a collaborative process among Windward, LDWG, EPA, and Ecology.

Windward has played an instrumental part in clearly outlining and synthesizing the key findings of the RI in a series of technical meetings, presentations, and memoranda. Windward staff also participated in a series of community outreach meetings and workshops to brief the community on project status and challenging topics. Currently, Windward is supporting the feasibility study by providing residual risk analyses, risk communication, database and GIS support, and strategic input.

Although the project was originally negotiated by LDWG and Windward as a voluntary action to be addressed through a streamlined process, it was later declared a Superfund site by EPA and a Model Toxics Control Act site by Ecology. Despite these designations, and the challenges inherent in conducting an RI in a 5-mile stretch of an estuarine, urban waterway, Windward and LDWG continued to work for an efficient and clearly directed process on both technical and policy issues, including consultation with EPA, Ecology, and the trustees. Windward's efforts on this Superfund site have been successful in meeting an aggressive schedule and a reasonable budget compared to other Superfund sites around the nation.

highlights

- Prepared clear and comprehensive reports that culminated in a unified conceptual site model to facilitate remedy selection and risk management
- Synthesized a sediment transport model with sediment chemistry data to support the evaluation of remedy options in the FS
- Created a project database with over 150,000 data records linked to a GIS interface
- Provided an overview of potential sources and ongoing source control efforts
- Identified clear objectives to guide data collection and analysis
- Enabled consistent progress through clear and trusted communication with key parties, including EPA, Ecology, and stakeholders

seattle city light utility pole hazard assessment

Windward was asked by Seattle City Light to assess the relative environmental hazards of in-service utility poles that had been treated full-length with copper naphthenate (CuN) or butt-treated with pentachlorophenol (PCP); both chemicals are commonly used as wood preservatives to promote longevity once the poles have been installed. Although both chemicals are known to have toxic effects on human health and the environment, Seattle City Light was interested in determining which chemical posed the lesser hazard so as to make informed decisions regarding future utility pole purchases in keeping with its goal of minimizing the environmental impact. The manufacturers of CuN and PCP have sponsored research on the potential environmental impacts of their products, but these assessments did not directly compare the two products.

The hazard assessment conducted by Windward was similar to a risk assessment in that it included evaluations of exposure and toxicity, but differed qualitatively in that no numerical risk estimates were made. The hazard assessment consisted of the following five elements: conceptual model, exposure assessment, toxicity assessment, hazard characterization, and uncertainty analysis. The conceptual model established scenarios under which people or animals could come into contact with the wood preservatives; the exposure assessment established the probability of this contact based on the presence of the chemicals in the environment and the behavior of people and animals near utility poles; the toxicity assessment reviewed the toxic effects of the chemicals on human and ecological health; and the hazard assessment integrated the exposure and toxicity assessments through the use of qualitative labels such as low, medium, and high for each combination of exposure scenario and exposure route (e.g., ingestion).

The results of the relative hazard assessment suggested that CuN and PCP, when examined without consideration of trace contaminants, would be hazardous to both human and ecological health when used in the treatment of utility poles. The expected hazards from dioxins/furans, a common trace contaminant in PCP, would be more significant than the expected hazards of either of the other two chemicals. When considered with the results of the PCP hazard assessment, the dioxin/furan results suggested that in-service utility poles treated with PCP would be more hazardous to both human and ecological health than poles treated with CuN.

location

- Seattle, WA

key services

- Developed a conceptual model, exposure assessment, and toxicity assessment
- Established qualitative ranking system for relative hazards
- Developed graphical summary of results

highlights

- Applied knowledge of human and ecological toxicity
- Performed a hazard assessment on utility poles treated with two common preservatives
- Communicated conclusions in a clear fashion to enable decision making by client

east waterway supplemental remedial investigation

Windward was retained to develop a comprehensive technical strategy to address environmental and human health issues associated with sediment contamination within the East Waterway in Seattle, Washington. Windward has the primary responsibility for the development of the supplemental remedial investigation (SRI), including the ecological and human health risk assessments. The work has been conducted in close coordination with the consultant team responsible for the feasibility study (FS) to ensure that the process was efficient in addressing as many of the FS data needs as possible in order to complete the entire SRI/FS on an aggressive schedule.

The data collection efforts for the SRI were conducted between 2008 and 2009. These multi-media investigations involved the collection of juvenile Chinook salmon, geoducks, benthic invertebrates, fish, crabs, clams, surface sediment, sediment cores, surface water, and intertidal seeps. In addition, Windward designed and implemented a survey of human access locations and human use activities throughout the waterway.

Windward consistently focused data collection efforts on clearly stated objectives, which resulted in focused and efficient sampling designs. The extensive historical dataset was assessed and used to focus the SRI sampling effort on existing data gaps. An innovative strategy has been the use of multi-increment samples for sediment and other compositing strategies for tissue and sediment, which resulted in more representative samples and reduced analytical costs for chemicals such as polychlorinated biphenyl congeners and dioxins and furans.

The risk assessments will be completed in 2011 followed by the draft SRI in 2012. These documents will provide the basis for the derivation of risk-based sediment threshold concentrations in sediment and tissue for risk-driving chemicals.

A unique challenge for this project has been that the SRI is being conducted adjacent to the Lower Duwamish Waterway (LDW). The LDW RI process is several years ahead of the East Waterway SRI, and the process for the East Waterway has been as consistent as possible with that of the LDW. The conceptual site model included the identification of significant similarities and differences between the two sites, which will be reflected in the design of the sampling plans, the risk assessments, and ultimately the SRI.

location

- Seattle, WA

key services

- Human health and ecological risk assessments
- Multi-media data collection (sediment, tissue, surface water, and seep water)
- Source characterization
- Risk communication

highlights

- Identified clear objectives to guide data collection and analysis
- Created a project database with over 100,000 data records linked to a geographic information system interface
- Designed programs and conducted sampling of tissue, sediment, and surface water within 12 months
- Prepared clear and comprehensive reports culminating in a unified conceptual site model to facilitate remedy selection and risk management

portland harbor ecological risk assessment

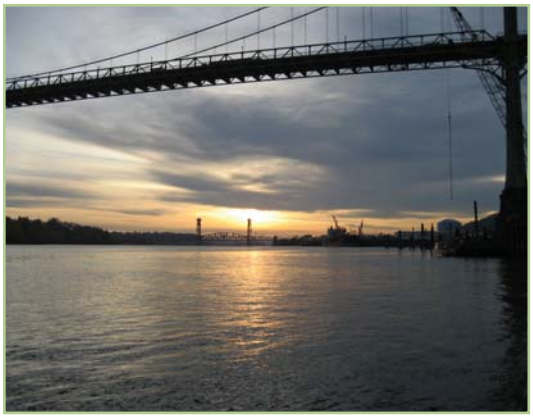
Windward was retained by the Lower Willamette Group (LWG) to investigate risks to the environment and complete the ecological risk assessment (ERA) and bioaccumulation models for the Portland Harbor Superfund Site. The ERA addresses sediment contamination within Portland Harbor, a 10.4-mile dredged reach of the Lower Willamette River. Windward designed the ERA working closely with an interdisciplinary team of consultants, the LWG, EPA, and EPA's partners consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance. Current and future risks are being identified, including contributions from multiple upstream sources.

As part of the RI activities, Windward is assisting in the development of strategies related to early actions; natural resource damage (NRD) implications; the effect of flood events; the identification of sources, including those outside of the site; groundwater-to-surface water impacts on potential risks; agency negotiations; development of preliminary remediation goals; and evaluation of remedial alternatives, particularly with respect to residual risks. The consultant team has developed a comprehensive work plan that provides the framework for the site characterization, the ERA, and the human health risk assessment.

Data collection efforts included a biological inventory and habitat surveys for all potential ecological resources. As a planning tool, GIS mapping of habitat preferences was completed for each receptor group, and these maps were overlain with chemical concentration to determine potential areas of impact on receptors. These mapping exercises assisted in the development of the study design and directed data collection efforts.

Multi-media investigations have involved the use of many innovative sampling techniques to collect biotic (resident fish species, benthic invertebrates, crayfish, clams) and abiotic (surface water, surface and subsurface sediment) media. The design for each of the RI studies has been a collaborative process between Windward, LWG, EPA, and EPA's partners. Windward developed sampling plans and provided field support for a wide range of field studies including the collection of:

- Benthic invertebrate tissue samples (collected using benthic sledge)
- Epibenthic invertebrate tissue samples (collected using multiplate samplers) for taxonomic identification
- Juvenile Chinook salmon for the analysis of both whole-body tissue and stomach contents tissue
- Resident fish, crayfish, and clam tissue
- Sediment for bioassays, bioaccumulation testing, and site characterization (collected using grabs and cores)
- Surface water samples (both grab samples and high-volume samples collected using a peristaltic pump and XAD Infiltrex system)



location

- Portland, OR

key services

- Ecological risk assessment
- Multi-media data collection (sediment, fish tissue, benthic invertebrate tissue, water column invertebrate tissue, and surface water)
- Sediment bioassay sample collection and data analysis
- Development of toxicity reference values for use in the ecological risk assessment
- Bioaccumulation modeling/ development of preliminary remediation goals
- Source identification

highlights

- Developed and implemented comprehensive strategy for the assessment of risk to benthic invertebrates and fish
- Developed food web model to describe the relationships among tissue, water, and sediment chemical concentrations
- Developed site-specific sediment quality values
- Performed a risk evaluation to identify contaminants of concern

portland harbor ecological risk assessment

(continued)

The information from these field studies is being used to create a comprehensive strategy for assessing risk to benthic invertebrates, fish, birds, and mammals. To date, Windward has developed:

- Statistical approaches to address the relationship between sediment toxicity and sediment chemical concentrations.
- Toxicity reference values (TRVs) for the ERA based on an exhaustive literature review and analysis. These TRVs have been used in the risk evaluation to identify potential contaminants of concern as well as important exposure pathways for the various receptor groups.
- A bioaccumulation model that incorporates site-specific data on sediment, water, and aquatic organisms, along with literature-based data on chemical properties and dynamics. This model was used to determine the target sediment concentrations needed to achieve specific risk-based goals for tissue chemistry. The model will be one of the tools used in the feasibility study to determine the potential benefits of specific remedial actions.

terminal 117 engineering evaluation/cost analysis

Windward provided environmental and site management services to the Port of Seattle and the City of Seattle for Terminal 117 (T-117), an industrial property within the Lower Duwamish Waterway (LDW) Superfund site. Agency concerns regarding environmental conditions at the property were raised in the early 1970s and followed in later years by formal site investigations. Polychlorinated biphenyls (PCBs) were eventually identified as having impacted site soil and adjacent sediment in the waterway and riverbank. The presence of heavy petroleum products in subsurface soil was also noted. Demolition work on the property and a removal action that targeted PCB-contaminated soil in the former operations area of the site were completed during the late 1990s by other contractors on behalf of the Port. EPA identified T-117 as a candidate for early action in 2003 as part of the LDW Superfund site process because of the contaminated sediment adjacent to the terminal.

Windward completed several rounds of sediment, soil, and groundwater sampling between 2003 and 2008 to further determine the nature and extent of contamination and to gather source control-related information in support of the planned sediment remediation activities. This comprehensive sampling program revealed the presence of elevated levels of PCBs in upland locations adjacent to the river bank, which had not been identified during previous investigations. Windward initiated a comprehensive upland sampling program and completed a data gap analysis report in order to summarize and consolidate all past investigation activities and results throughout the expanded site area.

As part of this effort, Windward identified sources that might need to be controlled as part of any upland cleanup action and developed a source control plan that was consistent with the Washington State Department of Ecology's source control program for the LDW Superfund site. Windward also evaluated the potential for sediment recontamination from both the T-117 upland property and sources within the waterway.

All investigation results and analyses were used to support an engineering evaluation and cost analysis (EE/CA) for an early action at the site. The EE/CA, which was submitted for public review in June 2010, addressed remediation of PCB-contaminated sediment and soils in the adjacent river sediment and river bank, the entire upland T117 property, and city-owned streets in the vicinity of the terminal.

The EE/CA was received favorably by all parties, including EPA, state agencies, stakeholders, and local interests. The site is adjacent to a residential neighborhood, so there was a heightened sensitivity to potential impacts removal actions could have on the community. These concerns were addressed in detail in the EE/CA and effectively communicated through meetings and workshops with the community. Frequent communications with all parties during the drafting of the public review document was key to the project's success. The hard work of Windward staff and the rest of the project team resulted in EPA's site manager receiving an Environmental Justice Award.

location

- Seattle, WA

key services

- Source control/recontamination evaluation
- Multi-media investigations (sediment, soil, and groundwater; and upland)
- Engineering design and remediation
- Multiple sample collection efforts under challenging access conditions

highlights

- Simultaneous management of in-water sediment and upland soil removal actions
- Frequent, focused communication with diverse stakeholder group and highly motivated environmental community
- Flexible study and remediation design that incorporated a variety of potential future site use scenarios

us coast guard west coast indefinite delivery/indefinite quantity (ID/IQ) environmental engineering services contract

Windward is providing environmental engineering consulting services for the US Coast Guard (USCG) as part of the West Coast ID/IQ Environmental Engineering Services Contract. Under this contract since 2007, Windward has conducted, or is in the process of completing, 55 separate task orders. These task orders have included site investigations, remediation services, and permitting and regulatory compliance support, among many others.

Investigations of various sizes have involved soil boring and groundwater monitoring well installations as well as collection of indoor air/vapor, sediment, soil, groundwater, storm drain water, surface water, and seep water samples for chemical analysis. Windward successfully executed investigative programs by developing conceptual site models, transport mechanism evaluations, detailed hydrogeological maps/models, and screening-level ecological and human health risk assessments, as needed.

Remediation services have included system efficiency analysis, design, and implementation of innovative, in situ treatment units, and support for hazardous building-related material and health issues (asbestos, lead-based paint, radon). More recent assignments reflect the continued concerns surrounding stormwater dynamics, including facility compliance reporting (e.g., IERPs, SPCCs) and stormwater infrastructure evaluations. Updating IERPs for several sites also included a facility response plan, a State of Alaska Oil & Hazardous Materials Contingency Plan (C-Plan), and a storm water pollution prevention plan (SWPPP). Updating IERPs required Windward representatives to visit individual sites, meet with facility personnel, and review current state and federal regulations to ensure the client remains in overall compliance.

Permitting assistance has involved the planning and coordination of permit acquisition to meet federal, state, and local requirements, including those of USACE (individual permit), Ecology (401 Certification and Coastal Zone Management consistency), ESA consultation with USFWS and NOAA-NMFS, and NHPA cultural resources assessment.

USCG task orders range in size and technical requirements. Concurrent management and coordination of Windward team resources and subcontractors for several tasks at any given time is common. USCG's continued satisfaction with Windward's work is attributable to: 1) our understanding of the needs and internal resource constraints of each USCG division (e.g., engineering, compliance, facilities); 2) our awareness of regulators' interests; and 3) our ability to make Windward resources available to meet concurrent schedules and project milestones. In addition, open and frequent proactive communication has been integral to our success with the USCG. Using this approach to project management, Windward consistently provides effective support to the USCG no matter the size, technical requirements, or location of the project.

location

- Multiple locations - WA, AK, CA, and OH

key services

- Program and project management
- Site investigations
- Environmental assessment and data management
- Ecological and human health risk assessments
- Remediation services
- Permitting and regulatory support
- Compliance program support and reporting
- Stormwater infrastructure evaluations
- Chemical database management
- Administrative document control
- Comprehensive, multi-media site characterization and remediation support programs
- Developed conceptual site models, transport mechanism evaluations, detailed hydrogeological maps/ models, and screening-level ecological and human health risk assessments
- Facilities management support (i.e., lead-based paint, radon, asbestos)
- Permitting to meet federal, state, and local requirements, including: US Army Corps of Engineers (USACE), Washington State Department of Ecology (Ecology), Alaska Department of Environmental Conservation (ADEC), ESA, US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA)-National Marine Fisheries Service (NMFS), and NHPA
- Stormwater compliance program support (Integrated Emergency Response Plans (IERPs); Spill Prevention, Countermeasure, and Control Plans (SPCC)

hylebos waterway natural resource damage assessment restoration

Windward provided environmental support services to General Metals of Tacoma in association with the natural resource damage assessment (NRDA) of the Hylebos Waterway in Tacoma, Washington. A restoration-based settlement was pursued to compensate for NRD claims associated with a General Metals of Tacoma property located on the Hylebos Waterway. The settlement resulted in the Karileen Restoration Project, the creation of a 10-acre restoration site on the west branch of Hylebos Creek. Services provided by Windward included identifying a restoration project; calculating potential restoration credits using the Habitat Equivalency Analysis model; negotiating with the Natural Resources Trustee Council (Trustees) regarding compensation; procuring permit approval; and providing monitoring and oversight during construction

Windward evaluated potential restoration projects in Commencement Bay, particularly in the Hylebos Creek drainage basin, by researching the limiting factors associated with fish and wildlife, specifically Chinook salmon, which were the focus of the trustee restoration plan. A site was selected on the west branch of Hylebos Creek, and several restoration design scenarios were evaluated. Windward worked closely with the trustees, permitting jurisdictions, and local community groups to identify the best possible scenario for restoration at this site. The result was a publicly supported restoration design that would provide compensation for the NRD claims by restoring fish and wildlife habitat, in particular salmon spawning habitat.

Windward also facilitated the permit review process, coordinating permit acquisition and concurrence on project design among federal, state, and local jurisdictions, and coordinated the scoping of costs for tasks related to the planting effort, including plant installation, irrigation, and ongoing maintenance. During construction, Windward monitored fish and water quality in compliance with permit requirements and provided oversight during construction for consistency with the design plans. The project enhanced 600 feet of creeks and 1.95 acres of wetlands and involved the installation of almost 40,000 plants and over 200 pieces of large woody debris. Wetland enhancement during construction included the removal of invasive plants, placement of large woody debris, and improvement of the hydraulic connection between the floodplain and the stream.

Following construction, Windward created a 10-year monitoring program to evaluate the development of restored habitats and ensure compliance with performance criteria. Upon completion of the in-water stream and wetland work, the Trustees stated that they were very pleased with the construction results.

location

- Tacoma, WA

key services

- Evaluation of potential offsite restoration projects for NRD compensation
- Feasibility assessment of potential restoration scenarios
- Restoration site design
- Procurement of federal, state, and local permits
- Monitoring and oversight during construction to ensure compliance with performance standards and design criteria

highlights

- Restoration-based settlement of NRD claims
- Coordination of site selection, project design, and permit acquisition
- Oversight of in-stream and wetland work
- Development of postconstruction monitoring program

seattle public utilities combined sewer outflow characterization

The City of Seattle (City) asked Windward to prepare a characterization report to satisfy the City's National Pollutant Discharge Elimination System (NPDES) permit requirements and help evaluate the need for further control efforts. The NPDES permit required that a characterization report be prepared every 5 years.

Budget limitations precluded any fieldwork or the collection of new data. Thus, Windward staff designed an approach using existing data and statistical modeling to provide the City with useful information for evaluating the combined sewer overflow (CSO) program. The approach had two primary objectives:

- Use data from CSOs in other municipalities in the Northwest to predict the chemical and bacteriological quality, and ultimately the potential impact on receiving water quality, of the City's CSO discharges.
- Review existing data to determine whether there was any evidence that environmental impacts, primarily in sediment adjacent to the outfalls, could be attributed to CSOs.

A relational database consisting of CSO discharge chemistry data from the City of Bremerton (Washington), the Greater Vancouver (BC) Regional District, and King County (Washington) was compiled. Various multivariate statistical analyses were conducted to develop algorithms that could predict CSO water quality. Water quality was assessed relative to Washington's numeric criteria for toxic compounds. Historical sediment chemistry data from receiving waters potentially influenced by CSO discharges were compiled and reviewed to determine whether spatial signatures attributable to CSOs could be determined. These data were combined with biomonitoring data in a weight-of-evidence approach.

Five chemicals of potential concern were examined quantitatively: copper, zinc, fluoranthene, phenanthrene, and bis(2-ethylhexyl) phthalate. Only copper had a reasonable potential to exceed ambient water quality criteria at the end of the pipe, and a qualitative mixing zone analysis concluded that criteria would not be exceeded in the far field. Generally, no clear signal attributable to CSOs could be identified in sediment adjacent to the outfalls. The CSO characterization document satisfied NPDES permit requirements and was accepted by the Washington State Department of Ecology (Ecology). As a result of Windward's work, the City was not required to devote scarce resources to collecting unnecessary and costly chemistry data.

location

- Seattle, WA

key services

- Reviewed and summarized historical Prepared a characterization report for the City's CSOs
- Designed an approach using existing data and statistical modeling to provide the City with useful information for evaluating the CSO program
- Compiled a relational database consisting of CSO discharge chemistry data
- Compiled historical sediment chemistry data from receiving waters potentially influenced by CSO discharges

highlights

- CSO characterization document satisfied the NPDES permit requirements and was accepted by Ecology
- No clear signal attributable to CSOs could be identified in sediment adjacent to the outfalls

stormwater and source control compliance program

Windward was retained by a confidential client to assist with the implementation of a stormwater program for a facility in Tukwila, Washington. The property is adjacent to the Lower Duwamish Waterway, an industrialized waterway that has been listed as a Superfund site. The stormwater infrastructure at the facility needed to be assessed because of its complexity, age, and problems with groundwater infiltration into the stormwater system.

Windward determined that the stormwater system needed to be cleaned and oversaw vactor truck cleanout of drainage lines and catch basins on the property. Windward also oversaw video inspection of the drainage lines after the cleanout was complete and documented cleanout activities with detailed reports that were submitted to the Washington State Department of Ecology (Ecology). AutoCAD drawings were prepared using historical drainage system maps and information obtained during the storm drain system cleanout and video inspection activities to provide accurate maps of the facility's storm drainage system layout and to identify points in the system where groundwater was infiltrating the pipes.

In order to prevent groundwater infiltration into the stormwater system, Windward recommended that the client replace one of the catch basins at the downstream end of the system. Windward is preparing design drawings and specifications for the replacement of this catch basin and is working to obtain the necessary permits from local and state agencies.

Windward has also assisted the client in maintaining their stormwater treatment systems, which consist of Vortechs® and StormFilter® technologies. Windward provided oversight of cleanout activities for these systems and the replacement of the cartridges in one of the StormFilter® chambers. Windward also has monitored and helped maintain operation of the pumps associated with these systems.

Windward conducted a series of site inspections at the facility in order to identify additional best management practices (BMPs) that could be implemented to protect stormwater quality. It was recommended that the client pave portions of the facility yard where soils were exposed and implement additional housekeeping procedures. Windward also reviewed and updated the facility's surface water pollution prevention plan.

Windward also provides stormwater monitoring services in support of the client's National Pollutant Discharge Elimination System (NPDES) permit and prepares the discharge monitoring reports for submittal to Ecology.

location

- Tukwila, WA

key services

- Stormwater system inspection and maintenance
- Stormwater system mapping
- NPDES permit support
- Engineering design for catch basin replacement

highlights

- Successful troubleshooting of stormwater treatment systems
- Identification of effective stormwater BMPs
- Design services for improved stormwater infrastructure
- Implementation of source control in a multi-regulatory environment (Comprehensive Environmental Response, Compensation, and Liability Act and Model Toxics Control Act)

seattle-tacoma international airport construction stormwater monitoring

Windward is providing ongoing support to the Port of Seattle (Port) to meet the construction stormwater discharge water quality requirements of the Port's National Pollutant Discharge Elimination System (NPDES) Permit and Section 401 Water Quality Certification, as applicable to Master Plan Update Improvement Projects and other related construction activities at Seattle Tacoma International Airport (STIA).

Windward conducts all monitoring preparation, field sampling, and related support in accordance with the Port's standard operating procedures for construction stormwater monitoring at STIA. Windward field crew leaders monitor local weather forecasts and real-time precipitation amounts on an ongoing basis to identify qualifying storm events for monitoring. Field crews initiate sampling for stormwater quality monitoring within one hour of a qualifying rain event (i.e., 0.5 in. or more of rain in the previous 24 hours, as determined at 8:00 AM), as required by the Port's NPDES permit. Runoff samples from stormwater drainage system outfalls, as well as receiving water from upstream and downstream monitoring locations, are collected and analyzed in the field for turbidity and pH. If required (based on the presence or absence of a visual sheen), samples for total petroleum hydrocarbon analysis are collected and submitted to a commercial analytical laboratory. After each monitoring event, Windward submits construction monitoring data reports to Port Aviation Division environmental staff for use in monthly discharge monitoring report submissions to the Washington State Department of Ecology (Ecology).

Windward also provides other services in support of the Port's NPDES permit, including preparation of construction stormwater monitoring plans for submittal to Ecology for planned projects at the 90% design level, on-site inspections of construction site best management practices (BMPs), monitoring of construction dewatering discharges and instream construction work, and permit renewal assistance.

location

- SeaTac, WA

key services

- Performance of rain-triggered construction stormwater monitoring
- Preparation of construction stormwater monitoring plans
- Inspection of construction site BMPs
- NPDES permit support

highlights

- Assisting the Port with meeting NPDES permit requirements and complying with all other applicable permits and regulations
- Ongoing tracking of weather forecasts and actual precipitation amounts to identify qualifying storm events for monitoring
- Initiation of immediate water quality sampling in response to qualifying storm events
- Successful sampling of more than 100 rain-triggered monitoring events over the course of the project