

**Urban Clean Water Technology
Innovation Partnership Zone
BUSINESS PLAN**

I. Mission. The mission of the IPZ is to accelerate development of a globally competitive research-based urban clean water cluster in order to drive capital investment and private job creation in Tacoma-Pierce County, WA.

II. Goals.

- Retain and expand existing businesses and organizations in the urban clean water cluster.
- Recruit and attract businesses and organizations that enhance the value of the cluster.
- Establish conferences and symposia related to urban clean water that increase the cluster's global profile.

III. Leadership/Governance.

Description of the management team and roles:

The City of Tacoma, Port of Tacoma, Economic Development Board for Tacoma-Pierce County, Washington Economic Development Commission, University of Washington Tacoma, Washington State University and others have been engaged in an innovative and collaborative effort for the past 18 months with regard to development of the Urban Clean Water Technology Cluster. Leaders at the highest levels of these organizations have been engaged in crafting a strategy for growing the cluster, building on the community's assets and achieving the mission stated above.

The City of Tacoma will be the administrator for the Urban Clean Water Technology Innovation Partnership Zone, with significant support from the other entities.

Leadership Team:

- Rey Arellano, Interim City Manager, City of Tacoma – City will be zone administrator and fiscal agent
- Dr. Debra Friedman, Chancellor, University of Washington Tacoma – UWT will be lead research entity and higher education provider
- Dr. Joel Baker, Professor, Environmental Science, UWT; Science Director, Center for Urban Waters – Dr. Baker is lead researcher and collaborator
- Connie Bacon, Commissioner, Port of Tacoma – Port owns vacant property in the Zone available for development and is committed to protecting waterways
- Bruce Kendall, President and CEO, Tacoma-Pierce County Economic Development Board – EDB will lead data collection, recruitment of new firms and assistance for expanding firms
- Dr. Pamela Transue, President, Tacoma Community College – TCC will lead workforce development and corporate training

- Rita Schenck, Chair of the Board and Executive Director, Institute for Environmental Research and Education – IERE is resource for lifecycle assessments and other environmental evaluations for City, Port and private businesses
- Jeff Peacock, President & CEO, Parametrix – Company is liaison to private sector, IPZ advisor

Anticipated Partner Involvement & Investment:

Each partner is committed to providing the human resources necessary for the Urban Clean Water Technology Innovation Partnership Zone to be successful.

- City of Tacoma
 - Act as the Zone Administrator.
 - Compile annual performance data as required by the Department of Commerce (DOC) from all Parties and submit all required reports.
 - Act as the fiscal agent for the Zone, manage capital grants that may be provided by DOC under the Act, submit budget updates and invoices for reimbursement, and ensure compliance with all grant requirements.
 - Market the Zone for location of commercial businesses and research laboratories that would benefit from collocation within the Zone.
 - Continue development of the city’s stormwater management program, which is recognized as one of the best stormwater systems in the country. This program is based at in the Center for Urban Waters, a facility representing a \$37.8 million investment by the City.
 - Pursue development of Center for Urban Waters II on city-owned property across the street from the CUW to provide space for additional government agencies engaged in environmental work, incubator space for private businesses, and offices for established businesses and nonprofits engaged in the cluster.
- University of Washington Tacoma
 - Provide access to non-proprietary research relevant and appropriate to urban clean water, as determined by UWT, to advance the objectives of the Zone. Dr. Joel Baker, an internationally known leader in urban water science, is the research chair for the Center for Urban Waters and the UW Tacoma professor taking a leading role in IPZ/UW Tacoma integration. Dr. Baker is a member of the Puget Sound Partnership Science Panel, which he chaired from 2007-2009. He has co-authored more than 90 papers on contaminant cycling in the Great Lakes, the Chesapeake Bay and coastal waters, and edited Atmospheric Deposition of Contaminants to the Great Lakes and Coastal Waters (SETAC Press, 1997). He was the lead author on a scientific review of PCBs in the Hudson River, a contributing author to the Pew Oceans Commission report Marine Pollution in the United States, and a member of the NRC's Committee on Oil in the Sea. He chaired the New York Harbor Model Evaluation Group, advised the European Commission on water quality modeling, and served on the Board of Directors of the Society of Environmental Toxicology and Chemistry.
 - Develop a plan for collaborating with the other Parties for investigating commercially valuable research opportunities applicable to businesses in the Zone and for providing training capacity. Provide staffing to develop the plan.

- Provide staff and programs to support research and training:
 - During development of the Center for Urban Waters, an endowed chair was established to attract a leading researcher of water pollution in marine environments to the University of Washington Tacoma. Dr. Joel E. Baker was selected as the first holder of the endowed chair. He leads a marine research program at the UW Tacoma using laboratory facilities at the Center for Urban Waters and other university facilities. Four organizations funded the endowment: The Port of Tacoma contributed \$1 million, the City of Tacoma and SSA Marine contributed \$500,000 each, and the University of Washington Foundation matched the contributions with \$1 million.
 - The Environmental Program at UW Tacoma has 13 faculty and several staff who support bachelor's degree programs in Environmental Science and Environmental Studies and a certificate in Restoration Ecology that serve more than 150 students a year. The Environmental Program takes advantage of the Puget Sound being in its front yard. The curriculum, internship opportunities and research maintain local community ties while exploring global perspectives. These ample networking opportunities provided to UW Tacoma students have resulted in excellent career opportunities for graduates and provide a natural pipeline for skilled workers in clean water technology.
 - The Puget Sound Institute at UW Tacoma was funded with \$4 million from the EPA to enhance the integration of science into the restoration and preservation of the Puget Sound ecosystem. Under the direction of Dr. Baker and located at the Center for Urban Waters, the Institute will focus university researchers on priorities of the Puget Sound Partnership, which may include issues relevant to the Urban Clean Water Technology IPZ.
- Port of Tacoma
 - Market, to the extent practicable, vacant property located within the Zone to potential customers engaged in business related to the intent of the Zone; *provided*, that nothing herein shall prevent the Port from leasing or selling property to any entity the Port, in its sole discretion, deems appropriate.
 - Regularly convey to the Parties examples of the environmental challenges of its business and identify areas where scientific research and emerging technology are needed.
- Economic Development Board for Tacoma-Pierce County
 - Manage collection of data regarding performance of the IPZ, including private investment, job creation and other measures of innovation. See section VII for complete set of metrics.
 - Work directly with private firms in the IPZ to assist in their expansion.
 - Recruit new firms into the IPZ. The EDB recently hired an experienced economic development professional, Bill Stewart, as a business recruitment vice president to assist in this effort. A list of targeted firms in the U.S. and abroad has been developed and outreach has begun.
- Tacoma Community College
 - Serve as the lead for workforce development and corporate training for business and industry in the Zone.
 - Develop training modules, courses, and certificates that transfer directly into the Environmental Science degree and UWT, and utilize research findings to develop corporate training and workforce development investments for the zone's business and industry through Invista Performance Solutions group – the collaborative, corporate training division of the four Pierce County Community and Technical Colleges.

- Serve, through Invista Performance Solutions, as a training provider for potential companies for the Zone and act as a regional training partner for the region’s economic development clusters.
- Serve as the West Coast Affiliate for Global Corporate College and bring resources in workforce development and corporate training in the emerging field of clean water and sustainable business practices.
- Institute for Environmental Research and Education
 - Serve as a resource to the City and the Port in evaluating environmental impacts from their business operations.
 - Continue to work with the City on carrying out the action items outlined in Resolution #38188 in the area of collecting life cycle inventory data, to include water utilities.
 - Assist local businesses in the Zone to conduct *Life Cycle Assessments* (including water footprinting) and obtain Environmental Product Declarations (Type III Eco-labels) for their products and services.
 - Provide information to the EDB on life cycle approaches for business recruitment and retention in the Zone.
- Parametrix, GeoEngineers and CH2M HILL
 - Provide liaisons to the private sector.
 - Provide advice and guidance to facilitate the successful development of the IPZ.
 - Collaborate with UWT and Urban Waters on research projects.
 - Evaluate and include new technologies into project designs.

Sustainability Plan for the Next Four Years:

Our sustainability plan focuses on expanding the research and commercialization capacity within the IPZ by conducting the following activities:

- Expand the existing footprint of the Center for Urban Waters by pursuing implementation of Center for Urban Waters II. The current and future facilities are funded by local utility fees and do not rely on property or other taxes for support. The City already owns the property for CUW II across from the Center for Urban Waters and has the opportunity to acquire more land if needed.
- Establish an ongoing global conference focused on urban clean waters, leveraging Dr. Joel Baker’s and Dr. John Stark’s experience and worldwide reputation, coupled with support and resources from each of the IPZ partners. The conference would begin the branding process, enabling Tacoma’s IPZ to become known as a key resource for solving urban water problems. The Port of Tacoma has already initiated work with a conference planner. The conference would be held within 18 months of designation as an IPZ. Collaboration with two other U.S. cities – Philadelphia, PA, and Milwaukee, WI, both having similar urban clean water zone designations – would facilitate the creation of a “rotating conference” to be held among the three cities every third year. We anticipate that the event will help brand Tacoma as the “place to go for answers” when it comes to urban water issues.
- Host workshops and training sessions within the Center for Urban Waters to advance educational opportunities among local two-year college and UW Tacoma students. This “immersion training” would expose students to proper laboratory procedures, modern diagnostic protocols, and equipment maintenance to increase their knowledge and desirability in the job market. It also could increase the

ability of the Urban Clean Water Zone to more cost-effectively manage and maintain laboratory operations.

- Transition at least three technology applications and approaches to a commercial phase to create revenue for the IPZ-engaged partners and attract new IPZ participants. Creating a revenue stream would further support and enhance the continued development of the IPZ.
- Collaborate with other government entities, such as the U.S. EPA's Office of Sustainable Communities and its cross-agency initiative. This program is helping communities throughout the U.S. develop holistic plans for smart growth. As one of three contract holders working with the EPA on this initiative, CH2M HILL will support efforts to work with the EPA and, as feasible, provide support for research and policy analysis, technical assistance, communications and outreach, and promote Smart Growth principles. The EPA's Office Sustainable Communities helps communities develop plans that include environmental impacts, housing and community design, infrastructure and transportation systems, health, real estate finance and development, and public sector finance for development.
- Recruit new businesses through the Economic Development Board, which has increased its recruiting capacity by hiring an experienced economic development professional as a business recruitment vice president. Over the past 10 years, the EDB has worked with firms in a variety of sectors that have created more than 14,000 jobs and invested more than \$1 billion in Tacoma-Pierce County. The EDB will bring this experience to bear on the IPZ effort.
- The objectives of the IPZ naturally integrate with the research priorities of the Center for Urban Waters and its research foci related to issues identified by the Puget Sound Partnership, the Puget Sound Institute and UW Tacoma faculty. There is tremendous momentum created by the endowed research chair, held by Dr. Joel Baker, who leads the research arm of the Center for Urban Waters, and the ongoing Environmental Science and Environmental Studies programs at UW Tacoma, which not only help sustain the efforts of the IPZ but will build upon them.

IV. Strengths of the IPZ.

Technology. World-class, cutting-edge science is being conducted in the IPZ by the University of Washington Tacoma and Washington State University. Companies in Tacoma-Pierce County such as Parametrix, GeoEngineers, and CH2M HILL are developing/using products and services with global reach in the clean water field. See Appendix for information on Parametrix, GeoEngineers and CH2M HILL.

Human Capital. Dr. Joel Baker (UWT) and Dr. John Stark (WSU) are internationally recognized leaders in clean water research and applications. Dr. Baker has done extensive research on the Chesapeake Bay and Great Lakes and is engaged in scientific discussions about contaminated water that span the globe. Dr. Stark leads a critical research effort to understand and mitigate the impacts of pesticides on endangered species, especially iconic Pacific Northwest salmon species. The universities, Tacoma Community College, City of Tacoma and the private businesses in and around the IPZ are populated with highly accomplished, highly motivated researchers, technicians, entrepreneurs, and private service providers.

Education and training programs will be developed to support tech transfer at multiple levels throughout the process, beginning with workshops for university professors to enhance their ability to work well with businesses interested in bringing products from research to market (the IPZ has access to experts experienced in this kind of program). Meetings will be held at regular intervals with IPZ partners and support organizations to generate ideas, build alliances and coordinate exploration of potential new markets. Meetings with the TacomaAngel Network – which includes successful entrepreneurs, retired executives, and other area business leaders – will be held to exchange information as appropriate.

Products and services generated are likely to include implementation of highly technical scientific techniques and processes that graduates of the UW Tacoma Environmental Science program will be prepared to implement. New techniques and knowledge may be integrated into the curriculum as necessary for this purpose. Educational pathways including transfer degree partnerships between TCC and UW Tacoma science programs, and other academic programs can be enhanced and marketed as preparatory for work in the urban clean water technology field. TCC also can integrate vocational programs into this effort as needed.

Professional development courses can be developed and conducted by UW Tacoma, TCC and Invista Performance Solutions. With Invista, WorkForce Central (Tacoma-Pierce County Employment & Training Consortium) and UW Tacoma, the IPZ has access to a wealth of experience and resources for developing high-quality training programs. This consortium has capability to meet workforce training needs that emerge from the IPZ, ranging from one-time courses to more extensive training programs.

To get children interested in protecting Tacoma's environment and in studying environmental sciences, the City of Tacoma offers environmental education programs for K-8th grade students in Tacoma public and private schools. The 10-year-old EnviroChallenger program, targeting grades 2-8, offers lessons on a variety of environmental topics, including water pollution, stormwater, salmon and wastewater. A new art component for the EnviroChallenger program, targeting grades K-3, will be piloted in January 2012.

This wealth of educational resources will support development of a workforce prepared to address the emerging skills and knowledge-base necessary to help establish a competitive advantage for the region in the area of urban clean water technology.

Infrastructure. The IPZ is convenient to the Central Business District (CDB) and the UW Tacoma. D Street provides access from the south with a raised roadway above the rail yard eliminating conflicts between rail and auto movement. The historic Murray Morgan (11th Street) Bridge is being refurbished and, when completed in December 2012, will provide a direct east-west route connecting the CDB to the IPZ. Tacoma is centrally located within the Puget Sound region and offers easy access to Interstate 5, Highway 16, regional rail lines and SeaTac International Airport.

The area includes the zone anchor, the Center for Urban Waters, and environmental remediation firms and businesses that depend on clean water for successful operations.

The Center for Urban Waters houses a community of environmental scientists, analysts, engineers and policymakers developing creative and sustainable solutions to restore and protect urban waterways. The

51,000-square-foot center houses City of Tacoma Environmental Services labs and offices, UW Tacoma researchers and the Puget Sound Partnership.

The city is in the planning stages for the Center for Urban Waters II, a building adjacent to the existing Center that would house additional government agencies engaged in environmental work and offer incubator space for private businesses and offices for established businesses and nonprofits engaged in the cluster.

The zone includes 22 acres of prime Port of Tacoma property available for development by clean water technology-based companies.

The Port offers a natural laboratory for clean water technology research and provides a ready market channel for disseminating potential solutions.

- V. Long term market growth for the technology.** Many experts contend that clean water is one of the two greatest challenges facing humanity in the 21st century. The other is energy. The market opportunities for technologies being developed in the IPZ are widespread both domestically and overseas.

A study by Berk, a Seattle consulting firm, was completed in June 2011. Berk gathered information on the current landscape of related businesses and organizations already in Tacoma, businesses and organizations that could be targeted for recruitment to add to a clean water technology cluster, and related conferences and symposia that could be targeted for recruitment to Tacoma. Berk's final report includes an overview of the clean water landscape, interview findings and implications, and a database of recruitment and retention targets; conferences, symposia and meetings; potential funders; and associations. Market trends and opportunities for market growth identified by Berk include:

- Federal and state regulations will become increasingly tight and enforcement and monitoring will be stepped up, driving demand for stormwater management maintenance and services.
- Industries' demand for stormwater management products and services will show strong growth.
- Military installations will demand more stormwater management products and services.
- Retrofitting of old systems with new technologies is a big market opportunity. Federal funding may spur retrofitting of old municipal systems.
- Technologies for water remediation will be in demand for water reuse and for producing remediated water to re-charge aquifers.
- Public markets for stormwater management products and services are growing as the EPA has established more guidelines and rules that municipalities will have to follow. Smaller jurisdictions with limited resources will need new stormwater management approaches.
- New energy-efficient systems will be needed to replace the energy-intensive legacy systems being used to clean water.

- VI. Entrepreneurial climate in the proposed IPZ.** Tacoma is a city of collaborative innovators. To date, entrepreneurs and researchers operating in or near the IPZ are working on products related to clean drinking water, salmon habitat, stormwater cleanup/pollution prevention, and others. Tacoma has unique assets in clean water research, services and businesses that are already collaborating around shared

objectives. The Tacoma-Pierce County area has everything needed to build a comprehensive innovation ecosystem. Already in place:

- The Center for Urban Waters is the focal point of the zone. It is a partnership of the City of Tacoma, the University of Washington Tacoma and the Puget Sound Partnership, linking researchers and policymakers with the city. The Center is a draw for existing businesses, nonprofit organizations and start-ups that want to benefit from this rich concentration of environmental research, clean water management applications and policy development.
- The Center for Urban Waters and WSU Puyallup are already networked through the Washington Stormwater Center, which serves NPDES permittees and stormwater managers as they navigate the complexities and challenges of stormwater management. (NPDES is the EPA's National Pollutant Discharge Elimination System, designed to reduce pollution by regulating sources of pollution that discharge into the nation's waterways.)
- The City of Tacoma's Stormwater Management Program, based at the Center for Urban Waters, is nationally recognized for measurably improving the quality of stormwater discharged into receiving waters. The city's proven approaches can provide the basis for research and a competitive edge and credibility for businesses focused on developing innovative solutions to the fast-growing market emerging around stormwater management.
- The Puget Sound Institute, also located at the Center, is a cooperative agreement between the University of Washington, the U.S. Environmental Protection Agency and the Puget Sound Partnership that seeks to catalyze rigorous, transparent analysis, synthesis, discussion and dissemination of science in support of the restoration and protection of the Puget Sound ecosystem. The Institute will provide expert advice based on the best-available science.
- The Clean Water Technology Cluster Team is a collaboration of regional and state economic development leaders, city and congressional elected officials, Port of Tacoma, UW Tacoma and WSU, and local business leaders that has been working for two years to lay the foundation for an effective strategy to leverage local assets and associated businesses along the West Coast with a focus on accelerating the development of the urban clean water technology cluster. The team is working with Berk Consulting, a firm specializing in cluster development, to research strategic opportunities.
- The zone is supported by Marine View Ventures, the economic development arm of the Puyallup Tribe, which is focused on leveraging its existing assets to generate above-market returns for the Tribe and its strategic partners. Clean water and the creation of related jobs and businesses within the Puyallup Watershed is a primary interest of the Puyallup Tribe.
- The TacomaAngel Network (TAN), which focuses on supporting local and regional entrepreneurs, has fostered a partnership with the University of Washington Tacoma and will be available to review proposals developed within the zone. TAN is a nonprofit alliance of investors who provide investment

capital, strategic advice and mentoring to early-stage companies or companies embarking on major expansions.

- Education and workforce training are readily available with the Environmental Science Program at UW Tacoma and the transfer and vocational programs of Tacoma Community College. The zone is also supported by Invista Performance Solutions, a single point of contact that allows businesses to access education and training through Bates Technical College, Clover Park Technical College, Pierce College District and Tacoma Community College in Pierce County. These educational assets are poised to address workforce solutions required to support new business applications that may evolve from activities within the zone.

VII. Commercialization plan. Extensive research has already been done to identify strategic opportunities for a Tacoma-Pierce County Urban Clean Water Technology Cluster. The Berk report surveyed the current landscape of related businesses and organizations already in Tacoma, businesses and organizations that could be recruited to add to the cluster, and related conferences and symposia that could be target for recruitment to Tacoma.

A website, www.waterworkshere.com, was created to serve as a portal to the world-class talent and state-of-the-science resources already in place.

On the private side, each product and service being developed in the zone is under the control of its owner. For example, one firm is working on proprietary technology with regard to clean drinking water and low-water agriculture. In addition, UWT and WSU have technology commercialization offices that can facilitate commercialization of systems and products developed at the universities. In addition to the Center for Commercialization, assets of the UW include a track record as one of the top universities in the nation for receiving federal research funding, and a new president with a strong track record for commercializing research.

Our commercialization plan is results-oriented and focuses initially on partnering with local businesses to obtain matching grants, for example from the EPA Environmental Innovations initiative, to support the development of products geared to the clean water market. We then would supplement and/or replace such grant funding by supporting the further development of products that meet the following criteria:

- Have a commercialization outcome.
- Have a commercialization partner (public or private) who contributes at least 50 percent to the project.
- Have established tangible deliverables and metrics to measure project performance.

While science commercialization can be novel, we believe it will add significant value to the IPZ by promoting the economic sustainability of the scientific and business communities within the IPZ. Potential sources for commercial partners include the engineering companies who support the IPZ, along with other businesses who are developing proprietary technologies in the area of clean water.

VIII. Plan for measuring and reporting. Our management team has designated the Economic Development Board (EDB) for Tacoma-Pierce County as the lead agency for creating and implementing the plan to

measure progress against our proposed metrics. Because the EDB currently collects similar and relevant data throughout the city and county, it is a logical entity to lead this effort. The City of Tacoma, in its role as Zone Administrator, will facilitate review of the performance reports among the management team, and will submit the reports to State Department of Commerce in compliance with appropriate guidelines.

The initial plan for measuring program success will use metrics designed to reflect increasing success in achieving the mission and vision of the Urban Clean Waters Innovation Technology Zone. The plan will measure the following key performance indicators (KPIs) on a rating scale of 1 to 3, with 1 equating to “does not meet KPI,” 2 meaning “partial success in meeting KPI,” and 3 designating “full achievement of KPI.” Examples of our initial KPIs are shown below:

Year One:

- Attract one private investment
- Assist one existing firm to expand
- Create 1-5 new jobs
- Accomplish initial regional branding via targeted communications
- Collaborate with other cities to develop conference (e.g., Philadelphia and Milwaukee)

Year Two:

- Attract additional private investment for a total of two
- Assist additional existing firm to expand for a total of two
- Attain one matching grant to support IPZ development
- Create 5-10 new jobs
- Finalize proposal to site an Urban Clean Waters Conference in Tacoma to expand branding on a national basis

Year Three:

- Attract additional private investments for a total of three
- Assist additional existing firm to expand for a total of three
- Create 10-15 new jobs
- Implement matching grant successfully
- Demonstrate strong presence at Urban Clean Waters Conference to expand branding internationally
- Host at least one student workshop in the IPZ to provide education/training on urban clean waters programs

Year Four:

- Attract additional private investments for a total of four
- Assist additional existing firm to expand for a total of four
- Continue the successful implementation of the matching grant
- Create 15-20 new jobs
- Demonstrate strong presence at Urban Waters Conference to continue branding on a international basis
- Host at least one student workshop in the IPZ to provide education/training on urban clean waters programs

Urban Clean Water Technology
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Business Plan

APPENDIX

Parametrix

Parametrix is an engineering, planning and environmental solutions firm with offices in cities throughout the western United States and clients in every corner of the globe. The company offers an integrated approach to sustainable solutions for solving water and wastewater problems – small or large, municipal or industrial – using the latest in technology and cost-savings.

Parametrix engineers pioneered the use of ultraviolet (UV) disinfection to wastewater treatment in Washington state. Today, Parametrix is an industry leader in the use of new technologies such as micro-filtration using membranes to treat process wastewater. Similarly, the company is constantly researching, developing and evaluating treatment technologies to meet the changing regulatory environment for stormwater, specifically focused on Puget Sound basin recovery activities.

Parametrix scientists have developed a unique approach to evaluating and measuring changes in ecosystems services at landscape and site level scales. Their ecosystems services work was recently highlighted in the Presidential Report “Sustaining Environmental Capital; Protecting Society and the Economy” and is currently being employed at locations around the world for Fortune 500 companies, nonprofit organizations and government agencies, including applications in the emerging areas of marine spatial planning and renewable energy along the west coast of the United States.

The company offers comprehensive engineering and environmental services in a variety of areas vital to the IPZ, including storm and surface water management, drinking water, and wastewater treatment, disposal and conveyance. Parametrix also focuses on natural resources and planning, transportation, environmental engineering and science, toxicology and risk assessment, cultural resources, community building, surveying, landscape architecture, and program/construction management.

GeoEngineers

GeoEngineers is a national integrated earth science and technology company with an office in Tacoma, and 15 other offices located in Missouri, Idaho, Washington, Oregon, California, Utah and Louisiana. GeoEngineers offers an integrated suite of services for companies looking to build communities, harness and manage the earth’s resources, and move both products and people. Since the company was founded in 1980, it has successfully completed more than 25,000 projects worldwide for clients in the energy, transportation, water and natural resources, development and federal markets.

GeoEngineers provides a range of surface and groundwater services that assist clients in finding cost-effective water resource solutions. Successful water resource management requires a comprehensive approach that recognizes the interplay between practical experience and complex scientific analysis. GeoEngineers employs a deep understanding of surface and groundwater science, and “in-the-water”

experience to assist clients in finding cost-effective water resource management solutions.

GeoEngineers offers the following services:

- Watershed services – watershed analysis, drainage basin evaluation, critical/sensitive areas interpretation, hydrologic modeling, GIS mapping and data management
- Hydrogeologic evaluation – aquifer recharge, ground water availability and aquifer characterization
- River and stream channel studies – fluvial geomorphology, scour analysis, sediment transport analysis, channel migration delineation, floodplain management, hydraulic modeling
- Wellhead protection – contamination studies, ground water flow modeling, well field exploration, inventory classification
- Water supply development – water rights, site design, geotechnical and geologic, water quality sampling, infiltration/recharge facility modeling, horizontal directional drilling design
- Groundwater control – construction dewatering, seepage control, saltwater intrusion
- Natural resource protection- fish passages, culverts and hatcheries

GeoEngineers' strength lies not just in its expertise, but in the way it is able to apply this deep knowledge to discover innovative solutions to the challenge at hand. The company has hundreds of experts working locally and across the globe. In addition to the U.S., the company has completed projects in Canada, Latin America, South America, Europe, Africa, Asia and Australia.

The company's philosophy includes its trademark tagline, "We Find a Better Way®." The company's intent is to find a better way to apply earth science and technology to improve the world we live in, and to deliver outstanding client service. Tacoma's IPZ will make this happen for GeoEngineers.

CH2MHILL, Inc.

CH2M HILL is a global project delivery company, helping clients build a better and more sustainable world. Founded in 1946 in Corvallis, Oregon, CH2M HILL has grown to become the No.1 ranked program management firm, the No.1 design firm in sewer/wastewater treatment, and the No.1 environment firm in the United States (*Engineering News-Record, 2011*). With 166 offices and more than 23,000 employees, CH2M HILL is the largest employee-owned, full-service engineering, program management, consulting, operations, and related technical service firm in the U.S. The firm is financially stable with gross revenues of \$6.3 billion in 2010.

CH2M HILL, which has offices located on every continent, provides a full spectrum of services in water, environment, energy, communications, construction and transportation, and has delivered some of the largest and most challenging infrastructure programs in the world. The company's projects depend on its teams of experts to bring the knowledge gained from a wide array of projects around the world, rigorous attention to detail, and a capability to create innovative solutions that are also models for

industry. The firm's solutions keep sustainability always in mind, along with government regulations, environmental concerns, maintenance requirements and public perceptions.

The local staff has access to the depth of CH2M HILL's global water and wastewater technology network, which means that the local office in Tacoma works with a team that understands and appreciates local needs, ranging from water resources and wastewater infrastructure services, to studies and analyses, to facilities planning, design, construction, startup, and operations.

CH2M HILL delivers global capabilities on every local project through tools and processes designed to efficiently identify best practices and solutions for each individual client's needs. For example, in the water market, nutrient removal is one of the biggest challenges facing most wastewater treatment clients. CH2M HILL's record of nutrient removal innovation and implementation successes includes a history of research, development and application of nutrient removal processes as exemplified by the number of patentable nutrient removal technologies the company has developed and pioneered, including:

- 1989: High-rate biological wastewater treatment process (Patent #: 4,867,833)
- 1996: Step-feed Bio-P (Patent #: 5,480,548)
- 2003: Moving bed reactors (MBRs) for nutrient removal (Patent #: 6,517,723)
- 2005: Method for treating wastewater using membrane filters (Patent #: 6863818)
- 2004: MBR application to second-stage nitrification (Patent #: 6,723,244)
- 2005: Very low phosphorus removal using MBRs (Patent #: 6946073)
- 2006: Chemical enhanced primary sludge fermentation (Patent #: 6982036)
- 2007: Method for treatment wastewater (Patent #: 7279102)
- 2008: Wastewater treatment system (Patent #: 7435340)
- 2011: Low phosphorus water treatment methods (Patent #: 7927493)