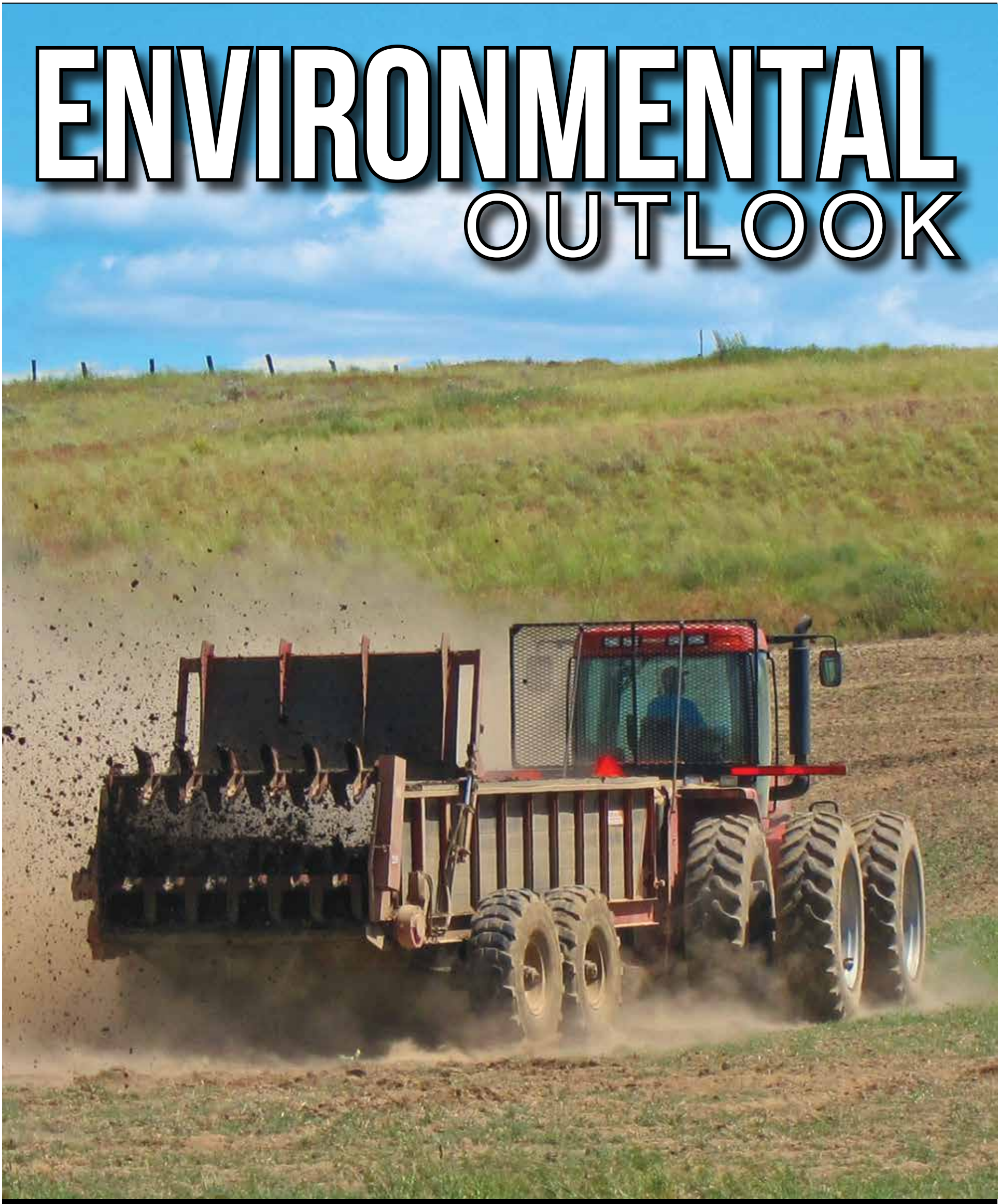
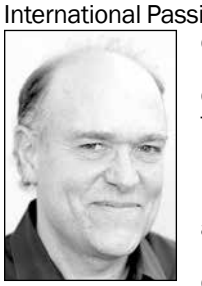
ENVIRONMENTAL OUTLOOK



PASSIVE HOUSE FINDS A PERMANENT HOME IN THE NORTHWEST

More local developers and builders have been adopting the energy-efficient standards.

Passive House design and building concepts have gained significant popularity worldwide over the past several years with more than 50,000 residential and non-residential units in existence, according to the International Passive House Association.



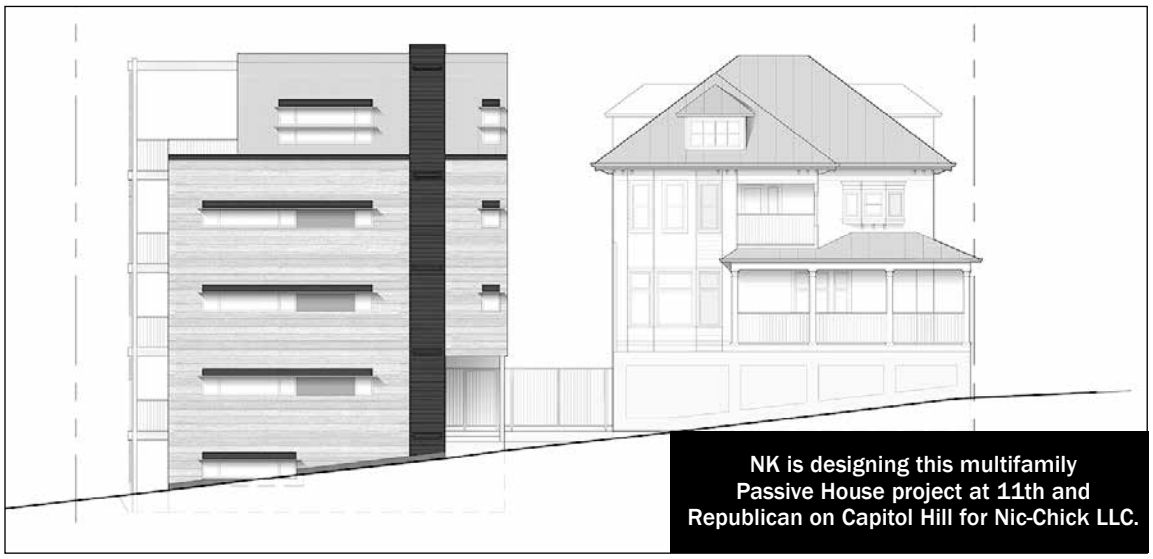
BY JOE GIAMPIETRO
NK ARCHITECTS

Now, the concept has begun to establish momentum here in the Northwest with a number of local developers and builders successfully using those strategies in both certified and non-certified Passive House buildings.

The Passive House concept represents today's highest energy standard with the goal of reducing heating energy consumption of buildings by up to 90 percent. A building constructed using passive house principles is very well-insulated and virtually air-tight, with high-performance triple-glazed windows and a strategic limitation of thermal bridging, which often allows heat to leak through walls. It is primarily heated using passive solar gain, and internal gains from people and electrical equipment, such as a condensing clothes dryer.

With energy losses minimized, remaining heat demand can be met using a very small source, such as a ductless mini-split heat pump. A heat recovery ventilator is used to provide a constant, balanced fresh air supply, which offers occupants terrific indoor air quality filtered from external pollutants, dust and pollen.

The "passive" in Passive House describes the buildings' ability to rely on natural resources through the capture of free solar energy instead of an active system, such as a furnace. Design and construction of Passive House buildings yield a net savings based on lower energy bills and longer lasting material use, particularly windows and insulation.



NK is designing this multifamily Passive House project at 11th and Republican on Capitol Hill for Nic-Chick LLC.

IMAGE COURTESY OF NK ARCHITECTS

The builders

The most notable Passive House locally is Park Passive, built by Seattle green builder Cascade Built. Now one year old, Park Passive was the recipient of significant national media attention, including the acclaimed AIA National Housing Award for demonstrating that great design, executed by our firm, and sustainability can co-exist.

Park Passive's owners suggest that building to such rigorous standards increased the construction cost by an average of 5 percent, while they now enjoy energy bills that are dramatically less than their previous home.

Cascade Built is also finalizing a townhouse project on Capitol Hill with units designed to meet Passive House standards, and one unit is expected to meet the difficult certification.

Dwell Development's Cork House, part of a multi-home development in Columbia City, was designed and built to Passive House standards. With completion slated for later this year, the company also added a passive house consultant to its team. Another builder contributing to Seattle's Passive House landscape is Portland-based Hammer & Hand. The builder/developer has two non-certified Passive House projects under its belt, including one under construction in Seattle's Madrona neighborhood.

Other applications

This movement into uber green building and design, and our new understanding of Passive House, is creating an exciting time for designers and builders alike. Alongside certified Passive House projects, we also see an opportunity for the application of Passive House techniques and high-performance products to every home and building as a way to maximize energy independence and reduce total cost of ownership through lower utility bills and maintenance costs.

Key Passive House strategies include capturing passive solar energy to heat the home, the creation of an airtight envelope using dense packed insulation in exterior walls and ceilings, insulation of the floor plate, high performance windows and doors, and a heat-recovery ventilator for continuous fresh air.

While we are just seeing the beginning of a Passive House movement in the Northwest, we expect it to quickly take hold.

Next year, NK Architects will break ground on a Passive House-certified apartment project — a first in the state of Washington. Residents will enjoy the same benefits of those individuals living in Passive House single-family homes: significantly reduced energy bills, a temperate indoor air temperature, notable fresh air and quiet (a side benefit resulting from the additional buffer of outside noise and lack of internal noise that typically comes from ducted heating systems).

Challenges

Although there are many positives, Passive House doesn't come without its challenges. Top barriers to adoption continue to be an industry that needs to better understand building science and solutions that are already available to increase energy independence; a wider understanding in the marketplace of the role that buildings play in addressing our growing carbon footprint; and industry resistance to change because they know what they've already done.

For architects, builders and developers, Passive House's compelling messages promise zero-energy ready properties that protect owners from energy cost inflation, differentiate the product in a robust marketplace, and provide an unparalleled level of comfort for inhabitants.

Passive House strategies are simple in theory and we believe simple enough to become part of Seattle's mainstream building standards. As a firm, we have created a dedicated initiative to engage with developers and builders to educate them on Passive House strategies that enable our future buildings to target net-zero energy use. As my daughter recently told me, "it's just a matter of time before FOMO (fear of missing out) takes hold."

Joe Giampietro is managing associate and Certified Passive House Consultant at NK Architects in Seattle. He has 30 years of experience in real estate development, land-use planning and architecture.

CARBON-RICH TIDAL WETLANDS DOWN, BUT NOT OUT

An immense amount of stored coastal carbon has been eliminated over the last 100 years. We need to protect the tidal wetlands we have and find ways to rebuild old ones.

BY DANIELLE L. DEVIER
ENVIRONMENTAL SCIENCE ASSOCIATES

About a hundred years ago, the Snohomish estuary was dominated by Sitka spruce forested wetland. Downed logs and driftwood occupied much of the channel in large rafts of diverse species.

Historical accounts report that it was possible for some of these floating natural structures to remain in place for long periods of time. New trees up to 3 feet in diameter were reported to grow on top of the rafts. Some were over 25 feet deep, consisting of many layers of large logs, 3 to 8 feet in diameter.

Today, the Snohomish estuary is much changed.

The estuary was logged and miles of dikes and levees were constructed in the late 19th and early 20th centuries. Since then, the Snohomish estuary has been used for agriculture, wastewater treatment, and as a site for several landfills.

Over the last hundred years these organic tidal wetland soils have subsided and eroded.

The good news is that large areas of the estuary have been restored and reconnected to the tides through both accidental and intentional breaches in dikes and levees. Some of these restoring areas have been rebuilding soils for decades, while other locations are being designed and planned as future restoration sites.

Local communities and state agencies are capitalizing on the benefits that tidal wetlands afford as a food source, water purifier, habitat provider, boaters' paradise, and as storage for atmospheric carbon dioxide. While many of us realize the food, water quality, habitat and recreational opportunities that tidal wetlands offer, many may not be aware of the carbon storage benefits of restored and existing tidal wetlands.

Tidal wetlands are buried treasures. The old ones, especially, are packed with valuable stored carbon. They soak up carbon dioxide, one of the most abundant greenhouse gases plaguing our atmosphere.

It's for this reason that restoration and conservation of tidal wetlands and forests has been dubbed "blue carbon." This term aptly describes the carbon captured and stored in plant biomass and organic soils, or sediment, from coastal wetlands and forests, salt marshes and sea grasses. These ecosystems capture carbon in living plant tissue and transfer this carbon into layers of carbon-rich soils, season-by-season.

Lyngbye's sedge, one of the first plants to colonize tidal flats, dominates this wetland in the Snohomish River estuary.

PHOTO COURTESY OF EARTHCORPS

Lost treasure

An immense amount of stored coastal carbon has been eliminated by development.

This development has taken the form of logging, diking and draining tidal wetlands, dredging for transportation, and urban development.

With many coastal cities adjacent to large rivers and estuaries, blue carbon habitat is

WETLANDS — PAGE 9

INSIDE

ON THE COVER

A farmer spreads Loop biosolids on his crops in Boulder Park, Douglas County. To find out how biosolids can be used to reduce greenhouse gases, turn to page 10.

IMAGE COURTESY OF KING COUNTY

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BEING GREEN IS NOT JUST ABOUT CHECKING BOXES

Contractors must recognize environmental challenges and opportunities before the project begins.

Sustainability in the construction industry is an interesting paradigm.

The building sector is inarguably one of the largest users and abusers of materials and resources, both in construction and operations. But the role of the contractor in a project's sustainable strategies and solutions is typically that of implementer, not innovator.

BY STACY SMEDLEY
SKANSKA USA

In most cases, due to market drivers or procurement methods, the contractor is not in the driver's seat — and oftentimes not even a passenger — when it comes to informing the early design choices that guide a building's sustainable approach.

When asked what their role is in the sustainability of the buildings they construct, most contractors would unfortunately answer that "it's not our decision."

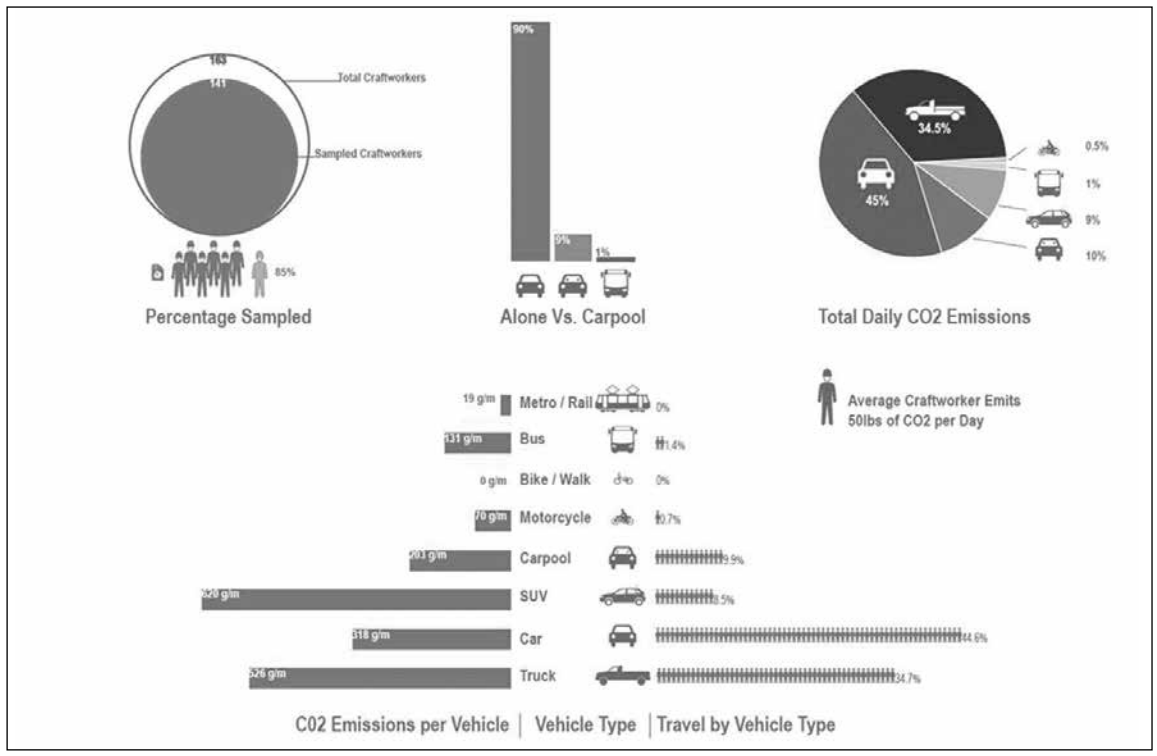
At Skanska, we believe that part of our responsibility as a contractor is to recognize the environmental challenges and opportunities we face on every project, and find innovative and leading approaches that allow us to be part of a project's green success story.

A few key steps over the past few years in this regard have resulted in giant leaps in a few categories, and have helped the company expand the role of the contractor in the journey toward sustainable solutions on all of our projects.

1. Be a leader instead of a follower (or an innovator instead of a reactor).

Our first leap was to provide preconstruction and construction services for what was to become the fourth certified Living Building in the world, the Bertschi School Living Science Building in Seattle.

Beyond the unknowns around many of the requirements of the Living Building Challenge at the time, the team was also donating its time to the effort. It was an opportunity to gain knowledge and experience by creating a built research project, in a way.



A recent study found that an average craft worker emits 50 pounds of carbon dioxide getting to and from work each day.

IMAGE COURTESY OF SKANSKA USA

Skanska led the materials research effort, which met the Living Building Challenge's progressive materials red list, appropriate sourcing, FSC-Certified Wood and construction waste management requirements.

What resulted was a cohesive, dedicated team that gained the experience of designing and constructing a living building and understood the risks and opportunities it offered for projects. Skanska is applying this experience and understanding on current projects with high sustainability goals, using the Living Building Challenge framework as one way to assess green strategies and solutions.

The experience also allowed Skanska to participate in Living Building Challenge projects across the country, because we were one of the early adopters.

2. Provide out-of-the-box services and tools.

Skanska's second leap was to commit to carbon footprint tracking on its three development projects in Seattle.

There are various tools out there to assist in quantifying and tracking the carbon impact of products based on their composition and the locations where their materials are extracted and assembled. Skanska developed its own material tracking spreadsheet, using carbon information from various industry tools.

Information on products is collected and logged during construction, so at the end of the project there is a comprehensive carbon assessment available. The impact of transit to and from the project site for all craft workers is also tracked in an effort to understand where people are coming from and how they are traveling to work.

The outcome is a database of typical construction materials used in projects — concrete, steel, glass and wood — with the embodied carbon associated with their manufacture, transport and installation. Various manufacturers of a specific product can be compared for impact. This information will be available to our project owners and design teams, so they can weigh the carbon footprint of a material as part of the design phase.

Skanska also compares carbon impact of its various projects and uses data to understand why one project is producing less carbon than another. These assessments will help to reduce carbon emissions and production during construction of future Skanska projects.

3. Look forward instead of backwards.

There is a current mindset of relying on environmental certifications to tell a building's sustainability story. Built Green and LEED are the front-runners in terms of certification languages that most have become fluent in, or can at least understand. Other certifications such as the Living Building Challenge and the Well Building Standard are emerging as alternative paths to creating a sustainable building.

With so many options available — all with different metrics — a project can easily become the victim of standards fatigue or information overload, where the

BEING GREEN — PAGE 12

PRESERVING SEATTLE'S LARGEST FOREST TAKES A GROUP EFFORT

Last year, Nature Consortium engaged over 3,100 volunteers and installed over 6,200 native plants in the West Duwamish Greenbelt.

Located on the western slope of the Duwamish River, the West Duwamish Greenbelt is the largest remaining contiguous forest in Seattle, spanning nearly 500 acres from Alki Point to Burien. Before European settlers arrived, this area was filled with tall evergreen trees such as western red cedar and Douglas fir. The forest has since been the site of timber logging, gravel mining, military operations and a proposed highway.

BY MONICA THOMAS
NATURE CONSORTIUM

Due to the immense value this greenbelt provides to the river and the West Seattle community, local nonprofit Nature Consortium is committed to being a steward of the West Duwamish Greenbelt for the lifetime of the organization.

Community benefits

Forested parkland like the West Duwamish Greenbelt is an important part of the urban landscape in Seattle, providing recreation opportunities for residents, habitat for local wildlife, and aesthetic value for the city. The plants and soil in the greenbelt filter pollutants in the water and help reduce erosion and stormwater runoff. As these plants absorb carbon dioxide and other pollutants from the air, they also reduce the effects of global warming.

Pollution from industrial developments in the area has made the Duwamish River one of the most polluted rivers in the country. Despite its changed condition, the West Duwamish Greenbelt remains an important part of the Duwamish watershed because it serves as a natural buffer between the polluted river corridor and nearby residences.

Greenbelt habitat threats

Due to the history of disturbance in the West Duwamish Greenbelt, the quality of habitat has been severely degraded.

After the forest was logged of its old evergreen trees in the late 1800s, new short-lived deciduous trees, such as bigleaf maple and red alder, began to grow in their place. As these deciduous trees reach the end of their lifespan (50-200 years), a new generation of evergreens is needed to continue the life of the forest.

In addition to these aging deciduous trees, many invasive weeds have also taken root in the greenbelt. Invasive plants like Himalayan blackberry, English ivy and Scotch broom compete for the forest's limited resources, threaten the forest's biodiversity, and prevent native plants from thriving.

Saving urban forests

Nationwide, urban forests are in decline both in quality and quantity. To combat this issue locally, the Green Seattle Partnership (GSP) was established in 2004 and declared its goal to restore and maintain 2,500 acres of forest within Seattle by the year 2025.

GSP is a public-private partnership between the city of Seattle and Forterra (formerly Cascade Land Conservancy) that seeks to educate and engage residents in longterm stewardship of the city's urban forests.

Nature Consortium and EarthCorps, which are also members of the partnership, play a major role in carrying out GSP's restoration goals by providing ecological expertise as well as volunteer recruitment and education.

Since 2003, Nature Consortium has brought volunteers and community members together to help restore habitat in the West Duwamish Greenbelt by removing invasive weeds, amending soil, addressing erosion issues, and planting new native trees and shrubs. The organization's main restoration goal is to increase native biodiversity and prevent the loss of forest habitat. In 2013 alone, they engaged over 3,100 volunteers and installed over 6,200 native plants.

Restoration at work

As part of the Green Seattle Partnership, Nature Consortium works to restore habitat in the greenbelt and increase recreation opportunities for residents. While Nature Consortium works primarily on forest habitat restoration efforts, Seattle Parks and Recreation also develops and improves trails in the area.

The Green Seattle Partnership, as the coordinator of urban forest restoration in Seattle, tracks the process of restoration through four phases. During phase one,

FOREST — PAGE 12

Nature Consortium volunteers look at the Duwamish industrial corridor from the forest where they are planting native vegetation.

PHOTO BY NANCY WHITLOCK

IS HARD WATER DROWNING EASTERN WASHINGTON'S ECONOMY?

Growers in Eastern Washington face a tricky dance when it comes to wastewater regulations.

Wastewater is mixed with clean water for crop irrigation in Eastern Washington. All dissolved solids in the wastewater are not necessarily treated by the crops, leading to potential impacts to the groundwater.

PHOTO COURTESY OF LANDAU ASSOCIATES

Washington state is a land of contrasts and the "one size fits all" precept has occasionally come under protest when legal or regulatory compliance issues are applied evenly across the state.

The economic, social and political divide is a popular topic with writers who follow the news of the state, but recently issues associated with hard water in Eastern Washington versus soft water in Western Washington are sparking challenges to find a regulatory balance that allows for equitable designs on growth.

BY CINDY EASTERSON
LANDAU ASSOCIATES

Hard water is water that is high in dissolved mineral content, usually in the form of dissolved solids (TDS), which are particles that pass through a 2-micron filter.

In Eastern Washington, particularly throughout the Central Basin, the groundwater has high, naturally occurring levels of TDS that approach regulatory levels established for drinking water. In most groundwater and surface water, these dissolved solids consist of inorganic minerals or salts such as sodium, potassium, calcium, chlorides, nitrate, phosphorus, iron, silica and sulfate.

For the person drawing a glass of tap water, the issue of TDS may be one of aesthetics, but for the manufacturer or community looking to grow crops in Eastern Washington, the issue of complying with existing water quality regulations for TDS becomes a tricky dance with increasingly complicated steps.

Not all in the bag

At the heart of the matter is the practice of land application of process wastewater or beneficial agricultural reuse, which uses the physical, chemical and microbial properties of soil and vegetation to remove contaminants from applied wastewater.

The issue impacts any industry or public agency that produces a wastewater stream, but food processors have been particularly challenged.

Food processing in Washington state is a $15 billion industry that employs 39,000 people, according to the Department of Revenue and Employment Security Department. To land a bag of frozen vegetables or any processed vegetable in our local grocery stores, the food processor must use water in the cleaning, cutting, seasoning, cooking and rapid cooling tasks; water which then becomes part of a waste stream that must be treated prior to discharge to the environment.

In the Central Basin, many of the food processors manage wastewater by mixing it with clean water and using it for crop irrigation on crop lands they own or through partnerships with area farmers. However, all dissolved solids present in the wastewater are not necessarily treated by the crops or retained in the soil column. Therefore, the potential for impacts to groundwater from TDS is a concern.

The Washington Department of Ecology regulates beneficial agricultural reuse of process wastewater through the state waste discharge permit, which allows for wastewater discharge to the ground if it is in compliance with permit conditions.

Issuance of a permit by Ecology or local municipalities requires approval of an engineering report and a crop management plan to ensure that the application of the wastewater does not go beyond the ability of the soil and crops to naturally remove dissolved constituents and thus release high concentrations of dissolved solids to the groundwater.

Herein lies the challenge. If the existing background level of TDS is already high, the land application must be extremely effective in removing TDS to protect groundwater. This can place a burden and sometimes significant expense on the food processor to provide additional pretreatment to the waste stream before applying it to crops as a beneficial reuse of this water resource.

Designs on development

Like communities everywhere, there is a deliberate and sustained effort to entice development to the Central Basin area.

According to the Grant County Economic Development Council, the region offers low electric rates, inexpensive land, a highly trained workforce and a developing infrastructure for transportation and trade. Success stories include new aerospace facilities, agricultural and food processors, data centers, machinery and chemical manufacturing.

While this results in welcomed economic growth and job creation, it also concentrates industries and can place additional stress on existing wastewater treatment facilities tasked with treating wastewater.

Municipal treatment facilities in the Central Basin discharge treated wastewater to the ground surface, so they must be able to demonstrate that these discharges are not impacting groundwater quality. Because municipal treatment facilities do not effectively treat for TDS, incrementally smaller margins are available for supporting additional development.

In Western Washington, by contrast, manufacturers, processors and communities rarely discharge to the ground, but rather to surface waters, which are regulated under National Pollutant Discharge Elimination System permits. Since the west side of the state has relatively low TDS concentration in groundwater and surface water, managing process wastewater

to comply with TDS standards is seldom an issue.

The proverbial hard place

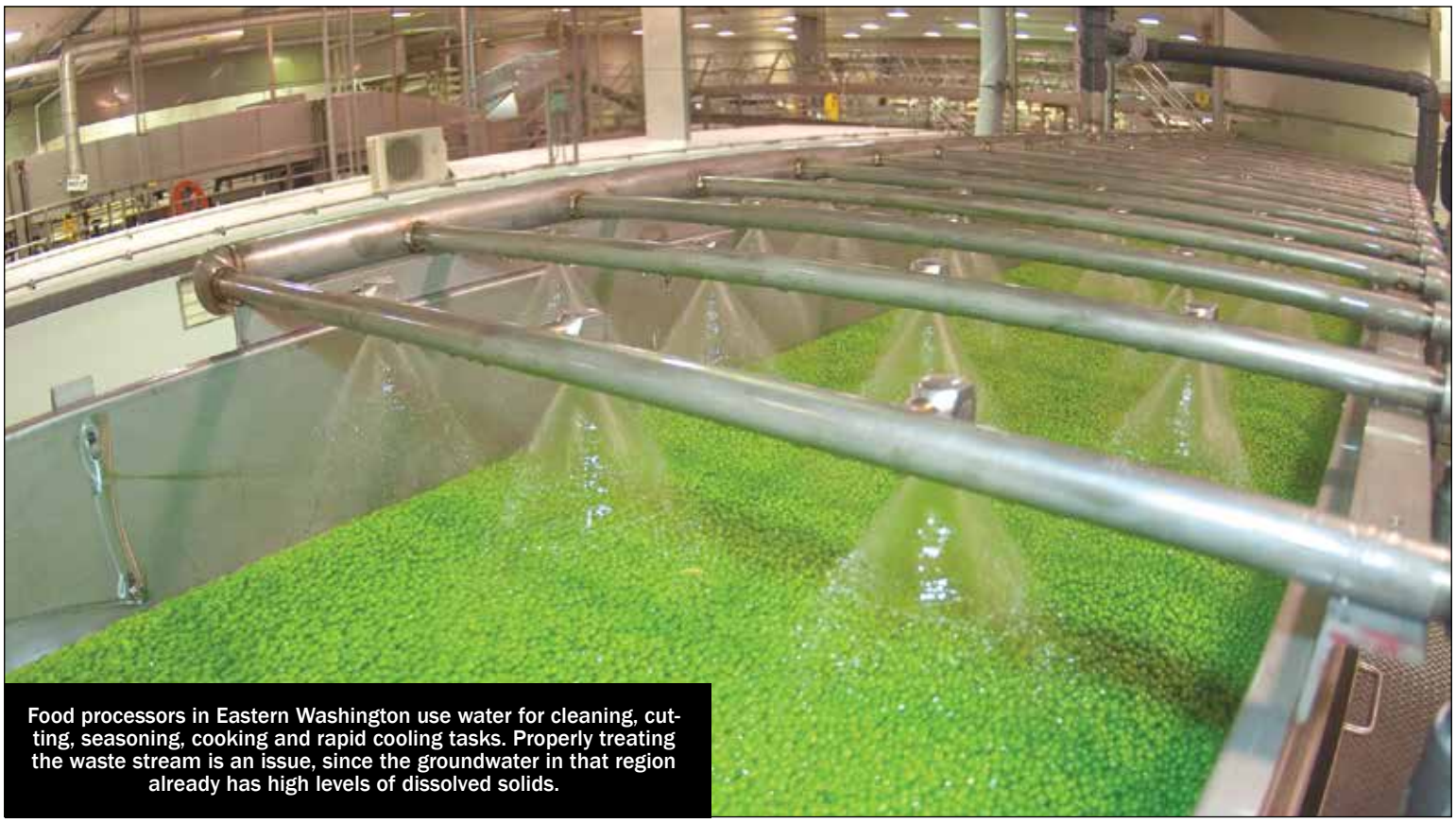
Ecology is tasked with enforcing compliance with the existing water quality standards but is also under some pressure to provide consistency in implementing regulations and provide guidance in searching for approaches that allow for maintaining beneficial agricultural reuse for managing wastewater.

High concentrations of TDS primarily influence aesthetic properties of water and are not considered a threat to human health; however Ecology regulates TDS to preserve groundwater quality to the highest and best use, which is drinking water. Washington has adopted the EPA standard of 500 milligrams per liter, which is regulated under Ecology's antidegradation rules for groundwater quality.

With existing, high levels of TDS in Eastern Washington's groundwater, if even small amounts of TDS not naturally removed through beneficial agricultural reuse it can have an impact on groundwater quality.

There are no simple solutions. The state waste discharge permit program requires that permit holders apply "all known, available, and reasonable methods of prevention and treatment" (AKART principles) to a discharge to protect groundwater quality from degradation.

If processors, manufacturers and communities are applying appropriate AKART principles, then it is allowable to change the groundwater quality up to the groundwater standard of 500 mg/L for TDS. Washington law covering groundwater quality standards does allow for some latitude if a "public interest will be served." Thus the debate ensues: Are regions in Eastern Washington, with existing, high levels of TDS in their groundwater, unfairly burdened when providing for growth and jobs?



Food processors in Eastern Washington use water for cleaning, cutting, seasoning, cooking and rapid cooling tasks. Properly treating the waste stream is an issue, since the groundwater in that region already has high levels of dissolved solids.

PHOTO COURTESY OF NATIONAL FROZEN FOOD CORP.

Solution in the science?

Ecology has not turned a blind eye to the issue, and has proposed a task force which will start with a literature review of technical resources and an evaluation of how other states are dealing with similar issues.

A representative from Ecology recently participated in a panel discussion, hosted by the Grant County Economic Development Council, on permit issuance and compliance with TDS issues and assured attendees that Ecology wants to engage affected industries to help find solutions that balance the interests of resources, environmental protection and economic development.

The Northwest Food Processors Association has invested in studies to better understand how salts from process wastewater, being applied as beneficial agricultural reuse, are both used and tolerated by various crops. For example, forage crops such as alfalfa and grasses tend to remove more salts from soils treated with process wastewater compared to annual crops.

Also under consideration is the capacity of different soils to retain certain salts by electrostatic attraction, thus preventing the release of TDS to groundwater.

In addition, a thorough understanding and accurate calculation of the leaching requirements is an important consideration when managing salts concentrations in the soils. Leaching refers to the loss of salts from the soil due to excess rain or irrigation.

In Western Washington, high rainfall can wash away nutrients, particularly nitrates, from crop soils. In Eastern Washington, leaching requirements are calculated to keep salts from building up in the soils to levels that impact crop growth. Finding the right irrigation rate and mix of wastewater and clean irrigation water helps maintain TDS in the soil at levels that keep them from impacting groundwater.

Many industries have been proactive in seeking improved and economically viable refinements to primary treatments to reduce levels of TDS. These include practices such as changing cleaning chemicals or cleaning practices to newly developed, greener solutions, isolating specific wastewater streams high in TDS for separate treatment, and/or improving conventional membrane treatments that use electro-dialysis reversal or reverse osmosis to better retain TDS that are incorporated into filterable solids.

A Solution in process

The dialogue for whether changes in permitting requirements can be developed to benefit regions of the state with high background concentrations of TDS in groundwater have just begun. Whether the approach will lend to further division or provide for more cohesion is yet to be seen.

Despite the dividing issues, economic development, whether it happens on the east side or the west side, is good for Washington and the protection of our water resources is good for all Washingtonians.

Cindy Easterson is a senior marketing partner with Landau Associates, a firm that specializes in environmental and geotechnical engineering, environmental permitting and natural resources consulting. Landau Associates has offices in Edmonds, Seattle, Tacoma, Olympia, Spokane and Portland.

Recontamination of the Lower Duwamish Waterway cleanup from upland sources is a large concern.

PHOTOS COURTESY OF SOUNDEARTH STRATEGIES

LOWER DUWAMISH: WATERSHED MANAGEMENT POSTER CHILD?

Businesses along the waterway may be affected by changing water quality standards and stormwater runoff rules.

Washington state is headed into a new era of water quality management.

The Department of Ecology recently submitted formal comments to the U.S. Environmental Protection Agency regarding proposed updates to human health criteria for 94 chemicals and later this year is expected to adopt changes to the state's water quality human health criteria based on a higher rate of fish consumption.

BY NATHAN HARDEBECK
SOUNDEARTH STRATEGIES

The fish consumption rate is used to calculate criteria for toxics and is intended to protect the public from health risks from eating fish and shellfish from local waters.

Last year Ecology adopted new sediment management standards that must consider the adjusted fish consumption rates in setting cleanup standards for in-water cleanup sites. This will have a significant impact on the regulation of future stormwater discharges and efforts to prevent recontamination at sediment cleanup sites.

A massive cleanup

One area of our state that demonstrates the interplay of these regulatory changes is the Lower Duwamish Waterway in south Seattle. Water reaches the waterway from a labyrinth of wastewater, combined sewer overflow, and stormwater discharges from neighborhoods, industry, commercial operations, and municipal and port conveyance.

The Duwamish is a high commerce area of both large and small businesses, all of which have a connection to the river, and is a Superfund cleanup site overseen by the EPA and Ecology. The Lower Duwamish is preparing for the cleanup actions to begin with many management considerations, from how much sediment will be removed in which locations to how the dredged material is going to be handled once brought to shore.

ECOSS, a free and confidential support organization for local residents and businesses in the South Park neighborhood, has seen an increase in questions and awareness of the local businesses that may be impacted to the cleanup and stormwater management of the waterway. The cleanup is a massive undertaking, and while improving the health of the waterway and providing jobs and opportunities for some, it also will likely increase operational costs to businesses that discharge stormwater along its shoreline.

The waterway cleanup poses important considerations for businesses and municipalities. The parties paying for the removal of the contaminated sediment from the river have a vested interest in making sure that the cleanup, once complete, meets the criteria imposed by the regulatory agencies.

Tracy Williams of Murphy Armstrong & Felton LLP has advised businesses on and near the Duwamish on stormwater management issues and how new water quality standards might impact them.

"The regulatory agencies will seek to ensure that recontamination of the Duwamish from upland discharges to the river does not occur and water quality standards are met," Williams said. "To achieve that, federal, state and local agencies will continue to inspect businesses for practices that could result in releases of contaminants into the Duwamish."

Williams believes stormwater management is crucial in preventing contaminants from properties that are discharging to the Duwamish.

"Businesses holding a National Pollutant Discharge Elimination System Permit should fully understand all conditions of the permit and be in compliance," Williams said. "Staying in compliance with a permit is extremely important because, in addition to the enforcement authority of EPA and Ecology, the federal Clean Water Act allows citizen groups to bring lawsuits against permitees who are out of compliance with their permits."

Covered or not?

Ecology's new Industrial General Stormwater Permit (ISGP) is being drafted and is expected to be effective on Jan. 1, 2015. One of the new requirements includes additional monitoring and cleaning of storm lines from industrial facilities discharging to the Lower Duwamish and other sediment cleanup sites.

Bradford Doll, an attorney with Tupper Mack Wells PLLC, has advised numerous public and private entities on stormwater compliance issues. He believes ISGP enforcement by EPA, Ecology and environmental groups has recently increased along the Duwamish and expressed concern with proposed ISGP requirements that apply to businesses discharging to Puget Sound sediment cleanup sites.

Doll notes that because Ecology has not specifically identified these sites, some dischargers may be left to guess at whether they are covered by the new rules. "Some businesses will likely find out too late they violated permit requirements they did not know applied to them," he said.

Doll also expressed concern with potential exposure to citizen group lawsuits resulting from the proposed changes to the ISGP and hopes that the increased stormwater requirements will result in sediment quality improvements.

"Given the potential for lawsuits against local businesses and uncertainty about stormwater's relationship to impaired sediments, I hope the additions to the ISGP are reasonable," he said.

Presently, many municipalities and businesses are challenged to handle stormwater management and source control. The coming changes are likely to increase the level of diligence necessary to minimize liability to permit non-compliance and citizen group lawsuit.

According to Nate Holloway, the Northwest stormwater regional manager for SoundEarth Strategies, who has worked on several sites along the Lower Duwamish in the past 10 years, some of the most common challenges faced by businesses with respect to stormwater management include understanding the site drainage, having paperwork in order, finding a sampling location that truly reflects the discharge from the site property alone and not from other contaminant sources, and sample collection procedures and analysis by methodologies that can define the site discharge accurately at very low levels.

Serious attention is required for stormwater management programs to be successful at meeting permit compliance.

Williams stresses that "stormwater management is a multi-step process and businesses need to remain flexible in compliance approaches. At the same time, businesses need to be prepared to respond quickly when they discover a problem with their selected management method."

A delayed response could lead to potential liability exposure, including a citizen suit or an enforcement action by a regulatory agency.

Several sites have developed stormwater programs and treatment approaches that have greatly reduced pollutants.

Patchwork of permits

The Lower Duwamish is poised to become a poster child for watershed management of stormwater. Watershed management means everyone — businesses, industry, municipalities, construction activities and even residential communities — managing stormwater based on improving the "health" of the water body at the end of the pipe and the people, plants and animals that call it home.

The collective objective to improve the health of a water body is a change in how stormwater is currently managed through a patchwork of permits.

There are many questions regarding the future implementation of sediment management and water quality standards:

- How will the standards affect stormwater management and industrial practices in the Lower Duwamish and other impaired water bodies?
- What impact will citizen lawsuits have at affecting state and federal policy?
- Will the Lower Duwamish set the stage for watershed management of stormwater in the U.S.?
- What will be the new operational costs to businesses that discharge to impaired water bodies?

It is not known for certain, but what can be counted on is that stormwater runoff and source control are going to be focuses for all parties — large and small, municipal and private — to make sure that "business as usual" considers the water quality needs of future generations.

Nathan Hardebeck is a stormwater program manager at SoundEarth Strategies. He has more than 14 years of experience in environmental consulting with an emphasis on best management practices and program management related to stormwater services.

WETLANDS

CONTINUED FROM PAGE 3

increasingly threatened. Here in the Pacific Northwest, large estuaries have varying rates of tidal wetland degradation. The greatest impacts have been to the Columbia River estuary and to Puget Sound; losses in each of these areas have exceeded 70 percent.

The good news is that many of these lost tidal wetlands may be restored and re-engaged as a place for carbon storage in the global carbon cycle once again.

Getting it back

Today, the Snohomish estuary is a diverse landscape ranging from undisturbed coastal forest and wetlands to industrial uses. This mix of natural processes and human intervention presents an excellent opportunity to study the effects of different coastal land uses and restoration efforts on carbon resources over time.

In 2013, a multi-disciplinary team consisting of faculty and graduate students from Western Washington University, EarthCorps professionals and scientists from Environmental Science Associates took a three-tiered approach to determine the magnitude of carbon benefits from restoration.

First they analyzed historic, current and future landscape conditions of the estuary. Next, soil carbon and soil accretion rates were measured at representative sites throughout the estuary. Finally, the team applied carbon values to planned and full tidal wetland restoration scenarios.

This study demonstrated that tidal wetland restoration efforts have carbon sequestration and climate mitigation benefits.

For example, based upon analysis of currently planned and in-construction restoration projects in the Snohomish estuary, an estimated 2.55 million tons of carbon dioxide may be sequestered from the atmosphere over the next 100 years. This value is equivalent to one full year's emissions from 500,000 passenger cars.

If plans are expanded to fully restore the estuary while allowing for existing large industrial uses to remain, the carbon sequestration benefit jumps to 8.9 million tons of carbon dioxide. This rate would equal a full year's emissions from about 1.7 million passenger cars.

Preserve for posterity

Preserving and restoring wetland natural areas buries carbon in sediment, and caps it with water. Plants collect atmospheric carbon dioxide into tissues and carbohydrates, eventually die, and sink into the organic muck that builds over the years. This process, which occurs globally along every continental coastline, has the capacity to do great things, measurably decreasing local greenhouse gases and making a world of difference.

Old tidal wetlands are loaded with valuable carbon. An immense amount of stored coastal carbon has been eliminated over the last 100 years. We need to protect the ones we have and find ways to restore and build new ones. Fortunately, in the Pacific Northwest, there are a multitude of opportunities to recover these lost treasures.

Danielle Devier, a Professional Landscape Architect and LEED-ND professional, has graduate degrees in both landscape architecture and ecology. She has a strong interest in climate science and local landscapes.

HOW BIOSOLIDS CAN CURB GREENHOUSE GASES

King County's Loop, a fertilizer substitute made from poop, deposits some carbon in the soil but also makes plants grow larger, which takes more carbon out of the atmosphere through photosynthesis.

BY PAM ELARDO
KING COUNTY WASTEWATER TREATMENT DIVISION

Each day more than 1.5 million people in the Puget Sound region unwittingly support King County's effort to fight climate change — just by flushing a toilet.

For decades, King County's Wastewater Treatment Division has created resources from sewage such as biosolids, a nutrient-rich substitute for fertilizer sold under the brand name Loop.

Biosolids are well known for improving plant and soil health. Now they are emerging as a potentially valuable tool in curbing greenhouse gas emissions.

A loaded tractor is ready to spread Loop biosolids on a field in Eastern Washington.

PHOTOS COURTESY OF KING COUNTY

How it works

Biosolids are produced through an advanced wastewater treatment process. Solids are separated and placed in a heated, oxygen-free environment for a month, which kills pathogens and breaks down harmful pollutants.

What remains is a rich, dark, earthy matter loaded with carbon and nutrients.

When biosolids are applied to land, some of the carbon remains in the soil, which keeps it out of the atmosphere. This process is called carbon sequestration, and it's one way to mitigate some of the problems associated with climate change.

Biosolids also improve soil health and reduce erosion, which means plants grow larger and can take more carbon out of the atmosphere via photosynthesis. These plants not only store carbon in their tissues but eventually they'll drop leaves and branches on the soil surface, helping to return even more carbon in the soil.

GET IN THE LOOP

Information on King County's Loop biosolids can be found at www.loopforyoursoil.com.

King County's Loop trucks deliver biosolids to farmers, foresters and local composter GroCo.

Finally, biosolids can reduce demand for synthetic fertilizer, which takes a tremendous amount of fossil fuel to manufacture.

By contrast, the production of biosolids actually creates energy because the beneficial bacteria generate methane during the treatment process. Some of this gas is used for heat and power at the treatment plants while the rest of it is sold to local utilities for distribution to their customers.

Smaller carbon footprint

Confronting climate change is a top priority for King County Executive Dow Constantine, who called for ambitious energy efficiency targets and investments in 2010 that are now realizing $2.6 million in annual savings for King County government operations.

The challenge is that wastewater treatment, though crucial for protecting regional water quality, is an energy-intensive process. Treatment facilities operate around the clock. The advanced levels of treatment and odor control favored by communities demand still more energy.

Through a combination of conservation, investment in energy-efficient equipment and making the best use of renewable resources, the Wastewater Treatment Division is doing its part to reduce its carbon footprint.

King County's wastewater utility recycles 100 percent of the 120,000 tons of biosolids it produces each year. Between biosolids recycling and the production of renewable energy, the utility estimates its carbon offset is equivalent to 42,000 tons of CO2, which is like taking 8,000 cars off the road each year.

Capturing waste energy from its treatment plants has also helped King County surpass its goal of meeting the equivalent of half of the county's energy needs through renewable energy in 2013.

The Wastewater Treatment Division's resource recovery efforts are just some of the steps King County is taking to make communities, the economy and environment more resilient to climate change impacts.

The county is also working with the broader community to reduce county-wide emissions by 80 percent by 2050.

A proven, beneficial practice

Though the safety and benefits of biosolids recycling and use are well-documented and grounded in rigorous science, opposition to the practice exists.

In reality, King County's Loop biosolids is far more heavily regulated than manures, yard waste composts and synthetic fertilizers.

Decades of research from universities, the EPA and the National Academy of Sciences shows that biosolids are safe for people and the environment when used according to regulations and best management practices.

With an emphasis on creating resources from wastewater, King County is working hard to become one of the nation's first carbon-neutral wastewater utilities.

Recycling biosolids will play a critical role in making that vision a reality.

Pam Elardo is the director of King County's Wastewater Treatment Division. Elardo has a master's degree in environmental engineering from the University of Washington and a bachelor's degree in chemical engineering from Northwestern University. She is also a licensed Professional Engineer and certified Group IV Wastewater Treatment Plant Operator.

TACKLING TOXICS WITH GREEN CHEMISTRY

The emerging field of green chemistry is all about building safer products and designing cleaner manufacturing methods.

In the Pacific Northwest, we've grown accustomed to thinking about the environmental impact of our everyday lives: We buy products made with natural ingredients, we work in sustainable buildings, and we light and heat those buildings with renewable energy.

BY KEN ZARKER
DEPARTMENT OF ECOLOGY

Despite that commitment, toxic chemicals continue to impact the health of our families and the environment of our region. Copper reduces salmon survival rates, PCBs build up in orca whales, and phthalate plasticizers may affect our children's development.

Every problem creates an opportunity, though, and finding safer alternatives to toxic chemicals is an area where opportunities abound. This emerging field is called green chemistry. It's the science of building safer products and designing cleaner manufacturing methods. And it's an area where the Pacific Northwest is leading the way.

Leadership leads to change

Chemistry sounds like something that only happens in a lab, but finding safer chemicals often requires leadership from across an organization. Many of the people driving this change work in purchasing, supply chain management, occupational health, or sustainability. They may be entrepreneurs chasing an opportunity or CEOs seeking an edge. Wherever they come from, these are leaders who are willing to challenge the status quo and make a break from the way things have traditionally been done.

Consider the Bullitt Center in Seattle. Designed to the exacting specifications of the Living Building Challenge, the Bullitt Center was built to be the greenest commercial building in the world. Part of meeting that lofty standard required the builders to steer clear of a red list of toxic chemicals. That created a dilemma for the architects when they discovered that the breathable building membrane they specified contained phthalates, one of the red list chemicals.

Phthalates are a common chemical used to make plastics flexible, but they have been linked to reproductive and developmental concerns. Washington state banned the use of phthalates in children's products in 2009.

Fortunately for the Bullitt Center, the membrane's manufacturer was able to reformulate its product to meet the same performance standard with a safer chemical. What's more, the manufacturer decided to switch its entire product line to the phthalate-free alternative.

You can find another example across the mountains near Yakima where Liberty Bottleworks manufactures sports bottles using recycled aluminum in a zero-waste plant.

Liberty wanted to find an alternative to the plastic coating containing bisphenol A, or BPA, which was often used to coat the interior of metal drinking bottles. There are concerns about BPA's potential effects on infants and children, and Washington state banned the chemical's use in children's drinking products in 2011 and in sports bottles in 2012.

After some searching, Liberty found a powder coating that uses food-grade polyester. Consumers seem to appreciate Liberty's commitment to making a safer product — since production began in 2011, the company has sold more than a million bottles.

Both Liberty and Bullitt demonstrate the impact a company can have by pushing their suppliers to find safer alternatives. Already, many of our region's leading companies are working with their suppliers to identify hazardous chemicals in their products and seek out safer alternatives.

Some companies are working together to address common concerns. Members of the Outdoor Industry Association, for instance, have cooperated to create a chemicals management framework, which gives member companies a guide to discuss chemical hazards with their global suppliers.

More resources coming

Educational and nonprofit organizations are also stepping up. Northwest Green Chemistry is a new nonprofit established to facilitate research, development, commercialization, technical assistance, and education in green chemistry and engineering. Northwest Green Chemistry is holding a roundtable Oct. 28 in Tacoma to share the latest opportunities, innovation and research in the field.

The University of Washington's Professional and Continuing Education department will offer a certificate program in green chemistry in 2015, giving professionals the opportunity to study the principles of green chemistry and then apply them in their workplaces.

The Washington Department of Ecology developed an alternatives assessment guide in cooperation with a group of other states, and offers free training in assessing chemical hazards. Toxics reduction specialists with Ecology work with many of the state's manufacturers on reducing their use of hazardous chemicals and finding safer substitutes.

None of this is to suggest that there are easy answers to the chemical hazards we face in Washington. But it does show that there are solutions out there and increasing numbers of people dedicated to solving those problems.

Ken Zarker is section manager for pollution prevention and regulatory assistance at the Washington Department of Ecology, chairman of the board for the National Pollution Prevention Roundtable, and acting director for Northwest Green Chemistry.

Jesus Larios of Liberty Bottleworks inspects water bottles. Liberty uses a food-grade polyester to line its bottles.

PHOTO BY ANDREW WINEKE/WASHINGTON DEPARTMENT OF ECOLOGY

FOREST

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volunteers and GSP staff clear the area of invasive weeds. Himalayan blackberry, English ivy, and Scotch broom top the list for the most common invasive species.

In phase two, native plants are installed to reestablish the natural ecosystem. In phase three, volunteers and staff monitor and maintain the new plantings, install wood mulch as a weed barrier, and conduct additional rounds of weeding. A site can remain in phase three for several years, and much time is required to remove any weeds that begin to grow back.

Phase four sites are considered "fully restored" and support self-sustaining native plant communities requiring minimal maintenance.

GSP cautions volunteers and residents that while a site may be considered to be fully-restored, the urban setting still requires some level of human intervention in the form of monitoring, maintenance and adaptive management to ensure that these areas remain weed-free and ecologically healthy into the future.

Overall, about 114 acres of the West Duwamish Greenbelt are in phases one through four, with the rest not yet in restoration. In accordance with the city-wide goal, GSP aims to bring all areas of the greenbelt into phase four restoration by 2025.

Challenges to success

Ultimately, ecological restoration in an urban setting is an ongoing process and requires repeated efforts rather than a single act. Invasive species are notoriously difficult to eradicate, and other urban influences including polluted air and stormwater runoff pose different challenges to establishing and maintaining healthy ecosystems.

In addition to the human-caused changes in the West Duwamish Greenbelt, there are natural environmental constraints such as steep, landslide-prone slopes, unstable and excessively well-drained soils, and sensitive wetlands and streams. The presence of these sensitive natural features requires specialized restoration techniques and often requires the assistance of professional restoration technicians in addition to community volunteers.

Added to the human impacts and natural site constraints are the challenges of land use throughout the greenbelt. While Seattle Parks and Recreation owns about one-third of the West Duwamish Greenbelt, other areas are owned by private businesses, homeowners, and other municipal and county agencies. Therefore, successful restoration on an ecosystem level requires a unique type of collaboration.

Business partnerships

In addition to government and nonprofits, many local businesses are also getting involved in the West Duwamish Greenbelt restoration. For several years, companies like Boeing have brought employees to volunteer with Nature Consortium. Boeing's volunteer work in the greenbelt is part of its larger commitment to global corporate citizenship and a healthy Duwamish watershed.

"Boeing looks for community partnerships where our goals are aligned," says environmental communications officer Joanna Pickup. "We look for organizations that focus on protecting and restoring the watershed and have educational opportunities where employees can actively participate."

Kira Cha, an avid environmentalist and Boeing employee, was introduced to Nature Consortium after her employer gave her a scholarship to attend a nonprofit board leadership training. In addition to the environmental benefits, Cha says "volunteering with coworkers is a great way to team build and learn about their environmental passions."

Nature Consortium sees these business partnerships as a highly impactful way to support Duwamish restoration and strengthen the local environmental community.

Monica Thomas is marketing and communications manager at Nature Consortium and holds a bachelor's degree in environmental science and forest resources.

BEING GREEN

CONTINUED FROM PAGE 4

goal becomes simply checking boxes to reach a certain level of green. On the other end, a team may opt out of certification altogether because the choices and options become overwhelming.

Skanska is developing a process to help projects assess their level of green based on specific goals and values. Sustainable strategies would be developed and weighed against how they help support project values prior to using a rating system checklist, to allow the team to focus on finding holistic, project-based sustainable solutions without the noise of how many points or stars it achieves.

Applying these three categories of thought to sustainability has provided Skanska a path to increasing our knowledge, capacity and opportunity to be a part of the conversation earlier in a project's life. We have learned that the contractor can be a project's builder as well as design participant, if the effort is applied to gain knowledge and experience necessary to bring unique and innovative green solutions to the table.

The work has only just begun. We know there is much more to learn and do.

Stacy Smedley is a preconstruction manager for sustainability at Skanska USA, providing strategic guidance across Skanska projects in the Seattle area. Smedley came to Skanska from KMD Architects, where she was the project manager for the extension of the Bertschi School Science Wing. She is also the founder of local nonprofit The SEED Collaborative.

TIME TO JUMP ON CONTAMINATED URBAN PROPERTIES?

Although development within a city core runs the risk of encountering large pockets of contamination, obtaining a Property-Specific NFA letter can significantly reduce investment risk.

Numerous commercial property owners, developers and local governments appear to have positioned themselves well during the Great Recession so that previously shelved projects could be restarted in this strengthening economy.

BY MATT WHEATON
TERRACON CONSULTANTS

Those shelved properties often consisted of sites with some form of environmental impact that was deemed too costly for redevelopment.

With a stronger economy and more demand for urban locations, the number of contaminated sites which are being redeveloped has increased. However, requirements for cleanup have not been relaxed.

So what has helped to clean up these difficult sites? One key may be focusing cleanup activities only on portions of identified contaminated soil or groundwater.

For the lucky property owner the extent of contamination is limited to the property boundaries, but in most instances contamination spreads across parcel boundaries, affecting other properties. This level of contamination can be extremely difficult to manage, and may dissuade even the most aggressive prospective purchaser or their lending institution.

Unless the financial backer can be assured that a "No Further Action" letter from the Washington Department of Ecology will be granted for a cleanup, the large-scale contaminated sites are typically too risky to back.

By reducing the level of effort required for cleanup, and thereby reducing the cost, a property within the limits of a large area of contamination could become more attractive for a financial backer. One way to decrease this cost is to pursue "Property-Specific No Further Action" status.

Property-Specific NFA

Most economists agree that the Great Recession started in late 2007 and ended in mid-2009. Within the midst of the recession, Ecology published "Guidelines for Property Cleanups under the Voluntary Cleanup Program." This July 2008 guideline provides direction for Ecology staff and the public to conduct characterizations and cleanups of contaminated properties with the intent of obtaining a Property-Specific NFA.

The intent of the document was to demonstrate the steps required to achieve a Property-Specific NFA when the cost and time-frame to clean up the entire site was prohibitive and lengthy. At a time when many projects were stalling due to the cost of cleanup, this document clarified the path associated with a more cost-effective approach.

To understand the applicability of a Property-Specific NFA, the regulatory definition of "site" must first be understood. Simply put, the "site" is comprised of all media (e.g., soil and groundwater) that have been impacted with a regulated compound above regulatory action levels, irrespective of property boundaries.

If the site consists of three tax parcels, of which only one is being redeveloped, and access to cleanup of the entire site is cost prohibitive, then a property owner could opt to pursue a Property-Specific NFA. This assumes that the steps taken by the property owner are adhering to the 2008 guidelines and state administrative codes.

Pitfalls and successes

With the economic upturn, municipalities have reassessed the potential for redeveloping individual properties, and are making development on these properties easier in an effort to lure developers.

Although urban development within a city core runs the risk of encountering large pockets of contamination, the possibility of obtaining a Property-Specific NFA has significantly reduced the risk associated with investing in individual properties, assuming that the regulatory provisions in the 2008 guidelines are followed.

One such property was recently put up for sale within in a section of Seattle ideal for commercial development. Historically, the property was developed with a small, privately owned automotive repair business that used numerous underground storage tanks. As is usually the case with underground tanks, they leaked, and the impacts to property soil were identified during the recent removal of the tanks.

As is recommended for effective regulatory cleanup, the source of contamination was excavated and approximately 300 tons of contaminated soil was removed. Even though it appeared that contaminant source removal had resulted in the cleanup of the property, confirmation sampling was not performed at the time of removal to demonstrate that all contamination had been removed. In other words, the site had not been defined.

Furthermore, the limits of

CONTAMINATION — PAGE 17

OLD MINING POND BECOMES NEW SALMON HABITAT

Billy's Pond in Yakima was naturalized to mimic abandoned channels and pools of the Yakima River. It now provides off-channel refuge, rearing and foraging habitats for salmon.

One of the great challenges of habitat restoration within a heavily built environment is fitting the puzzle pieces together. The focus is often narrow by necessity, and it's not easy to return a site to its natural condition if everything around it remains as-is.

BY SHERRIE DUNCAN
RIDOLFI INC.

What makes the Billy's Pond project in the Yakima River Basin unusual — and prototypical — is that the city of Yakima took the long view, bringing together salmon, infrastructure, flood control and recreation in an innovative and sustainable design.

Rethinking flood control

Over the past 100 years, levees built in several reaches of the Yakima River to control flooding have modified natural flows; eliminated meandering, off-channel habitats important to fish; and disconnected the river from its historical floodplain. Now, a multiagency effort led by the U.S. Bureau of Reclamation will roll back some of this infrastructure along the river between Selah Gap and Union Gap.

In support of this "Gap to Gap" project, the city of Yakima opted to relocate the effluent outfall at its wastewater treatment plant. But more than that, the city also seized the opportunity to restore off-channel habitat where fish can rear and forage, and to move the Greenway Trail out of the floodplain.

The Greenway Trail is a much-used, much-loved network of more than 10 miles of pathways that connects parks, lakes, nature walks and natural areas. In the vicinity of Billy's Pond, the trail formerly ran along the top of an old, unmaintained embankment built decades ago to protect gravel mining and agriculture in the area.

Rock pit to salmon habitat

Phase one of the city's three-phase master plan for the outfall relocation is the Billy's Pond habitat restoration, which encompasses 30 acres.

Billy's Pond is 5 acres of open water created in the mid-1960s as a result of the gravel mining. The manmade pond, which is fed by groundwater, formerly drained through two 40-foot culverts, under the Greenway Trail, to a manmade ditch. The culverts were a barrier to fish passage, and the pond was supporting only warm-water, invasive fish species such as carp and bass, while the embankment provided a home to non-native and noxious plants.

With no infrastructure or homes in the vicinity, this city-owned property was a prime location where the Yakima River could take back the floodplain through natural processes if the river and its floodplain were reconnected.

Keeping the restoration as simple and natural as possible was an important focus of the design. It was also key that construction of this first phase of the master plan should dovetail with plans for phases two and three (now under construction) to maximize the value of public dollars.

Specific elements were selected that use sustainable design, such as reducing fuel use and limiting impacts on the site, to achieve both goals. Here are some details:

- During construction, heavy equipment was fitted with an automatic global positioning system to reduce the effort required for the earthwork. Inputting the design drawing to the machines meant that the GPS did things like calculate the curves. One outcome of this innovative use of GPS was that only a single fine grading pass was needed to meet construction specifications. Other benefits included savings in time and budget, as well as significantly reduced environmental impact.

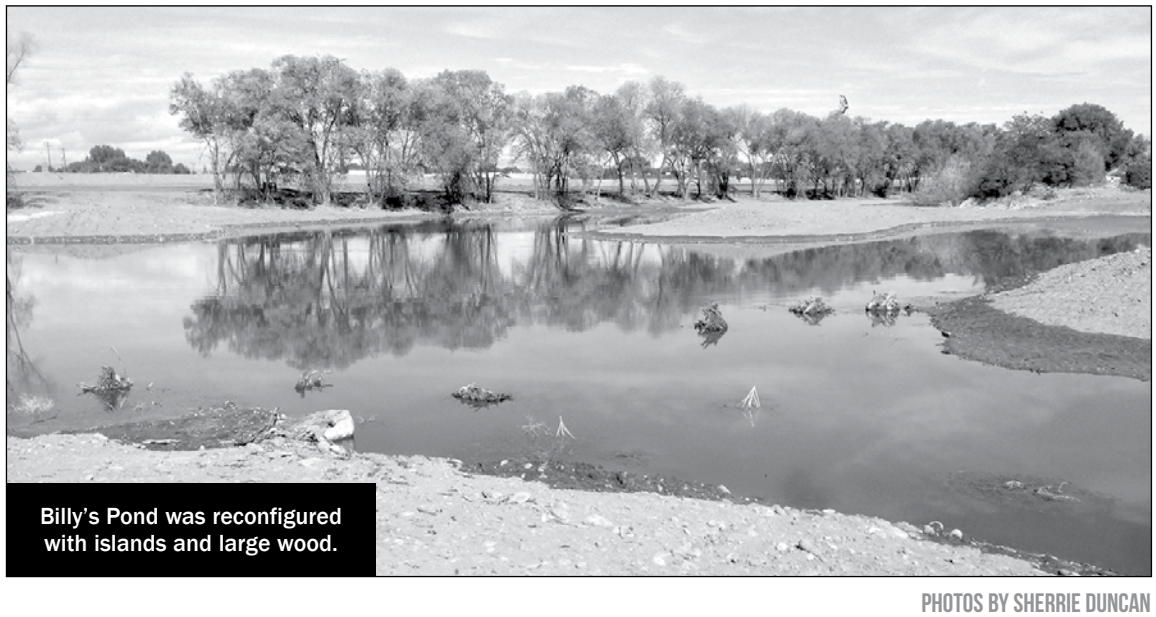
- On-site materials like boulders, river cobbles and topsoil were reused throughout construction, eliminating the need to truck an estimated 30,000 cubic yards of those materials out and bring new materials in. That reduced fuel consumption and cost, minimized overall environmental impact, and limited chances to introduce invasive or exotic species to the site.

- To allow for a hydraulic connection between the river and the restoration area, the Greenway Trail was realigned to higher ground, reducing the need for costly maintenance by the nonprofit Yakima Greenway Foundation in areas that used to regularly flood. At the same time, new scenic viewpoints overlooking the restored floodplain were added to enhance the recreational experience for trail users.

- Community volunteers were enlisted to replant the new riverbank with native vegetation like sedges, willows and rushes, which not only provided obvious cost savings, but also opened the way to discussions among all the stakeholders about historical salmon runs in the Yakima River

HABITAT — PAGE 15

Crews excavated groundwater-fed channels near Billy's Pond.



Billy's Pond was reconfigured with islands and large wood.

PHOTOS BY SHERRIE DUNCAN

The modules line 500 feet of the Shark Island coast in Louisiana.

PHOTOS COURTESY OF JANSEN INC.

LOCAL FIRMS INVENT MODULES TO PROTECT LOUISIANA COAST

The modules are one of three devices being tested to control waves.

The coastal regions of Louisiana are suffering significant erosion and land loss. According to scientists, Louisiana has already lost about 1,900 square miles of coastal land throughout the 20th century and they predict it could lose an additional 700 square miles in just 50 years if no action is taken. About a football field per hour of Louisiana coastal land is currently eroding away.

BY GRANT JANSEN
JANSEN INC.

Engineers found that while working to restore Louisiana's coastal protection they didn't have any materials that were proven to work other than armor rock, which is often ineffective as it sinks into the inherently poor soils common in coastal Louisiana.

Since the 1990s, the federal and state governments have spent hundreds of millions of dollars on coastal restoration, but the efforts have been unable to stop land loss.

As a result, the Natural Resources Conservation Service of the U.S. Department of Agriculture put out requests for new innovative design proposals that didn't involve rock products and had never been used in coastal Louisiana.

The purpose of the Non-Rock Shoreline Protection Demonstration Project was to install and monitor several non-rock shoreline protection systems along coastal areas in Louisiana.

Shark Island, Louisiana, is the area this system is being tested and monitored in over the next two to three years.

Jansen Inc. and Bellingham-based Merit Engineering worked together for nearly two years to design the patented Buoyancy Compensated Erosion Control Module. The team was selected as one of the three finalists out of 17 designs submitted to the Natural Resources Conservation Service.

The Jansen/Merit system fully prevents wind and wave action from reaching the shoreline. The modules consist of a concrete shell with foam, secured with four 60-foot pin piles and placed adjacent to one another in a line along the shoreline. They are 10 feet long by 7 feet tall and designed to last at least 20 years.

Modules are strong enough to withstand hurricane conditions, yet versatile enough to set in any geographical location using small lightweight equipment. Bellingham Marine Industries built them at its Florida plant.

To date the system has had the least amount of shoreline erosion out of the designs that were engineered and constructed.

Grant Jansen is president of Jansen Inc., a Ferndale-based general contractor specializing in heavy-civil, environmental and marine work.

Each module is secured by four pin piles that extend 60 feet below.

HABITAT

CONTINUED FROM PAGE 14

and water quality in the mainstem channel today.

- The design made use of current topography and the existing groundwater connection with Billy's Pond to ensure that the restored habitat would not depend on surface water flow to stay productive year-round.

Multiple benefits

The Billy's Pond project was completed in the early fall of 2013, just two years after designing and permitting began. The pond, which was naturalized to mimic abandoned channels and pools of the Yakima River, now promotes salmon recovery by providing off-channel refuge, rearing and foraging habitats. The barriers to fish passage are gone, invasive species are being removed, the Greenway Trail was realigned out of the floodplain — and infrastructure relocation at the city's wastewater treatment plant, which sparked all of these gains, is under way.

Reconfiguring Billy's Pond and reconnecting the Yakima River to its historical floodplain have turned out — by design — to be good for fish, good for people, and good for the river.

A skilled fisheries biologist with more than 22 years of experience, Sherrie Duncan has dedicated her career to protecting local watersheds and restoring natural habitats. She volunteers on technical advisory groups for WRIA 10/12 Puyallup/Chambers-Clover Creek watersheds, and on the technical advisory committee of Citizens for a Healthy Bay in Tacoma.

THESE MODULAR CLASSROOMS ARE NOT OLD SCHOOL

The Smart Academic Green Environments classroom uses up to 50 percent less energy than a typical modular classroom and has a 60-year lifespan.

Most of us remember spending some part of our early education in a modular classroom; a common solution for school districts looking to address space needs in a fast turnaround time and with a low budget.

BY PATRICK ALLEN
PACIFIC MOBILE STRUCTURES

Created as a short-term fix, these structures were often built to meet the minimum construction standards, with little natural light and cramped quarters.

But what if you could transform the simple concept of a modular, relocatable classroom into a space that is beautifully made, long-lasting, environmentally kind, and most importantly, healthier for students and teachers?

Enter the Smart Academic Green Environments (SAGE) classroom.

The SAGE classroom was designed by faculty and students at Portland State University's School of Architecture with the support of a broad coalition of partners — including Chehalis-based Pacific Mobile Structures, the Portland Chapter of the American Institute of Architects and Blazer Industries — to create a cost-efficient "green" modular classroom.

This summer marked an important milestone with the Edmonds School District making a commitment to healthier learning with the installation of nine SAGE classrooms across five campuses for the 2014-15 school year.

Natural light and air

Children in these classrooms will be exposed to four times more natural light, 100 percent fresh air and 150 percent more air circulation compared to a traditional modular classroom.

Studies have shown that children have more academic success in learning environments where they are exposed to more natural light and are allowed to look outside and then refocus on their work. The SAGE classroom provides that environment.

With the constant exchange of fresh air and building materials with virtually no VOCs, these classrooms will keep the teachers and students healthy year round.

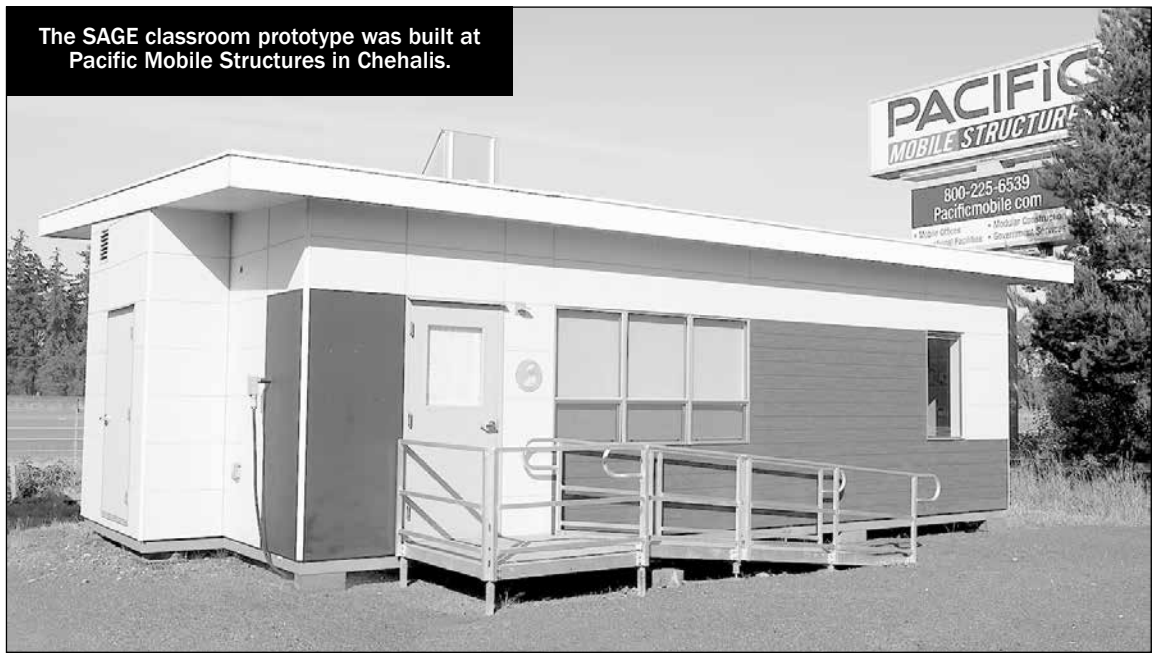
Long-term gain

For the district, the SAGE classroom will use up to 50 percent less energy than an average modular classroom and has an expected lifespan of 50 to 60 years.

SAGE is made with environmentally friendly materials and a manufacturing processes that minimizes material waste. The overall building process takes approximately half the time for building occupancy than standard construction practices.

LEED certifiable

The SAGE interior has an energy-efficient ERV (energy recovery ventilator) mechanical system, low-velocity fans, vaulted ceilings and continuous dimming lighting. The interior also has BioPCM phase change material in the walls that act as a thermal mass to stabilize indoor temperatures. The steel floor structure allows for a door threshold that is closer to the ground, reducing the costs associated with relocation, maintenance, foundation, stairs and ramps.



The SAGE classroom prototype was built at Pacific Mobile Structures in Chehalis.

PHOTOS COURTESY OF PACIFIC MOBILE STRUCTURES

Options also exist for solar-powered coolers to eliminate the need for air conditioning, LED pendant lighting and restrooms. The building was also designed to be LEED certifiable.

Exteriors have a modern architectural look with large overhangs to protect the building and Hardie reveal siding. The clerestory windows allow the buildings to be sited to take advantage of the most natural daylighting, reducing the amount of energy used on interior lights. The buildings use an exterior mechanical room that not only houses the ERV unit but also allows the district to enclose a communication link to monitor building performance.

In addition to the nine classrooms installed for the Edmonds School District, another SAGE will be installed at the Corvallis Waldorf School in Oregon. This SAGE was redesigned by Portland State's Margarette Leite at a size of 28 by 64 feet and includes three separate classrooms.

The building will have a monitoring dashboard to track performance and direct continued innovation and growth. The dashboard will:

- Monitor CO2 for air quality
- Monitor thermal comfort levels
- Periodically evaluate occupant interactions with HVAC and lighting controls
- Test for thermal leakage of the envelope
- Monitor lighting levels
- Test performance metrics of building materials
- Test overall occupant satisfaction

The SAGE classroom is a solution that turns the idea of a modular classroom into something that will be a long-term, cost-beneficial and energy-saving solution for school districts and a learning environment full of light and fresh air that parents and educators will be proud to have their kids in.

Patrick Allen is the head of the SAGE program for Chehalis-based Pacific Mobile Structures.

CONTAMINATION

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the remedial excavation were extended to the property boundaries, thereby limiting future sampling to confirm that all property impacts were adequately addressed. As a result, the cleanup of the property could not be confirmed and a Property-Specific NFA was denied pending further investigation (and money).

In a similar situation, a leaking underground tank was identified at a facility that contributed to the contamination of soil and groundwater. The local municipality was responsible for the leaking tank, and therefore was interested in cleaning up the site.

Given this situation and the city's desire to see this centrally located portion of land redeveloped in a suitable manner, the municipality was more than willing to work with a developer to clean up the property. When presented with the possibility of even a Property-Specific NFA, which would not alleviate the city from the responsibility of cleaning up the entire site, the city was still willing to help with the development of this important downtown property.

A thorough characterization was performed in an effort to determine the extent of contamination in soil or groundwater. As a result, contamination was confirmed to impact the property and numerous other parcels.

The site, defined by Ecology as all areas where contamination is known to exist, was fully characterized; however, it was determined that property soil was not impacted and that the only affected media was contaminated groundwater. To reduce the cleanup time-frame and cost, a property-specific cleanup was selected rather than a complete site cleanup.

Using in-situ injections, a subsurface barrier was created to impede future contamination into the property groundwater, and to comply with a requirement that groundwater not be re-impacted by off-property contamination.

Given that the groundwater impacts were cleaned to concentrations below action levels and that the 2008 guidelines were followed, a Property-Specific NFA was recommended and is pending the results of subsequent periodic monitoring.

By following the Guidelines for Property Cleanups, the owner will be able to receive an NFA for the property and provide his lender assurance that environmental issues have been handled in a cost-effective and timely manner. More importantly, for no additional investment, the owner now has the NFA to provide to future lenders, which can often be more important than securing the financing for the current redevelopment.

Matt Wheaton, LG, EIT, is the environmental department manager in Terracon's Mountlake Terrace office. Wheaton lives in Lynnwood, where he volun-

SURVEYS

FARALLON CONSULTING

Specialty: Remedial investigations and feasibility studies; mediation and litigation support; stormwater management and planning; due diligence and site assessment; sediments; water and energy permitting services
Management: Founding members Peter Jewett and Cliff Schmitt
Founded: 1998
Headquarters: Issaquah
2014 revenues: N/A
Projected 2015 revenues: N/A
Projects: EMJ early action sediment cleanup in the Lower Duwamish Waterway Superfund Site; Capital Industries remedial investigation/feasibility study for chlorinated solvents in groundwater in South Seattle

Tim Zier, general manager at Farallon Consulting, responded to questions from the DJC about his firm and trends and issues in the industry. Here is what he said:

Q: What sectors have grown quickly in the last year at your firm?

A: Stormwater, construction support and energy permitting services have substantively increased over the last year. The growth of these services is attributable to the addition of key technical staff and an increased need for these services by our clientele.

Q: How have you responded to that growth?

A: Farallon has made very strategic and intentional decisions regarding firm growth. Our goal is not to grow for the sake of growth but rather hiring key technical staff that are a cultural fit for our organization. Our goal is to be a company that our staff talk to their friends about and say Farallon is an incredible place to work and here are all the reasons why.

We want our employees to be highly recognized and valued; and that they have an opportunity to grow professionally within the organization for years to come.

Q: Have you seen a greater level of excitement among your clients recently?

A: Seattle is an exciting place to live and work right now. There is definitely a feeling of excitement. The economy has ramped up again. Farallon is supporting a number of clients in redevelopment projects which involve cleaning up contaminated properties. It's great to be part of a changing skyline while concurrently cleaning up the environment.

Q: What's the most exciting innovation you've recently come across?

A: Farallon is an early adopter in the consulting industry with deploying hardware and software to facilitate and streamline collection of field data. The tablets enable field crews to utilize features of the tablets, such as geographic positioning systems and video cameras to document work and project conditions, as well as software assuring complete, efficient and quality data collection.

Field data are rapidly uploaded to a secure relational database data warehouse for project collaboration using web-based portals, sophisticated data analysis using a range of tools, reporting for project deliverables, and input into mapping software for geographic information system analysis and display.

Efficient use of available technology is an important aspect of Farallon's culture to provide cost-effective and quality services to clientele.

Q: What are a few of the hurdles your industry faces?

A: It has been increasingly difficult to obtain regulatory closure at sites. However, Farallon recently received three regulatory closures at project sites on behalf of our clientele. The environmental industry is also greatly affected by economic downtowns and changing regulations. Farallon has always strived to maintain a diverse client base and broad range of services. These types of intentional decisions have allowed us to work through the economic downturns that have been experienced in recent years.

ENVIRONMENTAL SCIENCES ASSOCIATES

Specialty: SEPA and NEPA compliance, natural resource evaluation, water resource management, policy and planning work
Management (local): Lloyd Skinner, Pacific Northwest regional director; Molly Adolfson, Pacific Northwest water leader
Founded: 1969
Headquarters: San Francisco; local offices in Seattle and Portland
2014 revenues (local): $10 million
Projected 2015 revenues (local): $12 million
Projects: Denny Substation EIS for Seattle City Light; Maynard nearshore restoration, Jefferson County; Alaskan Way Viaduct replacement (cultural resources monitoring, site testing, assistance with tunnel boring machine retrieval)

Molly Adolfson is a senior vice president at Environmental Science Associates and its Pacific Northwest water leader. Here's what she had to say about her work:

Q: What sort of projects have been keeping you busy?

A: Our cultural resources group has been very busy with some major monitoring projects this year, including the SR 530 (Oso landslide) debris removal project, the Alaskan Way Viaduct project, and a large combined sewer overflow project in South Magnolia for King County Wastewater Treatment Division.

We've also been working on a number of beach restoration projects in Puget Sound and leading some major EISs, including NEPA EISs for the Bureau of Reclamation in Eastern Washington, a large SEPA EIS for a new Denny Substation in South Lake Union, and a programmatic SEPA EIS for Seattle Public Utilities' combined sewer overflow long-term control plan.

Our recent merger with Vigil-Agrimis in Portland has dramatically expanded our capabilities in restoration and stormwater management.

Q: What are a few changes you've noticed in the industry?

A: There has been a tremendous amount of consolidation in the consulting industry, with firms generally getting larger and larger. Small- to medium-sized firms like ours are getting increasingly scarce.

We've also seen increasing pressure on our billing rates, and overall pressure on budgets, to do more for less.

Technological advances have really changed how we do our work, with GIS at the forefront. And we are finding that nearly all of our projects require a multidisciplinary team, with planners, biologists, engineers and cultural resource specialists working hand-in-hand from the planning stages through construction and monitoring.

ESA is a consultant for the Maynard nearshore restoration project on Discovery Bay in Jefferson County.

PHOTO COURTESY OF ESA

Q: How has the availability of public funds affected your company?

A: We've been a bit more cautious about hiring, as we've seen a number of public projects go on hold or move at a slower pace, particularly transportation projects. Our public sector clients have really been feeling the squeeze due to internal budget cuts or restrictions, and projects can take longer to move through the system, either through the contracting process, or review process for permits, internal review documents, etc. We are seeing things start to pick up, however, and we have been hiring recently.

Q: Where are the biggest opportunities for growth?

A: Right now we are looking at tremendous opportunities for integrated planning services (land use, climate change adaptation, and restoration), cultural resource evaluation and monitoring, and construction support services. Our roots in SEPA and NEPA will continue to be bread-and-butter work for us as the Puget Sound region continues to boom.

Q: If you could pass any law tomorrow what would it be?

A: I'd like to see a law that ensures a robust, sustainable funding mechanism for education — from preschool to university.

SURVEYS

WISERG CORP.

Specialty: Bio-clean technology company that converts food scraps into renewable resources; current focus is to convert food scraps to an organic liquid fertilizer for sale to farmers and consumers
Management: Larry LeSueur, founder and chief executive officer; Jose Lugo, founder and chief operating officer; Victor Tyron, chief science officer
Founded: 2010
Headquarters: Redmond
Projects: Harvester units at PCC Natural Markets, Central Market, Whole Foods Markets, Red Apple Markets and other grocery stores in the Pacific Northwest; working to get Harvesters installed at large corporate campuses; WISErganic liquid fertilizer sales to commercial produce growers and residential consumers

The DJC asked Jose Lugo about WISErg. Here is what he said:

Q: What is WISErg and how does the Harvester work?

A: The Harvester converts food scraps to a raw material that can later be turned into renewable resources like a liquid fertilizer approved for use in organic crop production. It can process any kind of food scraps, which makes it ideal for grocery stores that want to deal with food scraps responsibly and sustainably. A worker deposits food scraps into the Harvester, where they are broken down and stabilized until WISErg services the unit and collects the nutrient-rich material.

The Harvester also collects information about the weight, type of waste material and reason for discarding. We return this data to the generator to promote improved inventory management.

Q: How much does the Harvester cost? Can it work downtown?

A: The sale price for the Harvester depends on the volume of organics and which add-ons are included. We're seeing a large opportunity with grocery stores, restaurants and commercial campuses across Washington. This market is growing, and we're very close to announcing additional deployments in other regions of the country.

There is definitely a market for the Harvester in downtown settings. In fact, we have multiple units deployed in Seattle. The fact that the Harvester is sealed makes it attractive for grocery stores, restaurants and large campuses that want to deal with their food scraps sustainably without the smell, pests and leaching waste of compost. Many of our customers turn to WISErg after their neighbors complain about their composting and/or waste collection setup. We like to call the Harvester the "good neighbor" solution to food scrap recycling.

On the residential side, WISErg is working with communities and state agencies to provide the tools and education needed to improve waste separation efforts to increase food waste recycling opportunities.

Q: Does your company sell the fertilizer produced via the Harvester?

A: WISErganic liquid fertilizer is sold to commercial growers and consumers. It feeds your plants and soil and, through continued use, results in beautiful lawns and gardens.

The Organic Materials Review Institute, Washington Department of Agriculture Organic Program and the California Department of Food and Agriculture have approved it for use in organic crop production — reviewing it against the regulations set forth by the USDA National Organic Program.

In addition to retail sales at grocers that have installed Harvesters, we sell it directly to produce growers across the country. These growers rave about WISErganic. It's a natural fertilizer that produces healthy soil, which is the key to healthy and productive crops.

Our customers also find it works better in their irrigation and fertilizing systems than other organic fertilizers, many of which are primarily fish or manure-based. Those fertilizers tend to smell and can clog irrigation systems, requiring workers to manually clean them several times a day.

Q: Who are the co-founders of WISErg?

A: Larry LeSueur and I founded WISErg after working together at Microsoft. Larry is an innovative guy who likes to challenge the status quo. He was drawn back to his love of agriculture and healthy land after spending 20 years in product development and process improvement at Fortune 500 technology companies.

I'm a computer engineer by trade with a background in quality assurance, process innovation and operations. I spent 18 years with Microsoft helping build Microsoft Exchange and running several recruiting and acquisition initiatives. In 2005, I decided a change was needed and relocated to Mexico to co-found AguaYVida S.A., a company focused on reforestation, clean water and waste-to-energy solutions. It was a rewarding experience, but I returned to the U.S. in 2008 to apply what I learned to urban areas. WISErg was a natural evolution after Larry and I reconnected.

Q: Who is financially backing WISErg?

A: WISErg announced Series B funding in June. We secured $5 million in funding from private sources to help us expand and set the stage for a national rollout for Harvester and WISErganic. We're on schedule for that expansion, with increasing attention and interest every day.

The Harvester converts food scraps into an organic liquid fertilizer.

PHOTO COURTESY OF WISERG CORP.

Q: Does WISErg plan to expand into new markets?

A: We are focused on growth and are in discussions with several large grocery and retail chains to install Harvester units and sell WISErganic fertilizer across the U.S. and Canada. There is definitely a market need. Food waste is a universal issue with staggering numbers. According to the EPA, the U.S. sends more than 60 billion pounds of food to landfills each year. WISErg is challenging that status quo to help everyone see the value in food waste.

Our goal is to create a virtuous loop from farm to grocery back to farm. We've been able to accomplish that with several grocery stores in the area, where a grower uses WISErganic to produce crops for a local grocery that also has a Harvester unit installed. We want to replicate that to help build truly sustainable communities across the country. It's been amazing to see farmers and grocery stores share our passion.

ERM

Specialty: Environmental, health safety and sustainability consultants
Management (local): Paul Hausmann, managing partner for the Pacific Northwest
Founded: 1971; 1977 (in the U.S.)
Headquarters: London; regional offices in Seattle, Portland and Bellingham
2014 revenues (local): N/A
Projected 2015 revenues (local): N/A
Projects: Providing a range of services to a major Pacific Northwest refinery ranging from air and waste permitting and management to legacy site management; helping a major cruise line manage its environmental compliance program

Environmental Resources Management bills itself as the world's largest sustainability consultancy. John Kinsella, the Seattle-based commercial director for ERM's Western Division, responded to questions about the company.

Q: Do your industrial clients view regulatory requirements as obstacles or opportunities?

A: Our clients view the requirements as that, requirements to do business. Many have mature EHS management systems or programs that require them to set EHS performance goals and to audit their progress to meeting those goals. Many of these performance goals go above base compliance.

For those companies that are able to change processes that no longer result in air emissions or waste discharges and therefore remove the need for regulations, regulations are an opportunity to increase efficiency and reduce liability.

Q: ERM has more than 5,000 employees in over 150 offices around the world. Do you share resources?

A: We share knowledge and staff all the time. We have an internal company intranet site called Minerva (after the Greek goddess) where we post project profiles, company news and requests for help on any global project. This notice board is very active and allows us to rapidly respond to client questions and requests.

Staff from Seattle recently returned from a project in Nicaragua where they were part of a global field team.

Q: How many employees do you have locally?

A: Forty staff in Seattle, 15 in Bellingham, 15 in Portland.

Q: What's the most complex project you're working on now?

A: Several international projects present logistical challenges where we have people deployed in remote locations with limited communication networks as well as unstable political or health environments.

Q: Have any recent technological innovations changed how you work?

A: Smartphone apps are improving project communication and data gathering. (Having) global communications 24/7 allows us to have resources available on short notice if needed.

SURVEYS

ECO CHEMICAL

Specialty: Environmentally friendly paints and coatings
Management: Mark Cheirrett, founder and president; Peg Cheirrett, vice president of finance
Founded: 1991
Headquarters: 22,000-square-foot facility in Seattle's Georgetown neighborhood
2013 revenues: $2.6 million
Projected 2014 revenues: $3.1 million

The DJC asked Peg Cheirrett, vice president of finance, about Eco Chemical. Here is what she said:

Q: How did your company get its start?
A: Mark Cheirrett, our CEO, had worked in the chemicals and coatings industry for a number of years. He felt there was a desperate need for less environmentally damaging products. For example, when he was manufacturing moisture-cured urethanes, he noticed employee skin rash problems stemming from exposure to the toxic ingredients.

Eco Chemical water-based products eliminate the need for these ingredients along with the volatile organic compounds that create smog and toxic emissions.

Q: What segments of your market are doing well?
A: Our fastest growing product is our line of athletic field paints and removers. We were the first to produce paint for synthetic fields that could be applied and easily removed. Mark invented this product, working with the Seattle Seahawks in 2003. All of our products in this market are water-based and environmentally friendly. Since many synthetic fields are multi-use, it's helpful to be able to quickly and easily remove paint lines and repaint for the next event.

We also invented equipment designed to facilitate paint removal. Our Mantis hydro extractor is the top of the line and the favorite of both the NFL and CFL. It's the artificial grass equivalent of a Zamboni — pressure washing, scrubbing and vacuuming the field in one pass.

Q: What differentiates your products?
A: Being water based is an added advantage, besides providing high-quality colors and brightness, being able to stand up to weather as well as player wear and tear, yet still be easily removed when necessary.

Q: Is it used just on the West Coast?
A: Our initial market strength has been in the West but our revamped marketing program has created substantial growth for us this year in the East. In fact, if you watched the recent Monday Night Football game in Indianapolis, our product was used on that field. We have quite a few National Football League pro teams as our customers.

Q: Is it also used on grass fields?
A: We actually created a special product for grass fields. Grass paints aren't typically removed but need to be harmless to natural grass and soil. In 2010 we developed a concentrated water-based product consisting of separate powder and paste components that are shipped in a recyclable cardboard box. The customer adds water at their location, saving on the need for storage space and lowering the cost of shipping.

Most of our grass paint sales are to colleges and municipal parks departments around the country, including Seattle Parks & Recreation.

Q: What other segments of the industry are you involved in?
A: Our largest segment of the market is wood stains for pressure-treated lumber. These products are typically packaged in 275-gallon recyclable totes and sold to mills and pressure-treating plants, primarily in the West. Recent rebounds in the housing industry and the continuing trend towards stained pressure-treated products have contributed to excellent growth for us in this segment for the last couple of years.

Q: Do you sell products to retail outlets like Home Depot?
A: We presently only sell to lumber products manufacturers who in turn, typically sell their stained products to building material retailers such as Home Depot and Lowe's. We offer a broad spectrum of colors to our customers although the majority of our sales are various shades of red or brown.

Q: What measures do you take at your facilities to be eco-friendly?
A: We practice waste and pollution reduction throughout our manufacturing, packaging and shipping processes. For example, we manufacture only water-based paints and stains, so we emit no toxic fumes or discharge any hazardous substances; we capture the wastewater used to clean our mixing tanks and use it in the next batch; and we filter out solids from our waste stream and send a concentrated sludge to a solid waste facility rather than down the sewer.

We order our resins in 275-gallon plastic totes and then reuse those totes to ship our concentrated stains to our customers — resulting in one of the largest tote recycling programs on the West Coast.

Eco Chemical makes water-based paints for synthetic fields that can be easily removed.

PHOTO COURTESY OF ECO CHEMICAL

HWA GEOSCIENCES

Specialty: Geotechnical engineering, geoenvironmental, hydrogeology, materials testing and inspection
Management: Arnie Sugar, president; Bryan Hawkins, geotechnical engineer; Steve Greene, geology, lab and inspection
Headquarters: Bothell
2014 revenue: $3.5 million
Projected 2015 revenue: $4 million
Projects: Bothell downtown redevelopment and transportation improvements; geotechnical engineering for U.S. embassies in Nouakchott, Mauritania; Santo Domingo, Dominican Republic; and Kabul, Afghanistan

HWA GeoSciences has played a big role in the redevelopment of downtown Bothell. The firm has provided various services for public/private development projects and infrastructure improvements, including environmental cleanup, geotechnical engineering, and inspection.

The downtown redevelopment includes the investment of more than $150 million in public resources that has generated more than $200 million in private investment over the last few years.

Arnie Sugar, HWA's president, sat down with the DJC to discuss the state of the industry and how the company is adjusting to today's issues.

Q: How is technology changing what you do?
A: Technology is continuously changing the way we receive and transmit information. The limiting step in that process, however, is our ability to process and coordinate that information with others to achieve some shared objective. At HWA we utilize technology to enhance collaboration, but still stress human interaction and meaningful communication to achieve successful projects for our clients.

Q: Which of your services are most in demand?
A: As the economy improves, we are seeing an increase in demand for all of our services, from geotechnical engineering to environmental consulting, hydrogeology, materials testing and inspection.

Q: What sustainable practices do you use in your work?
A: HWA is involved with wastewater reuse, green stormwater infrastructure, and recycling of roadways and building materials. Our annual HWA-sponsored bicycle ride on Whidbey Island, the "Tour Des Engineers," symbolizes our commitment to sustainability (and having fun).

Q: Where do you see growth coming from over the next few years?
A: We've seen some increase in pavement preservation work due to transportation funding issues. We are also involved in several large public/private development and cleanup projects, notably the Bothell downtown redevelopment and Everett Riverfront projects.

Q: What are the biggest challenges for your industry?
A: With the ever-increasing pressure for efficiency and economy in our public sector work due to funding limitations, one challenge for project owners is knowing where to economize. The corresponding challenge for consultants and designers is to demonstrate value for design and inspection services, where economy is not often best placed.


Crews drill for a U.S. embassy project in Sarajevo, Bosnia/Herzegovina.

COURTESY HWA GEOSCIENCES

SURVEYS

LANDAU ASSOCIATES

Specialty: Environmental remediation and engineering, geotechnical engineering, permitting, compliance services
Management: Jerry Ninteman, principal and remediation services director; Chip Halbert, principal and environmental permitting director; Calvin McCaughan, senior associate engineer and geotechnical services director
Founded: 1982
Headquarters: Edmonds; offices in Seattle, Tacoma, Olympia, Spokane, Portland
2013 revenues: $14 million
Project: Environmental due diligence, regulatory agency and cleanup action support for development of Stadium Place in Seattle

Jay P. Bower, CEO of Landau Associates, responded to questions from the DJC about his firm and trends and issues in the industry. Here is what he said:

Q: What's the most exciting innovation you're recently come across?

A: One of the recent innovations we're excited about is a technological development in the pulping industry — and it's impressed us enough that we've taken an equity position in the project.

We've been working with Columbia Pulp to build a new straw-based pulping facility in Eastern Washington.

Columbia Pulp's proposed manufacturing process produces a pulp that directly competes with hardwood pulp on a product-quality basis. John Begley, Columbia Pulp's president, plans on developing a full-scale mill that could mark the beginning of some exciting changes for the pulp industry as a whole.

Wheat straw availability and its sustainability as a short-growth-cycle crop make the business model attractive in other wheat-growing regions of the country. And with an environmental footprint that is a fraction of that produced by other pulping processes, the straw-based pulping process is gathering fans from within the industry, from local communities, and from regulatory agencies.

Q: How did the recession change your industry and your firm?

A: From an industry perspective, the number of projects with private funding declined while the competition for those same projects increased substantially. Prior to the recession, we had a number of privately financed development projects in Eastern Washington (data centers and other large capital projects) and we saw that money move to the sidelines.

As a small firm, we also noticed a change in the competitive landscape — we found ourselves competing more often with very large firms who were driven to go after smaller projects. We were fortunate to have a number of clients that weathered the recession very well and continued to fund project work.

Additionally, only a very small part of our business was tied to the residential construction market, so we were spared the downturn in that sector. The recession provided a great opportunity to retool and decide how we wanted to grow as the economy improved.

Q: What are some of the biggest trends for geotechnical engineers?

A: A significant challenge for our geotechnical practice has been the increasing use of design-build bids for large transportation projects.

We were fortunate to be on very good teams for two of the three spans of the new 520 bridge. For these projects, WSDOT paid the design-build teams a fee that covered some of the expenses to develop the bid to construct the project — in reality the engineering firms are losing money while completing a substantial part of the design and they need to be on the successful team to avoid an overall loss.

Because the geotechnical engineering fees represent an insignificant part of the total project cost (we could work for free and not materially affect the total bid), it is difficult for firms like ours to affect the outcome of the bid process. In the case of the projects mentioned, we were not on the winning teams.

Q: Is there too much regulation or not enough?

A: In general, business hates uncertainty, so perhaps it's not so much a question of too much or too little regulation as it is of how regulations will change, how they will be implemented, and whether they make sense.

An example of regulatory uncertainty is the ongoing debate on fish consumption rates that drive regulatory decisions for establishing water quality criteria.

An example of regulations that may not make sense is the low criterion for zinc concentration discharged in stormwater from industrial facilities. The discharge criterion may drive businesses to spend resources on facility modifications or the installation of treatment systems to control trace levels of zinc; however, homeowners continue to purchase bags of zinc sulfate to spread on their roofs as a moss inhibitor and the cars and trucks that we drive release large amounts of zinc through tire dust.

Q: What are the top environmental considerations when planning a project?

A: It may sound obvious, but the most important consideration is making sure you understand the objectives and the entire scope required to meet those objectives. Clients want their projects on the ground as efficiently and economically as possible.

If we understand a project will require complex permitting, time spent mapping out the proper sequencing for those permits can shave weeks or months from the final schedule. With an environmental site investigation, a full understanding of the ultimate goals helps you plan for efficient data collection.

If you don't focus on the ultimate goals, it can result in not scoping the project properly. This happened to us on a recent project where the scope of the project phases were laid out in an agreement between our client and a regulatory agency — the initial phase was too narrow in scope, which resulted in some inefficiencies in the data collection process.

HERRERA ENVIRONMENTAL CONSULTANTS

Specialty: Water, restoration, sustainable development
Management: Michael Spillane, president; Carol Slaughterbeck, vice president of operations; Theresa Wood, vice president of finance
Headquarters: Seattle
2014 revenue: $14.8 million
Projected 2015 revenue: $16 million
Projects: Low-impact development training, Port Angeles Landfill stabilization and closure

Herrera Environmental Consultants' roots go back to the Cuban Revolution. When Fidel Castro took power, the company's founder Carlos Herrera, fled with his family to the U.S.

Herrera Environmental Consultants was born out of a contract with the Seattle Water Department, and the company spent the 1980s and 1990s focused on stormwater impacts to ecosystems, water quality treatment design, recycling and waste separation, and restoration projects.

Herrera specializes in sustainable development, water and restoration projects and finding solutions to resource problems facing companies and governments. The DJC sat down with the staff of Herrera to learn more about the company.

Q: How is technology changing what you do?

Jason King and Jennifer Schmidt: In addition to giving us tools to perform complex analyses for projects, technology provides new ways for us to engage communities and share information.

As part of our recent work on the Ballard District Open Space Plan, we equipped volunteers from nonprofit Groundswell NW with a simple web-based GIS smartphone app to map potential opportunities for open space acquisition and enhancement in their neighborhood. Users could carry their phone, and using the GPS, input data and take photos — all of which was compiled in a centralized database so that sites were visible to all volunteers in real-time as they were added.

The collection of sites formed the basis of the plan, and also provoked dialogue about what the nature of open space is, as well as how to accommodate rapid growth and demographic changes.

These tools facilitate better stakeholder engagement and a more successful planning process.

Q: Which of your services are most in demand?

Melissa Buttin and Carol Slaughterbeck: We have very high demand for our low-impact development design and policy services and have recently added several designers in Seattle and Portland to meet the demand. We are leading a statewide LID training program to prepare designers and developers for the new LID permit requirements that are about to take effect.

Demand is also strong for our stormwater planning and treatment design services, stream and river restoration and floodplain management services, solid-waste planning and engineering, abandoned mine site services, and our natural resource and permitting services.

Q: Are clients more committed to sustainability than in the past?

Buttin and Phil Coughlan: Yes, both in terms of having to demonstrate our own sustainability as a company, and in our ability to deliver services that support and drive sustainable projects. For example, we are working with a team to permit, construct and operate the first offshore wind energy project off the West Coast. We're also working on a proposal where a quarter of the total score is based on Corporate Responsibility and Sustainability.

Q: How can businesses and municipalities adjust to diminishing resources?

Slaughterbeck and Chris Webb: "Thinking outside the box" is a tired phrase, but businesses and municipalities really do need to rethink how nearly every type of infrastructure is funded, designed, operated and maintained.

We can't meet the challenges of decreased tax revenue, increasing population, climate change and increased pressure on natural resources with the thinking and methods that worked well in the past.

For example, stormwater flow control in urban areas is typically provided in single-purpose vaults. These tanks fill up and drain down controlled by a simple orifice. If these vaults were able to be operated in a dynamic way they could more efficiently manage stormwater by changing their operation seasonally. Seasonal operation can repurpose these vaults to store water for re-use in the summer when not needed to control large storm events.

These are the types of innovations needed for our communities to be more resilient and adaptable.

Q: What are the biggest challenges for your industry?

Slaughterbeck: The biggest challenges I see for the industry are: 1. Dealing with increasing public pressure for accountability and efficiency while the problems we must solve increase in complexity and; 2. The number of "10,000-hour" experts retiring in the next 10 years.

I hope that we can meet these challenges through new ways of integrated team thinking and collaboration, honest communication with the public about risks and tradeoffs, and finding ways to engage all generations in the workforce.