



412 NW Couch Street
Suite 202
Portland, OR 97209
971.244.8322
biohabitats.com

January 15, 2020

Dennis Todd, Ph.D. (541) 554-0359
Land Use Management Planning Committee
Oregon Country Fair
442 Lawrence Street
Eugene, Oregon 97401
rfq@oregoncountryfair.org

RE: **RFP Comparative Analysis of Grey Water Recycling Systems**
Biohabitats Proposal No. P20006.03

Dear Dennis Todd and members of the selection committee:

It was a pleasure to have met you at the Oregon Country Fair site last week and to discuss the long history of OCF working to improve and innovate its water infrastructure.

As you know, there are variety of opportunities to improve current water infrastructure. Any comparative analysis should include a technical, regulatory, and financial evaluation of blackwater and greywater treatment and dispersal/reuse options (irrigation and water for dust suppression).

While a greywater treatment system at the Sauna may be the easiest to treat and reuse, treating wastewater from the Main Kitchen has the additional financial benefit of not hauling wastewater offsite. We recommend a water infrastructure impact study, a high-level analysis to narrow down the most valuable sources of water for treatment and reuse.

Following an infrastructure impact study, an alternative analysis to understand capital cost, electrical demand, maintenance required, and financial return on investment would be completed.

Since 1982, Biohabitats has focused on conservation planning, ecological restoration, and regenerative water infrastructure design. Our mission to "Restore the Earth and Inspire Ecological Stewardship" is bold and encompasses over 30 years of combining sound science with integrated design to protect and restore natural habitats.

Our Integrated Water Strategies practice centers on creating adaptive designs for a changing climate, managing whole water systems, and restoring ecosystems. Biohabitats is a leader in the design of onsite, decentralized waste/water treatment and reuse, and we have decades of experience with natural-systems approaches such as constructed wetlands and other low-tech but resilient systems. Many of Biohabitats' projects have become precedent-setting examples in the design field. We were the first firm to have total water reuse projects (for irrigation and flushing water closets) in New Mexico, Nevada, New Jersey, Washington D.C., and Virginia. Biohabitats has also been involved with green building and sustainable development projects including dozens of Leadership in Energy and Environmental Design (LEED) and Living Building Challenge™ (LBC) projects.

Our interdisciplinary team of engineers, scientists, technicians, and operators are experienced at a complete wide range of services, including assessing, planning, engineering, designing, permitting, bidding, constructing, commissioning, and operating all types of water infrastructure. We specialize in understanding and developing decentralized water infrastructure opportunities and water reuse strategies.



Biohabitats understands what it takes to successfully operate, maintain and troubleshoot these waste/water systems and integrate this knowledge and experience into the design, commissioning and training phases. We have tackled projects located in unique, challenging locations that experience seasonal or peak use, have limited access to water/electricity/power and maintenance staff, and that must also meet stringent groundwater protection requirements. Many of our projects become part of the landscape and serve as an interpretive highlight for visitors.

PROJECT LEADERSHIP

PETE MUÑOZ, PE, LEED AP | SENIOR ENGINEER

Pete has focused the bulk of his career on the development of sustainable water infrastructure. A licensed engineer and former wastewater treatment operator, Pete has been involved in over 200 infrastructure projects including wastewater treatment, stormwater management, rain harvesting, environmental remediation, and watershed restoration. He maintains a holistic perspective and always tries to understand the value of utilizing natural treatment systems to meet water infrastructure needs. Pete's two decades of wastewater treatment experience has a special emphasis on utilizing natural treatment components.

Water conservation, water reuse, and workable landscapes (edible and regenerative) are guiding factors in Pete's practice. His philosophy pushes design work to reconnect communities with their infrastructure by integrating supportive systems into our landscape, food systems and recreational areas. Providing opportunity for this connectivity allows for greater awareness, educational opportunities, resilient systems, and cross pollination.

Pete has supervised or participated in a wide range of sustainability projects, including SITES, LEED and Living Building Challenge (LBC) projects. He is an EcoDistricts faculty, and has taught at Yestermorrow Design/Build School and the Omega Institute.

CRYSTAL GRINNELL, EIT, PLA

Crystal Grinnell is both a water resources engineer and landscape architect. She began her professional career as a landscape architect, working on environmental, recreation, and transportation projects. In 2013, she completed a M.S. degree in Civil and Environmental Engineering, which included a research focus on water quality and wastewater treatment technologies. Her unique skill set contributes to a variety of water-related project work at Biohabitats, including wastewater, stormwater, and stream restoration projects. Crystal's unique technical and aesthetic approach to the design process includes site analysis, site planning, hydrologic and hydraulic modeling, site grading, ecological design, and graphic representation.

REFERENCES

ROBERT "SKIP" BACKUS, CEO

Omega Institute
150 Lake Drive
Rhinebeck, NY 12572
845.266.4444
rcbackus@eomega.org

STEVE SAWYER, MANAGER OF WISCONSIN AVE BUILDINGS

Sidwell Friends School
3825 Wisconsin Ave. NW
Washington, DC 20016
202.537.2432
sawyerst@sidwell.edu

JOHN DUMMER, PRINCIPAL ENGINEER

Fernhill South Wetlands Natural Treatment System
Clean Water Services
2250 SW Hillsboro Highway
Hillsboro, OR 97123
503.797.1919
dummerj@cleanwaterservices.org

Thank you for the invitation to offer our qualifications for your consideration. We look forward to speaking to you more about your unique need, challenges and aspirations. We are confident that we have the experience and expertise and share your values and mission-driven values that could make our collaboration a successful and enjoyable process.

Sincerely,
BIOHABITATS



Pete Munoz, PE, LEED AP
Senior Engineer/Practice Leader
Cell: 802.598.2372
pmunoz@biohabitats.com



Certified B Corporations are for-profit companies that use the power of business to build a more inclusive and sustainable economy. They meet the highest verified standards of social and environmental performance, transparency, and accountability. To see Biohabitats' overall B Impact Score go to <https://bcorporation.net/directory/biohabitats-inc>.



JUST is a nutrition label for socially just and equitable organizations. The JUST program provides a transparent platform for organizations to voluntarily disclose initiatives in the categories of Diversity, Equity, Safety, Worker Benefit, Local Benefit, and Stewardship. To see Biohabitats' social justice label go to <http://justorganizations.com/just-profile/biohabitats-inc>.



1% for the Planet is a global network of businesses, nonprofits, and individuals working together for a healthy planet. As a business member, Biohabitats donates 1% of our annual sales to environmental nonprofits. To see how our donations go to work to save the planet visit <https://www.onepercentfortheplanet.org/issues>.

AMERICAN ASSETS TRUST

Hassalo on 8th Wastewater Treatment & Reuse System

Portland, Oregon



An urban redevelopment project treats its wastewater for reuse onsite, redirecting it away from stressed city sewer infrastructure.

SERVICES

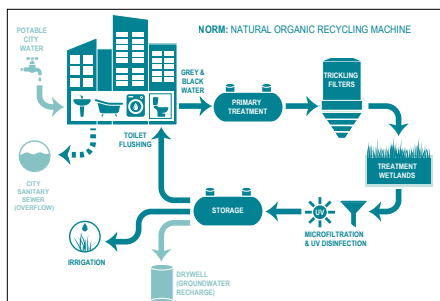
Planning
Green Infrastructure
Program Management

Portland’s Lloyd neighborhood is a dense cluster of office buildings with little residential space. The area is served by a combined sewer overflow system, in which rainwater is conveyed along with sewage and ultimately treated as wastewater. The LEED Neighborhood Development Platinum certified four-block, sustainable urban development boasts the highest level of certification in renewable, clean energy development, green roofs, and numerous other eco-friendly technologies and amenities. It is also one of the first urban neighborhoods to treat and recycle its wastewater on site.

Biohabitats designed an onsite wastewater system Natural Organic Recycling Machine (nicknamed NORM). The decentralized treatment and reuse system is designed to divert 100% of the wastewater generated in the three new buildings away from the municipal sewer. The project lessens the burden on this public utility, staving off costly repairs and infrastructure expansion, which garnered considerable support from the City as well as the Oregon Department of Environmental Quality. It is also a popular sustainability feature on the site.

The system—designed in collaboration with GBD Architects, Glumac, and PLACE—treats 45,000 gallons per day to State of Oregon Class A reuse standards through a series of trickling filters and constructed wetlands. The trickling filters are integrated into the design of the park-like pedestrian corridor at the center of the project and the wetlands are an element of the landscaping. Treated, disinfected wastewater is reused for toilet flushing, running the buildings’ cooling systems, and landscape irrigation. Excess, unused treated wastewater is injected into dry wells for crucial groundwater recharge in a largely impervious urban area, ensuring that no element of this new ‘waste’ stream is wasted.

A 60,000-gallon rainwater cistern collects runoff from the green roof of one of the buildings and feeds it into a water feature that stretches along a pedestrian corridor in the center of the site. The captured rainwater recirculates through both features, so no potable water is needed for their operation.



OREGON STATE UNIVERSITY

OSU-Cascades Long Range Development Plan

Bend, Oregon



Part of an expansion onto reclaimed land, the campus aspires to reduce consumption and become water-neutral while improving water quality.

SERVICES

Engage
Assess
Plan

The Oregon State University (OSU) opened its Cascades location as a 10-acre, three-building campus. To serve the region's educational, economic, and cultural goals, and to make room for 5,000 students, the campus needed to expand to 128 acres. To do so, the University chose to develop an adjacent 46-acre former pumice mine and a 72-acre former landfill. The properties provided a rare opportunity to reclaim land considered unusable and develop a sustainable community and regional asset with minimal impact on neighbors.

Intent on demonstrating innovation and leadership in sustainability, community, and education in a financially viable manner, the University envisioned OSU-Cascades as a net-zero energy, waste-, carbon-, and water-neutral campus. As a key member of a planning and engineering team led by Page Southerland Page, Biohabitats helped design a plan that would guide campus development to incorporate the bold energy, water, and habitat goals. Recognizing the opportunity to create sustainability and catalyze positive change in Central Oregon, the team used the Long-Range Development planning process that incorporated environmental, economic, social, cultural, and health/wellness values.

Biohabitats identified opportunities and constraints in developing a water-neutral campus and aimed to change the way campus water resources were planned and managed. Focused on making decisions based on local conditions rather than demand, Biohabitats developed strategies that would enable the campus to use water that only falls on site and eliminate all water quality impacts from the site.

Biohabitats developed calculations to project future campus water use and provided guidance for phasing water infrastructure. The new water-neutral campus will allow the community to reap financial and environmental benefits from reducing water use and quality impacts by enhancing utilization and protecting water resources from the building scale to the entire watershed.

OMEGA INSTITUTE

Omega Center for Sustainable Living

Rhinebeck, New York



An integrated water strategy links a holistic wellness center's wastewater treatment to its mission and educational activities, and a visionary ecological master plan guides the future conservation and restoration efforts of its 200-acre campus.

SERVICES

Community
Engineer & Design
Regenerate

The Omega Institute is a nonprofit educational organization and wellness center dedicated to pioneering holistic studies. When the Institute needed to replace its aging wastewater infrastructure, they sought a solution that would align with their mission and provide opportunities for education and inspiration.

In collaboration with BNIM Architects and John Todd Ecological Design, Biohabitats designed a low-energy, low-maintenance wastewater treatment system that also functions as a teaching tool. Known as the Omega Center for Sustainable Living (OCSL), the system includes primary treatment, an anoxic tank, subsurface flow constructed wetlands, an indoor aerated lagoon, a recirculating sand filter and subsurface dispersal.

The effluent meets all of the State of New York water quality standards for the land application/subsurface disposal of treated effluent. This aids the Omega Institute in working towards its goal of a Net Zero campus.

The OCSL treats up to 52,000 gallons of wastewater per day and is a key part of the Institute's educational programming about ecological impact. In operation since July 2009, the facility was awarded the AIA COTE Top Ten for highly sustainable projects and received LEED Platinum certification in 2010. The building was also one of the world's first certified Living Buildings.

BOY SCOUTS OF AMERICA

The Summit Bechtel Family Scout Reserve Greywater Reuse/ Onsite Wastewater Treatment & Dispersal

Fayette County, West Virginia



Reusing greywater, treating wastewater on site, and dispersing treated water through a forested ecosystem in the pristine New River Gorge.

SERVICES

Planning
Green Infrastructure
Design
Construction Management
Program Management

The 10,600-acre Summit Bechtel Family Scout reserve is the Boy Scouts of America's high adventure base and permanent home to the National Scout Jamboree, an event drawing over 75,000 people. Situated in rugged, forested mountains adjacent to the 70,000-acres New River Gorge National River area, The Summit is rich in natural, cultural, and recreational resources. To protect of those resources, sustainability guided the design, programming, and operations.

Given the site's unique landscape and proximity to the New River Gorge, wastewater management required out-of-the-box engineering. To eliminate direct discharge of treated wastewater, Biohabitats designed a system to treat reclaimed effluent on site and slowly disperse it through the soils and rich ecology of the forest floor via spray irrigation. This further polishes and filters the effluent before it percolates into the groundwater, which protects water quality and recharges groundwater. However, spray irrigation requires good soils and areas free of steep slopes and rocks, conditions in limited supply at The Summit. A radical reduction in water use and wastewater generation was required. The easiest way to do this? Provide low-flow, pull-chain, ambient temperature showers, and then capture, treat, and reuse greywater to flush toilets. After becoming blackwater, it enters a centralized treatment plant where it is filtered, disinfected, and dispersed through irrigation.

The systems at each of the 112 showerhouses process the greywater to provide disinfected water for toilet flushing. Once used in the toilets and urinals, the water enters a septic tank and joins any unused greywater prior to being pumped to the wastewater treatment plant that has the capacity required for the large flows during the high-population Jamboree events. The design flow is up to 96,000 gpd after equalization.

The greywater and blackwater systems reduce the use of potable water by 30% and save acres of land that would otherwise be needed for effluent dispersal. They demonstrate responsible water use and the BSA's commitment to sustainability to future leaders.

ALICE FERGUSON FOUNDATION

Hard Bargain Farm Environmental Center Greywater Treatment

Accokeek, Maryland



A low-energy and simple soil-based greywater treatment/dispersal system designed to Living Building standards sustainably manages water and watershed ecology.

SERVICES

Green Infrastructure
Design

The Alice Ferguson Foundation's mission connects people to the natural world, sustainable agricultural practices, and the cultural heritage of the Potomac River watershed. The Foundation's 330-acre Hard Bargain Farm serves as an environmental education center and provides hands-on activities, models, and field studies amid a diverse range of habitats. When the Foundation needed a new education building, they pursued Living Building Challenge™ (LBC) certification, the most rigorous standard established for sustainability. To design a greywater system that would achieve these net zero water requirements, they turned to Biohabitats.

Carefully harvesting, recycling, and balancing water and nutrients is a key component for Living Buildings, often a more challenging aspect of LBC certification. Regional regulations do not always align with LBC goals; therefore, collaboration with local regulatory authorities is crucial to introduce decentralized water/waste systems and innovation. At Hard Bargain Farm, composting toilets handle sanitary wastes with minimal water demands, but greywater still requires treatment. A conventional septic system was prohibitively expensive due to site soil constraints and resulting equipment needs.

Biohabitats designed and permitted a low energy greywater system to safely recharge treated greywater back to the aquifer. The core of the system is a land application subsurface drip irrigation system that slowly treats greywater through biologically active soils and plant roots in an existing meadow. Greywater is collected, settled, equalized, and filtered prior to the subsurface drip irrigation system, which was engineered to operate year-round even through freezing temperatures. Native grasses within the land application field make the system disappear back into the natural landscape of the farm.

The system treats up to 1,840 gpd and disperses it to recharge the groundwater and improve the quality of water entering the Potomac River. A new type of system in this county, it is an educational model that teaches integrated water strategies and the connections between human actions and local ecology.

RODALE INSTITUTE

Rodale Institute Wastewater Treatment Design

Kutztown, Pennsylvania



Seamlessly integrated into the landscape, the institute's innovative wastewater system is affordable and simple to operate, and accessible for education and research.

SERVICES

Green Infrastructure
Design

Founded by J.I. Rodale, one of the first advocates of sustainable, organic farming in the U.S., the Rodale Institute is a nonprofit dedicated to pioneering organic farming through research and outreach. The Institute wanted a wastewater treatment system in line with its mission for its new visitor center. In response Biohabitats designed a fitting solution for an organization that devotes itself to studying the link between healthy soil, food, and people. The innovative wastewater system comprises three main components: rainwater to flush toilets, wetlands to treat wastewater, and a drip irrigation system that uses the treated water to irrigate the building's landscaping.

Biohabitats worked closely with the farm director and staff to design a system that is accessible for educational and research purposes, carefully integrates into the welcome area landscape, and is sensibly designed to be affordable and simple to operate. Serving the main visitor restrooms, this system serves as a demonstration and teaching site to educate visitors about ecological technology. Biohabitats likes to think J.I. Rodale would be proud.

NIKE INC.

Nike Northwoods Pavilion Onsite Wastewater System

Beaverton, Oregon



The district-scale wastewater treatment and water reuse system includes constructed wetlands situated near building entrances as site amenities.

SERVICES

Green Infrastructure Design

The expansion adds approximately 3.2 million square feet of mixed-use facilities and parking to campus. The new structures extend into the landscape and connect to the original campus by linking to preexisting areas through open green spaces, paths, sports areas. The building designs aim for LEED Platinum and sustainable aspects include natural daylighting, passive chilled beams, and a closed-looped greywater treatment center.

The onsite wastewater treatment and reuse system captures a portion of the discharge from the new executive office building to create sufficient Class B recycled water to meet the facility's toilet flushing demand. The remainder of the wastewater flows through the lift station by gravity to be discharged into the municipal sanitary sewer system. The portion of daily flow captured and treated by the onsite system is adjustable up to 8,400 gpd to easily accommodate the design average daily total flushing demand of 6,750 gpd. The treatment system incorporates extra capacity both to better meet peak demands and to compensate for evaporative losses from the constructed wetlands during the summer months.

The wastewater treatment system is centered on constructed wetlands technology, though there are several other processes that enable the system to produce reuse-quality water. There are multiple emergency overflow connections to the sanitary sewer throughout the system in the case of critical process or equipment failures.