INNOVATIVE NUTRIENT REDUCTION PILOT FOR THE CALOOSAHATCHEE RIVER WATERSHED

UNSOLICITED PROPOSAL

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ATTN: PROCUREMENT BUREAU
B-1 BUILDING, 2ND FLOOR WEST
3301 GUN CLUB ROA
WEST PALM BEACH, FL 33406

PREPARED BY
SUSTAINABLE WATER INFRASTRUCTURE GROUP, LLC (SWIG)
51 KNIGHT BOXX ROAD | ORANGE PARK, FL 32065 | 904-234-7865 | SWIG-LLC.COM

Letter of Intent

August 6, 2026

South Florida Water Management District
Attn: Procurement Bureau
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: Innovative Nutrient Reduction Project for the Caloosahatchee River

Dear Procurement Bureau:

Sustainable Water Infrastructure Group, LLC (SWIG) respectfully submits this unsolicited proposal for an innovative nutrient-reduction pilot project along the Hendry-Hilliard Canal, a tributary of the Caloosahatchee River. The project deploys SWIG's proprietary PES+N engineered media to demonstrate high-efficiency removal of bioavailable nitrogen, with a focus on dissolved organic nitrogen (DON), the dominant and most treatment-resistant nitrogen fraction in the C-43 Basin, while evaluating system performance under controlled variable-flow conditions designed to simulate drought periods. Unlike conventional treatment wetlands, which are prone to nutrient reversal during drying and rewetting cycles, the PES+N system is engineered to maintain treatment integrity across intermittent flow regimes, providing the SFWMD with actionable, field-scale data on a drought-resilient alternative to land-intensive wetland treatment. Using baseline water quality data collected at the Hendry-Hilliard canal and an estimated average annual treated volume of 36.2 acre-feet, the project is expected to remove approximately 45 pounds of phosphorus and 81 pounds of nitrogen per year under normal operating conditions.

This water quality project serves a clear public purpose and benefit to the watershed. Over a 12-month operational period, it will generate a comprehensive, field-scale treatment performance dataset encompassing a range of hydrologic conditions, including active operation, controlled drought simulations, and post-rewetting recovery, that does not currently exist for media-based nutrient removal systems in South Florida. This data will provide the District with a powerful new tool to address water quality challenges in the Caloosahatchee Basin, inform future nutrient management decisions, and support the long-term protection of the river and estuary ecosystem.

SWIG welcomes the opportunity to work alongside the SFWMD to advance meaningful nutrient-load reductions in the C-43 Basin and generate the performance data needed to inform the next generation of nutrient management strategies for the region. As a registered Small Business Enterprise (122717), we look forward to discussing this proposal and its pathway to implementation through the unsolicited proposal process pursuant to §255.065, F.S.

Thank you for your consideration.

Sincerely,
Kenneth W. Kellum
Kenneth W. Kellum, P.E.

Chief Design Engineer

Table of Contents

1. About SWIG

Sustainable Water Infrastructure Group, LLC (SWIG) is a supplier of innovative nature-based nutrient removal systems and products that restore and protect nutrient-impaired waters from nitrogen and phosphorus pollution. The company's products enable high-impact, reliable passive pollutant removal within a small-footprint system, with no residual waste or by-products generated, and ease of implementation at a comparably low cost. We support water quality improvements for public and private clients in multiple water resource market segments including surface and stormwater, wastewater, and aquifer recharge. Our products are used in both point and nonpoint source systems to intercept and remove pollutants.

Our mission is to unlock both environmental and economic value while safeguarding ecosystems for future generations. We envision a future where ecological integrity and economic prosperity go hand in hand, delivering measurable, resilient benefits for both communities and natural systems.

With our team's expertise and experience, we are qualified to serve as a private entity under Section 255.065, Florida Statutes, for the delivery of infrastructure projects through this alternative approach to delivering a project and through the unsolicited proposal process. The firm is registered and authorized to conduct business in the State of Florida (FEI/EIN Number: 82-2425924) and maintains all professional licenses and certifications necessary to perform the proposed services.

2. Our Partners

Barge Design Solutions, Inc. will serve as the lead engineering firm for the project, including site investigation, civil design, and permitting activities. Barge will lead the Phase I Environmental Site Assessment, which will evaluate existing site conditions, document regulatory and permit history, and identify any recognized environmental conditions within the project footprint. Barge will also conduct the topographic and boundary survey necessary to support final design and permitting, establishing the baseline survey control and site geometry needed for accurate civil plan development. Building on the site assessment and survey findings, Barge will lead the design of the pump system, including pump selection, intake configuration, conveyance sizing, and operational controls, ensuring the system is appropriately scaled for the pilot pumping rates and designed for reliable year-round operation. Barge will prepare the civil site plans, including grading, drainage, and infrastructure layout, and will lead permitting support activities, including preparation and submittal of the Environmental Resource Permit application and coordination with regulatory agencies throughout the review process. Barge's familiarity with the District's design standards and the state's permitting procedures will be instrumental in advancing the project efficiently through the regulatory process.

Southwest Ag Environmental, LLC (SWEN) will serve as the local construction contractor responsible for building and installing the proposed PES+N system. Headquartered in LaBelle along the Caloosahatchee River, SWEN brings hands-on experience delivering environmental restoration, earthwork, water-management, and agricultural construction projects throughout South Florida. The company's familiarity with local soils, hydrology, seasonal conditions, and SFWMD requirements will support efficient project implementation. SWEN's scope will include site preparation and grading, construction of the treatment cells and berms, installation of piping, water-control structures, underdrains, and related infrastructure, and placement of the PES+N media and vegetation in coordination with SWIG and Barge Design Solutions. As a local contractor with established regional personnel and equipment, SWEN is well positioned to complete the work safely, cost-effectively, and in accordance with the approved design and permit requirements.

3. Understanding the Caloosahatchee River and Estuary

The Caloosahatchee River and Estuary are among southwest Florida's most valuable natural resources, providing extensive ecological, economic, and social benefits that connect the landscape, wildlife, and human communities (Map 1). Environmentally, the river serves as a crucial link between Lake Okeechobee and the Gulf of Mexico, sustaining a dynamic estuarine system that supports diverse habitats such as freshwater marshes, tidal creeks, mangrove forests, and seagrass meadows. These habitats provide nursery grounds for fish, shellfish, and wading birds, enhance biodiversity, and improve regional water quality through sediment trapping, nutrient cycling, and pollutant

Map 1 - Caloosahatchee River and Estuary Watershed

filtration. The estuary also plays a vital role in buffering coastal areas from storm surge and erosion, thereby strengthening the resilience of both ecosystems and built environments.

Economically, the Caloosahatchee system underpins a thriving regional economy rooted in natural resources. It supports commercial and recreational fishing industries, boating, ecotourism, and waterfront real estate—activities that collectively generate hundreds of millions of dollars annually. The health of the river directly influences tourism appeal, property values, and local employment, particularly in Lee and Hendry Counties. Agricultural operations upstream also rely on the watershed for irrigation, while downstream communities benefit from its role in maintaining navigable waters and coastal productivity.

Current Health and Condition of the Caloosahatchee River and Estuary

The Caloosahatchee River and Estuary are experiencing ongoing ecological stress linked to hydrologic modification, excessive nutrient loading, and unbalanced freshwater inflows. The river is currently listed as impaired under Section 303(d) of the Clean Water Act, with nutrient enrichment, specifically elevated concentrations of total nitrogen (TN) and total phosphorus (TP), identified as a primary cause of degradation. The natural watershed has been heavily altered through channelization and the construction of control structures, most notably the S-77 (Moore Haven Lock and Dam) and S-79 (Franklin Lock and Dam), which regulate flows from Lake Okeechobee and the upper watershed. These structures have transformed the river into a managed waterway, creating unnatural, variable flow conditions for downstream ecosystems. Periods of high discharge during wet years deliver large nutrient and sediment loads to the estuary, contributing to eutrophication, low dissolved oxygen, and recurring harmful algal blooms, while also reducing salinity and impacting estuarine species. Prolonged low-flow periods in dry seasons can cause elevated salinity, leading to stress and mortality of estuarine vegetation and benthic organisms. The 2020 Caloosahatchee River and Estuary Basin Management Action Plan (BMAP) established a Total Maximum Daily Load (TMDL) of 1,301,365 pounds per year for TN to prevent harm to the estuary; however, annual TN loads over the past five water years have averaged approximately 1,690,084 pounds per year, requiring a 23% reduction to achieve compliance.

Hydrologic Variability and the Limits of Treatment Wetlands

The Caloosahatchee and western Everglades region is characterized by pronounced hydrologic variability, with rainfall and runoff concentrated during a June–October wet season followed by an extended dry season during which flows diminish sharply or cease entirely. This feast-or-famine regime is further compounded by Lake Okeechobee operations and water control structures along the C-43 canal, which can amplify or suppress flows depending on lake stage management and regional water supply demands. The result is a flow environment that fluctuates between periods of high-volume discharge and prolonged low- or no-flow conditions, making it exceedingly difficult to sustain the perennial inflows that conventional treatment wetlands require to function effectively.

Treatment wetlands depend on continuous saturation to maintain the anaerobic conditions that support nutrient transformation and retention. When inflows cease and wetland soils are exposed to air, aerobic decomposition accelerates the mineralization of accumulated organic matter, releasing previously sequestered nitrogen and phosphorus back into the water column upon rewetting. These nutrient reversals can temporarily transform a treatment system into a net nutrient source, generating export pulses that coincide with the low-flow, high-salinity conditions the estuary is already most vulnerable to. In the Caloosahatchee watershed, where dry-season flows are frequently insufficient to maintain standing water across large treatment cells, this risk is persistent and underscores the need for treatment approaches that are resilient to intermittent flow and better matched to the region's hydrologic realities.

4. Developing the Solution

Meeting the Caloosahatchee's total nitrogen TMDL will require substantial new treatment infrastructure distributed across the watershed. The challenge has been recognized for well over a decade. In the early 2010s, the SFWMD and Lee County Government sought nature-based tools capable of achieving a 23 percent reduction in nitrogen loads entering the estuary, confronting a particularly difficult obstacle: nearly 80 percent of the nitrogen in C-43 waters exists as dissolved organic nitrogen (DON), a form that conventional treatment methods struggle to remove. Progress has been made through investments at sites such as BOMA, but current annual TN loads continue to average approximately 2,190 metric tons per year, leaving a substantial reduction gap that new projects must help close.

This pilot project consists of an approximate 0.1-acre footprint located on private agricultural land within the Hendry-Hillard Water Control District (HHWCD) in the East Caloosahatchee Basin, discharging near its confluence with the C-43 canal. **See Appendix A – Figure 1. Site Location Map**. This location is strategically significant: the East Caloosahatchee Basin contributes disproportionately high TN loads relative to its size, yet the SFWMD has limited existing treatment infrastructure within this section of the watershed, making it an underserved area with meaningful opportunity for nutrient load reduction.

Beyond filling this geographic gap, this project reflects a broader need that water managers across Florida are beginning to confront. As developable land becomes increasingly constrained and the most suitable sites for large-scale treatment wetlands are built out, the state will gradually exhaust opportunities to construct the massive, land-intensive STAs that have anchored nutrient management strategies for decades. Future progress will depend on compact, high-performance treatment tools that can be deployed in both rural and urban settings, on parcels too small or hydrologically variable to support conventional wetland systems. Treatment wetlands can present significant challenges in systems with intermittent flow and extended dry periods, where drying and rewetting cycles drive nutrient reversals rather than net removal. The Caloosahatchee watershed and the western Everglades region, with its pronounced seasonal hydrology, is precisely the

environment where next-generation, nature-based media treatment approaches are not just beneficial but necessary.

5. The Proposed Project

Project Description

The proposed project is a small, field pilot-scale treatment system designed to demonstrate nature-based advanced nutrient removal within the C-43 Basin and the Caloosahatchee River watershed. Located in the northeast corner of the site, the project is easily accessible from SR 80 and is adjacent to the Hendry-Hillard Canal. **See Appendix A – Figure 2. Site Plan**.

Each of the three treatment cells will utilize SWIG's proprietary PES+N nutrient-removal media, a nature-based filtration system engineered for efficient phosphorus and nitrogen reduction. Bench and pilot testing of the PES+N system indicates potential removal efficiencies of up to 80 percent for total phosphorus and approximately 45 percent for total nitrogen. The denitrification process is a biological process where bacteria in the system utilize the dissolved organic nitrogen and convert it to nitrogen gas. The nitrogen is off-gassed to the atmosphere. Dissolved inorganic nitrogen and refractory organic nitrogen cannot be utilized by the bacteria, so they are not removed. The system also removes a portion of the particulate nitrogen.

Design and Operations

The project has advanced to approximately 30 percent design and is sited within an existing cleared area along the canal, minimizing land disturbance and simplifying construction. The facility will include approximately 0.10 acres of filter media beds containing a multilayer PES+N system developed by SWIG, consisting of a media layer for phosphorus adsorption and nitrification, a hardwood-chip layer providing a carbon source for denitrification, and a saturated gravel layer to support anaerobic denitrification. The filter bed is evenly divided into 3 cells that will be contained in a bermed area. The berms will be two feet high.

The project is intentionally designed around simple, proven infrastructure that the District is familiar with and would be able to operate and maintain. Influent water will be pumped from the canal using a standard centrifugal pump and conveyed through conventional piping to a distribution manifold at the upgradient end of the filter bed. Water is released across the full width of the bed through a series of risers, which control the distribution of flow and maintain even sheet flow across the media surface, improving residence time and minimizing short-circuiting. Water infiltrates through the media layers and treated effluent is collected in an underdrain and returned to the Hendry Hilliard canal near its confluence with the C-43 canal. This straightforward configuration keeps the footprint small, reduces permitting complexity, and ensures that operational knowledge and maintenance protocols are readily transferable to District staff.

The system will be monitored and controlled with a telemetry system that monitors water levels in the system and the operation of the pump. The HHWCD has approved access to the Hendry-Hillard canal for this project (see Appendix B).

Water Availability and Expected Operation

Unlike storage-based treatment systems, this project operates as a continuous flow-through system with a short hydraulic residence time (HRT) of approximately 60 minutes. Because the system draws water directly from the C-43 canal at low pilot-scale pumping rates, its intake has a negligible effect on river flow and can operate year-round. The pump intake will be installed two feet below the average dry season water level. This design eliminates the operational constraints tied to storage availability and allows the system to function during both wet and dry seasons, making it substantially more flexible than impoundment-based treatment approaches.

At full operation, the system treats approximately 0.15-cfs (67.9-gpm), producing an average annual treatment volume of about 109.5-acre-feet, or roughly 35.68 million gallons. The pump intake within the canal will be set at an elevation to pull water throughout the year. As a pilot system, a key objective is to characterize nutrient removal performance across a range of hydrologic conditions, including the drought and low-flow periods that challenge conventional treatment wetlands. To that end, pump operations will be intentionally suspended at least three times during the study period, in increments of 1) two weeks, 2) four weeks, and 3) six weeks, to simulate variable hydrology and extended dry periods. Inflow and outflow water quality will be monitored before, during, and after each shutdown event to evaluate nutrient reversal responses and quantify the magnitude and duration of any post-rewetting export of phosphorus and nitrogen. These controlled interruptions will generate data critical to understanding how media-based systems perform relative to conventional wetlands under the same hydrologic stressors.

Water Quality Conditions and Anticipated Nutrient Reduction

Table 9.2 of Volume I of the Environmental Resources Permit Applicant Handbook provides an event mean concentration for total phosphorus (TP) from row crops of 0.577 milligrams per liter (mg/L). Baseline water quality data collected at the Hendry-Hilliard canal (Station No. 32269) indicate that inflow concentrations of total nitrogen (TN) average approximately 1.64 mg/L based on data available from DBHYRO. These concentrations are representative of upstream C-43 Basin water entering the site and are consistent with typical inflows to the PES+N system during freshwater discharge periods.

Using these concentrations and an estimated average annual treated volume of 95.8 acre-feet, the project is expected to remove approximately 214 pounds of phosphorus and 120 pounds of nitrogen per year under normal operating conditions.

The anticipated nutrient-load reduction will demonstrate how this technology could contribute directly to Caloosahatchee River Basin Management Action Plan (BMAP) goals by reducing nutrient

inputs to the river and estuary. The project will also provide valuable performance data to inform the future design and scaling of nutrient-removal technologies throughout the C-43 Basin.

The Roadrunner Project embodies the SFWMD's adaptive, data-driven approach to restoration, demonstrating how science, policy, and engineering can work in sequence. Ultimately, the project tells a story not only of research success but of innovation in restoration—potentially transforming a former sugar cane field into a dynamic landscape that grows wetland habitat and filters the one of Southwest Florida's greatest natural resources.

Operational Sequencing

The project site is located on private lands but will remain open to District staff for periodic inspections. Routine operations will include periodic inspection of pumps and controls from staff located in La Belle, Fl.

Permitting

The project is anticipated to require an Environmental Resource Permit (ERP), which regulates activities involving the alteration of surface water flows and stormwater management systems. The ERP application will document the proposed intake and discharge configuration, pump operations, filter media bed construction, and the operational criteria governing system withdrawals from and returns to the Hendry-Hilliard Canal. Based on the upland character of the site and the small project footprint of approximately 0.27 acres (including treatment area and berms), a U.S. Army Corps of Engineers Section 404 permit is not expected to be required, though this will be confirmed through coordination with the Corps' Fort Myers Permitting Section. It is anticipated that an exemption from FDEP will be granted for the surface water discharge in accordance with previous exemptions obtained for similar pilot projects SWIG has designed and operated. The overall permitting pathway is expected to be straightforward given the project's water quality improvement purpose, upland siting, and compatibility with the District's existing management objectives for the East Caloosahatchee Basin.

Installation, Implementation and Cost

Following final design approval and permit authorization, construction of the system will proceed. Implementation will begin with site preparation and grading to establish the three treatment cells, followed by installation of the pump station, inflow and outflow structures, level spreaders, and the underdrain collection network. The PES+N media and vegetation will then be placed and established in accordance with design specifications to ensure proper installation and performance.

SWEN will lead site construction with oversight from SWIG to confirm that all work meets design, environmental, and safety standards. Construction sequencing will be scheduled to minimize wet-season impacts and maintain access for monitoring and testing. After installation is

complete, the system will undergo startup testing to verify hydraulic performance, and flow balance before continuous operation begins.

A planning-level engineer's cost estimate for design, permitting, construction, and startup is included in this proposal to support evaluation and budgeting by the SFWMD.

Monitoring, Reporting, and Performance

Monitoring and performance evaluation for this pilot nutrient reduction project will be coordinated with the HHWCD and SFWMD staff. Water quality sampling, flow measurements, and operational data collection will align with SFWMD's protocols to ensure that results are compatible with ongoing monitoring programs.

The monitoring approach will be designed to verify hydraulic function, system reliability, and nutrient-removal performance under typical operating conditions. Data from the pilot system will support evaluation of nutrient reduction efficiency, operational stability, and scalability of the technology for potential future applications within the C-43 Basin.

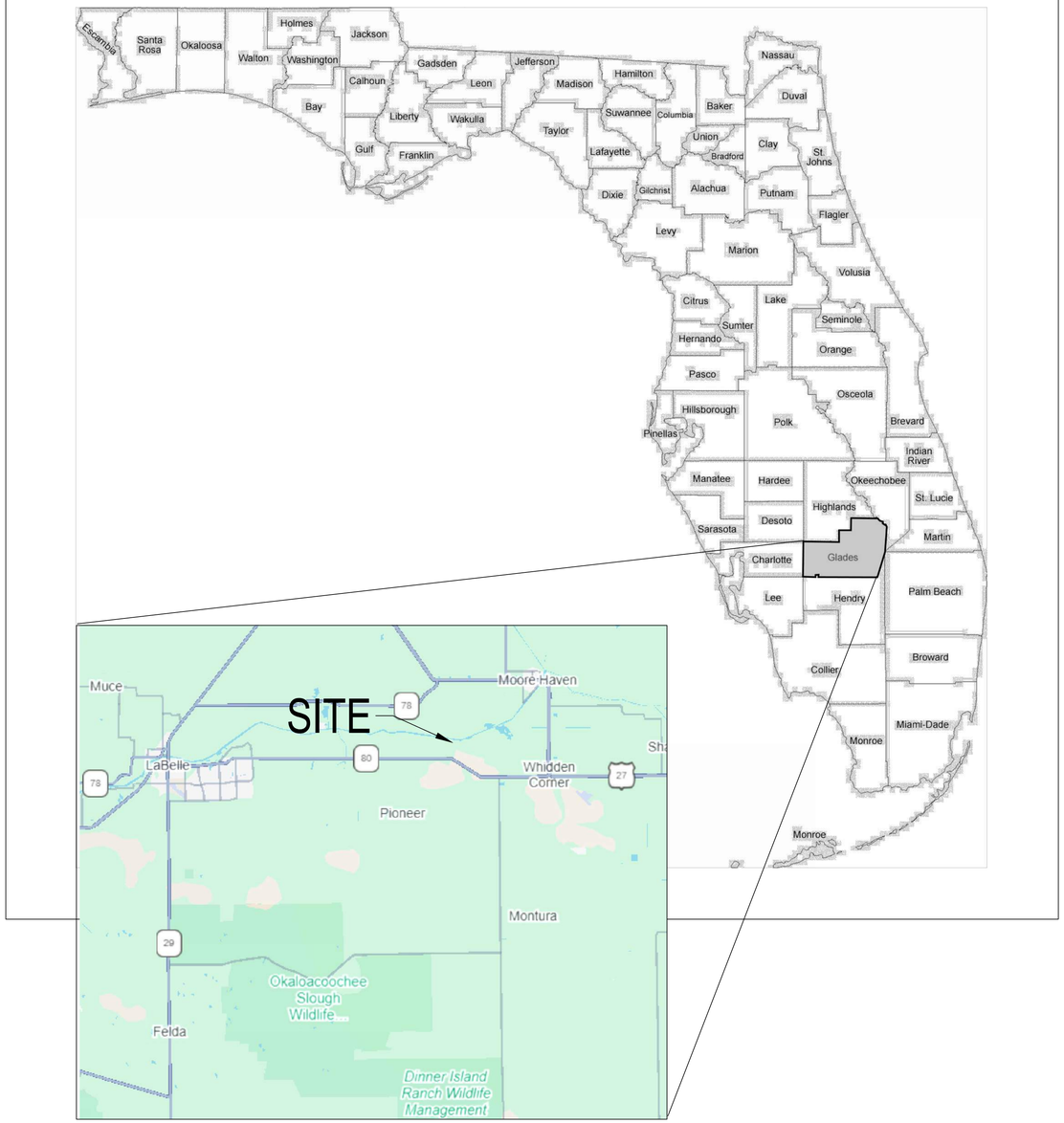
Reporting will follow the requirements and schedules established by SFWMD. SWIG will coordinate closely with District staff to integrate project results into regional data analyses and performance assessments.

Term

The project term spans approximately 22 months. Following contract execution, SWIG will complete permitting and construction within nine months, after which the system will enter a 12-month operational and monitoring period. Upon conclusion of operations, SWIG will decommission the system and, if requested, would transfer project assets, such as the treatment media, pumps, valves, and electrical controls, to the District during the project conclusion. SWIG would then revert the site to pre-project conditions which would be outlined in a lease agreement between SWIG and the landowner in accordance with the reversion plan established at the time of permitting.

Appendices

Appendix A – Figures



ADDRESS: STATE ROAD 80
MOOREHAVEN, FLORIDA
PARCEL ID: A36-42-31-A00-001A-0000
SEC/TWP/RNG: 36-42-31

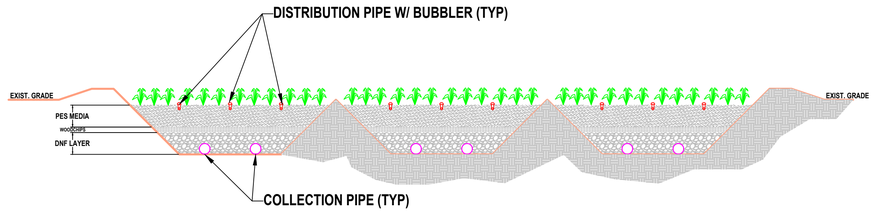
FIGURE 1. PROJECT LOCATION

3201 1st AVE. S. SUITE 202
SEATTLE, WA 98134
TEL: 206.276.9178
EMAIL: MARKM@SWIG-LLC.COM
WWW.SWIG-LLC.COM

ROADRUNNER

PROJECT # ROADRUNNER	LOCATION ROADRUNNER		DESIGNED: KK	
SCALE N.T.S.	DATE 06-01-2026		DRAWN: KK	CHECKED:MRM
CLASS\SHEET	SHEET 1 OF 1			APPROVED: VS

Appendix B



PES+N FILTER BED SECTION

Summary				
PES+N Area		==>	0.1	acres
Loading Rate		==>	3.0	ft/day
Flow Rate		==>	67.9	gpm
Volume Treated		==>	109.5	ac-ft/yr
TN Removed	50.0%	==>	245	lb/yr
TP Removed	80.0%	==>	137	lb/yr

3201 1st AVE. S. SUITE 202
SEATTLE, WA 98134
TEL: 206.276.9178
EMAIL: MARKM@SWIG-LLC.COM
WWW.SWIG-LLC.COM

FIGURE 2. SITE PLAN

ROADRUNNER

DESIGNED: KK			
DRAWN: KK			
CHECKED:MRM			
APPROVED: VS			
PROJECT # ROADRUNNER	LOCATION ROADRUNNER		
SCALE N.T.S.	DATE 06-01-2026		
CLASS\SHEET	SHEET 1 OF 1		