



## NEWTRIENT SNAPSHOT

# Soil and Water Engineering Technology, Inc. Nitrogen Interception Technology



## BUSINESS OVERVIEW

Soil and Water Engineering Technology, Inc. (SWET) is an engineering consulting firm based in the state of Florida; a region rich in precious hydrological systems. Comprised of a team of experts in water conservation and protection, SWET serves both public and private clients across the southeast. Their expertise includes consulting services in water resource modeling, pollution abatement strategies, implementation of agricultural best management practices, and design solutions for animal waste management.

## PROJECT

### TECHNOLOGY OVERVIEW

Manure applied to crop and pastureland has the potential to leach nitrates into groundwater. To preserve water quality, SWET's subsurface nitrogen interception technology aims to minimize the nitrogen load from liquid manure in groundwater. This is achieved by installing a series of intercept wells beneath irrigation pivots to capture water with high nitrogen levels before it reaches the surface of the underlying aquifer. Once intercepted, this water is collected and reapplied to the surface for plant uptake, lowering nitrogen concentrations. Use of a denitrification bioreactor can further reduce nitrate levels.

### PROJECT SIZE

The nitrogen interception technology is designed so that total pumped volumes match the annual leaching volume from rainfall in a given region. In a Florida-based study, wells were installed at a depth of 50-60 feet below the surface, approximately 10 feet below the seasonal low groundwater table. Water from one well flowed nearly continuously at an estimated rate of 50 gallons per minute into a 12,000-cubic-foot woodchip denitrification bioreactor.

### REQUIREMENTS

Before implementing nitrogen interception technology, manure and soil should be tested to optimize nutrient management. Intercept wells should be placed equidistantly beneath the irrigated area. Placement and pump rates are strategically designed to create localized hydrological depressions, enabling efficient interception and redirection of leachate. Flow meters from the wells to both the bioreactor and irrigation system should be monitored weekly. Regulatory compliance, comprehensive training, and routine maintenance with accurate record-keeping ensures optimal system performance.

## KEY CALL-OUTS



**Reduced Groundwater Nitrogen Levels:** Intercept wells capture nitrogen-rich water that seeps below the vadose zone.



**Enhanced Water Quality:** Reduced nitrogen loads to surface and groundwater minimize risks to environmental and human health.



**Improved Nutrient Management:** Reuse of nutrients creates an efficient, closed-loop system.



**Cost Savings:** Improved nitrogen use efficiency decreases reliance on commercial fertilizers to offset nutrient losses.

Findings are based on an evaluation conducted under a Conservation Innovation Grant awarded to Newtrient. To view a more detailed description of these results, visit the SWET Nitrogen Interception Technology Evaluation Summary on the [Newtrient website](#).

## FINANCIAL OVERVIEW



### CAPITAL INVESTMENT

As of 2025, the initial capital cost of a nitrogen interception system is approximately \$1,173 per acre. This includes an estimated \$821 per acre for the interceptor wells and irrigation reuse system and \$352 per acre for the woodchip bioreactor (Bottcher & Clark, 2021). Costs may vary based on regional rainfall volume, irrigation design and capacity, total acreage, and project requirements.



### DOWNSTREAM BENEFITS

Nitrogen interception technology can lead to long-term cost savings by improving nutrient use efficiency and reducing reliance on commercial fertilizers to compensate for nitrogen losses through leaching, runoff, or volatilization. Assuming an extracted nitrate concentration of about 30 mg-N/l, the cost efficiency of this technology is \$1.17 per pound of nitrate-N. As nitrate concentrations increase, the cost efficiency of the system improves (Bottcher & Clark, 2021).

## ENVIRONMENTAL IMPACT

### WATER QUALITY

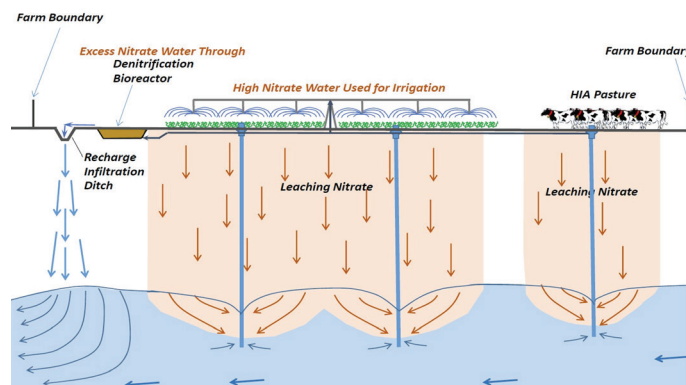
Nitrogen interception technology decreases excess nutrients from liquid dairy manure from entering groundwater. The system works by disrupting the hydrologic flow path of nitrates below the irrigation area, capturing and preventing their downward movement. When high nitrogen subsurface water is redirected for crop irrigation, the risk of nitrogen overloading into surface waterways is also lessened. Lowering nitrates in waterways significantly decreases the potential for algal blooms, oxygen depletion in aquatic environments, and risks to both human and environmental health.

### NUTRIENT USE EFFICIENCY

The SWET nitrogen interception technology promotes a closed-loop system that facilitates the recycling and reuse of nutrients. Nitrogen containing water captured by interceptor wells are either redirected for crop irrigation or further treated through a denitrification bioreactor, optimizing nutrient management.

### SWET Groundwater Nitrogen Mitigation System Diagram

Source: Bottcher, D. & Clark, M. (2021).



**REFERENCES:** Bottcher, D. & Clark, M. (2021). Groundwater Nitrate Mitigation System Using Interceptor Wells, Irrigation Reuse, and Denitrification Bioreactor. <https://www.newtrient.com/wp-content/uploads/Groundwater-Nitrate-Mitigation-Systems.3.1.21.pdf>. Cost estimates were adjusted for inflation: <https://www.usinflationcalculator.com/>

## NEWTRIENT'S 9-POINT TECHNOLOGY SCORING

### For SWET Nitrogen Interception System

Visit the [SWET Nitrogen Interception Technology](#) page in Newtrient's Solutions Catalog



Each solution can earn up to nine points, one for each criterion. Colored numbers indicate fulfilled criteria.

- 1 | Operational History
- 2 | Operational Reliability
- 3 | Market Penetration
- 4 | Capital Cost
- 5 | Operations & Maintenance Cost
- 6 | Value Proposition
- 7 | Vendor Information Sharing
- 8 | Case Study
- 9 | Funding Availability

Discover Newtrient's technology evaluation process: [Learn more about Newtrient's 9-Point Technology Scoring System.](#)



Newtrient's mission is to reduce the environmental footprint of dairy while making it economically viable to do so.

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