



# 2017 Final Report Summary Sheet

## Grantee Information

**Project Title:** Drainage water management and saturated buffers for achieving NLRs goals

**Institution:** University of Illinois

**Primary Investigator:** Christianson

**NREC Project #** 2017-4-360498-168

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Is your project on target from an IMPLEMENTATION standpoint?  Yes  No  
If you answered "no" please explain:

Is your project on target from a BUDGET standpoint?  Yes  No  
If you answered "no" please explain:

Based on what you know today, will you meet the objectives of your project on-time and on-budget?  Yes  No  
If you answered "no" please explain:

Have you encountered any issues related to this project?  Yes  No  
If you answered "yes" please explain:

Have you reached any conclusions related to this project that you would like to highlight?  Yes  No  
If you answered "yes" please explain:

Have you completed any outreach activities related this project? Or do you have any activities planned?  Yes  No  
If you answered "yes" please explain and provide details for any upcoming outreach:

Additional Notes:

## NREC January 2018 1.0 Year Report

### **Drainage water management and saturated buffers for achieving NLRs goals**

PI: Dr. Laura Christianson, Assistant Professor of Water Quality, Department of Crop Sciences, University of Illinois, S322 Turner Hall, 1102 S Goodwin Ave., Urbana, IL 61801.

Co-PIs: Dr. Paul Davidson and Dr. Richard Cooke, Agricultural and Biological Engineering, University of Illinois

#### 1. List of objectives

The specific assessable objectives are to:

1. **Monitor drainage water management (2) and saturated buffer (2) sites** for nutrient loss reduction and crop yield impacts.
2. **Develop a water balance** at the drainage water management sites to better quantify lateral seepage impacts upon the overall nutrient loss reduction.
3. **Perform an economic evaluation** of these two practices (\$ per acre treated and \$ per pound of nitrogen removed).
4. **Evaluate if these practices should be added to the IL NLRs.** And if so,
  - a. Develop an appropriate N loss reduction value to add to the NLRs tables.
  - b. Develop a procedure and seek approval for adding drainage water management and/or saturated buffers to the NLRs.
5. Per the RFP, the final objective is *“to include a final report at the conclusion of this project to address each of the objectives stated above.”*

#### 2. Length of project - number of years completed: 1.0 years

#### 3. Accomplishments

##### a. Drainage water management sites

- i. University of Illinois Agricultural Engineering Farm: Border tiles were installed to hydraulically isolate two x 2 acre plots which are being managed under free drainage and drainage water management. More than 30 piezometers have been installed to evaluate lateral seepage from each field (**Figure 1**). Awaiting spring drainage flow.
- ii. Private farm site: A 35 acre tile drainage system on a private farm in Macon County was recently installed to do drainage water management. Monitoring of the three drainage water management zones indicates this is a good location for nitrogen loss research (**Figure 2**), and plans are in development to evaluate lateral seepage at this site.

##### b. Saturated buffer sites

- i. Knox County saturated buffer: Sixteen monitoring wells have been installed (**Figure 3**) throughout the 1,000 ft saturated buffer. No flow has been recorded since well installation, with this expected to change very soon.
  1. The graduate student project manager, Mr. Janith Chandrasoma, presented early groundwater hydrology results from this site at the American Society of Agronomy annual international meeting in Tampa, Florida in October 2017 (Abstract #105171) where he was awarded 4<sup>th</sup> place in the graduate student presentation competition.
- ii. Piatt County saturated buffer: A saturated buffer originally installed in 2013 as a part of a regional Agricultural Drainage Management Coalition (ADMC) project, at which monitoring had subsided, is now being monitored for this project (ADMC site IL-4).

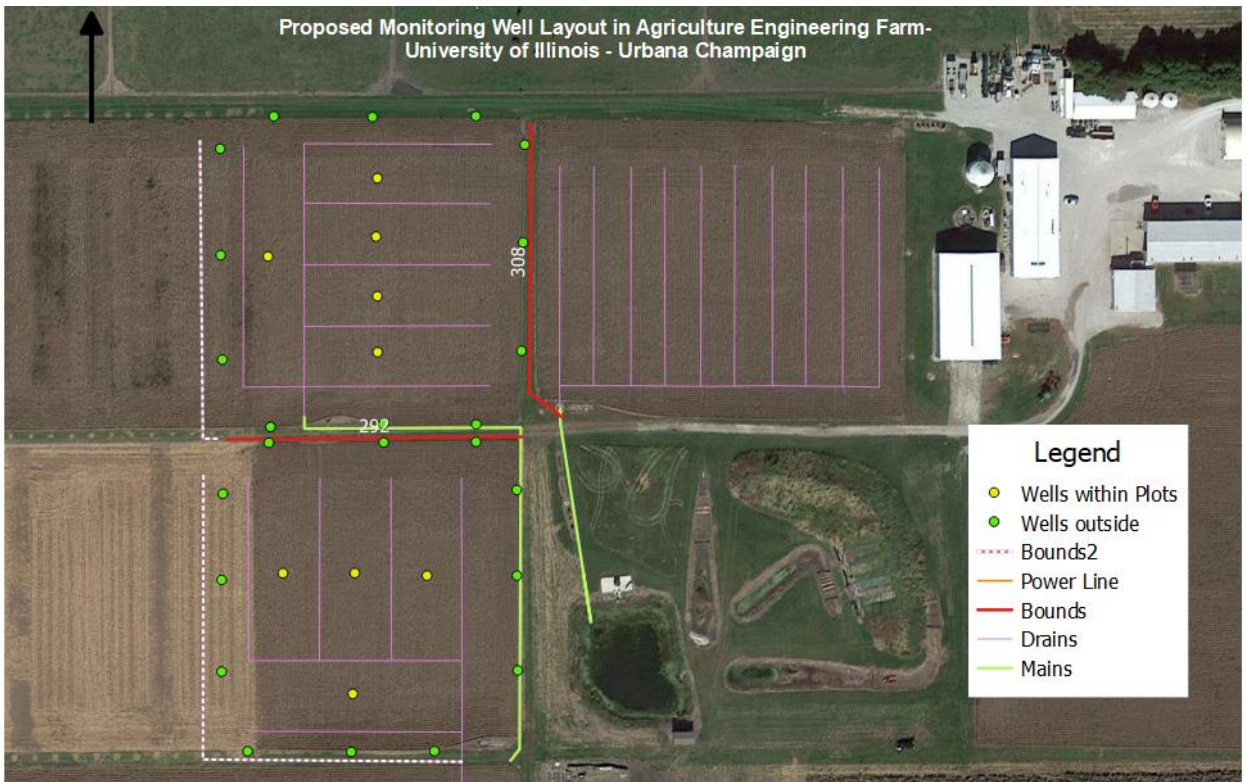


Figure 1. Piezometer placement at the Agricultural Engineering Farm drainage plots to assess seepage.

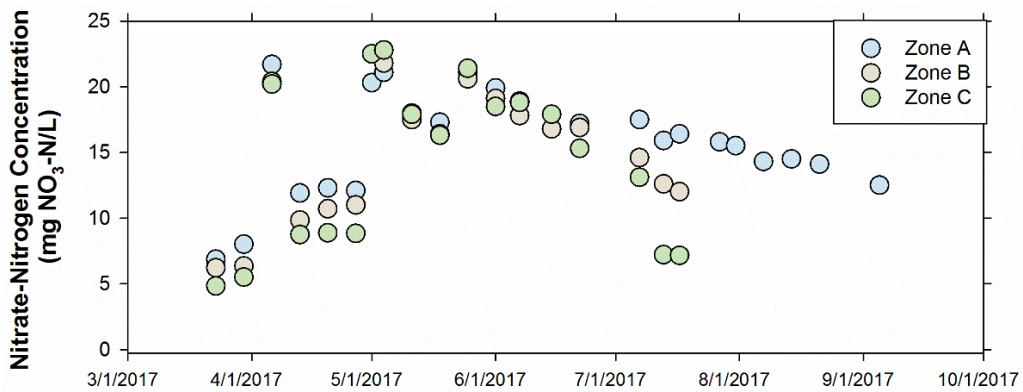


Figure 2. Nitrate-N concentrations from three drainage water management zones (A, B, and C) on a private farm in Macon Co., IL (please check with LEC before distributing data).

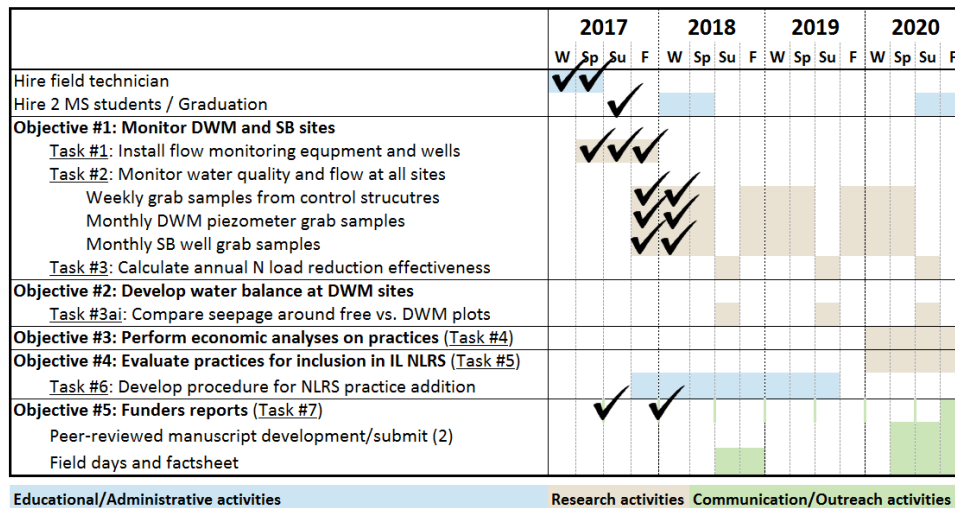


Figure 3. Sixteen wells and a weather station have been installed at the Knox County saturated buffer.

4. For first year projects, provide evidence of progress.

Monitoring is ongoing at all four sites (2 drainage water management sites and 2 saturated buffers), and we are currently awaiting spring drainage flow.

**Table 1. Up-to-date timeline for “Drainage water management and saturated buffers ...” project**



**How will the research benefit the environment and/or crop production, etc.?** There is a need to provide producers farming the 9.7 million tile-drained acres in Illinois the most science-based options to reduce N loss. There is room to evaluate the practices of drainage water management and saturated buffers for potential inclusion in the IL NLRs. Saturated buffers may be attractive as they do not impact in-field production (i.e., no negative yield impact), and drainage water management may in fact provide a yield boost in certain years.

**New questions created by this work:** Several additional questions have started to emerge such as:

- What are the flow paths and residence times of water within a saturated buffer? We have tentative plans to do a conservative tracer test at the Knox County saturated buffer to investigate.
- Does the vegetation have an impact in the saturated buffer? We are in talks with others on campus about the benefit perennial plantings may provide within saturated buffers.

**Table 2. Budget analysis showing expenditures aligned with budget categories.**

	Budgeted	Spent through 01/2018
A. Personnel		
1 UIUC MS Graduate Students	\$0	\$10,743
2 Academic salary and wages	\$39,200	\$16,838
B. Fringe Benefits	\$16,624	\$3,562
C. Travel	\$8,976	\$2,227
D. Equipment	\$0	\$0
E. Supplies	\$37,372	\$27,525
F. Contractual Services	\$2,000	\$3,345
G. Other	\$0	\$0
H. Indirect Charges	\$11,574	\$11,965
<b>TOTAL COST (Year 1.0)</b>	<b>\$115,746</b>	<b>\$76,206</b>
	<b>BALANCE REMAINING</b>	<b>39,541</b>