

# Village of Ottawa



# Evaluation of wastewater treatment to reduce nutrient transport from land application of dairy manure

Bowling Green State University  
US Geological Survey Ohio Water Science Center  
OSU OARDC Northwest Ag Research Station  
Village of Ottawa

# Problem

- Manure and wastewater from large, confined animal feeding operations (CAFOs) can negatively impact water quality
- Nutrient excesses can intensify harmful algal blooms
- Manure produced by CAFOs contains a lot of water and the cost of transport is high
- Low-cost treatment systems are needed to transform manure into a dewatered product that is economical to transport and that slowly releases nutrients to soil

# Overall goal of proposed work

Develop, optimize, field test, and document environmental benefits of a low cost dewatering treatment process for transforming dairy CAFO manure into a form that will reduce nutrient runoff from land application and substantially lower the cost of transportation of the treated manure.

Key goal: treatment cost lower than \$0.03/gallon

# Wastewater Treatment Plant Overview



# Lab Optimization

## Laboratory studies to develop & optimize the methods for treating manure

- Testing various combinations of lime, coagulants such as ferric chloride and alum and polymers
- Goals: 1) separate water and solids; 2) reduce concentration in water of phosphate < 0.05 ppm, nitrate < 2.0 ppm
- Test treated manure in soil to determine nutrient release rates — Goal: release rates matching crop absorption rates
- Select optimum treatment methods for pilot scale testing

# Pilot Scale Test Facility at OSU NWARS

- Eight test plots where surface and subsurface runoff is transported to a central sheltered location
  - 16 new Isco Avalanche samplers and 16 tipping buckets installed to collect runoff and measure flow
  - Currently establishing baseline conditions of the test plots



OSU OARDC Northwest  
Agricultural Research Station

# Installation

Avalanche samplers



Tipping buckets, L-shaped pipes, connecting tubes





# Approach

## Pilot-scale testing

- Lab tests will identify the 2 best treatments for testing under natural field conditions
  - Manure treated at Village of Ottawa WWTP
- Compare treated manure, raw manure, and control
  - Monitor surface/subsurface nutrient concentrations and flow
  - Determine and compare nutrient loads and crop yields
- Determine the cost and performance of selected treatments
- Continue to optimize for other types of manure and soils

# Goal

- Demonstrate a manure treatment that will reduce the transport of nutrients to Ohio waters at a cost comparable to or lower than other manure uses
- Thus address both economic and environment challenges



# Project Team

- **Bowling Green State University**
  - Laboratory studies
  - Collect and process field samples
- **USGS Ohio Water Science Center**
  - Equipment installation, testing, and maintenance
  - Analysis of samples for total and dissolved nutrients
- **OSU OARDC Northwest Agricultural Research Station**
  - Provide access to field plots
  - Services for land application of dairy manure and planting of row crops
- **Village of Ottawa, Ohio**
  - Provide a WWTP unit and services to treat manure

# The Poo Posse



The real reason...

