CENTRAL COAST IRRIGATION AND NUTRIENT MANAGEMENT (INM) PROGRAM, SANTA MARIA WATERSHED – Agreement No. 14-475-553

Proposition 84 Agricultural Water Quality Grant Program

Santa Maria, California

Final Project Summary

Introduction

The City of Santa Maria ("City") received grant funding of $1,250,000 from the State Water Resources Control Board ("State Water Board") under the Proposition 84 Irrigation and Nutrient Management Grant. The project goal was to utilize grant funding and City-match funding to construct a regional wood chip biofilter downstream of Bradley Channel to treat agricultural runoff from over 5,000 acres of irrigated farmland to a nitrate level below 10 mg/L – N, the municipal drinking water maximum contaminant level for nitrate.

Figure 1: Project Site Before Construction

This project consists of a regional wood chip biofilter and included a feasibility study, pilot project, design, construction, startup, and evaluation. Construction of the biofilter was completed in July 2017 and the biofilter became operational that month.

Background

The City of Santa Maria local groundwater supply has become increasingly impacted by nitrate. Water quality trends in municipal wells show increasing levels of nitrate over time. Multiple city wells contain nitrate above the maximum contaminant level for nitrate of 10 mg/L nitrate as nitrogen. Finding ways to cost-effectively remove those nitrate from the groundwater basin will help protect the local municipal water supply.

Feasibility

In 2012, the City contracted with Wallace Group, a civil and environmental engineering firm, to develop a feasibility study to establish the viability of using wetlands – based denitrification facilities employing wood chips, as a means of enhancing the water quality of the groundwater basin. The resulting feasibility study was utilized as the basis for the Jim May Park biofilter project.

Pilot Project

A pilot project was developed to test readily available local wood chips for use in the full-scale biofilter. Tests were conducted on influent and effluent of the pilot biofilter for ammonia, nitrate, flow, alkalinity, and temperature. Results from the pilot project indicated that “overs” (a byproduct of composting) performed the most consistently over time at removing nitrate.

Design

The City contracted with Michael K Nunley Associates, a civil and environmental engineering firm, to design the biofilter based on the Wallace group feasibility study. The design was completed in April 2016. Important elements of the design included flexibility to allow for various parameters to be tested for effectiveness, and automated controls.

Construction

Following design, the project was bid for construction in May 2016. Whitaker construction group, Inc., A construction company based in Paso Robles, was awarded the project in July 2016. Construction began in September 2016. Substantial completion of the project occurred in May 2017. The biofilter started up p.m. in operation in July 2017, and automated operation commenced in August 2017.

Figure 2: Completed Project

Startup and Evaluation

After startup, samples of ammonia, nitrite, nitrate, and total Kjeldahl nitrogen (TK and) were collected upstream and downstream of the biofilter, from Taylor well, and from Bradley Channel. Nitrate results are shown in Figure 3. Early in the biofilter operation, there was little influent nitrate to remove, and the effluent results were non-detect. However, for sampling conducted on August 31, 2017, there was substantial nitrate entering the biofilter and the biofilter was successful at removing 86% of the incoming nitrate.

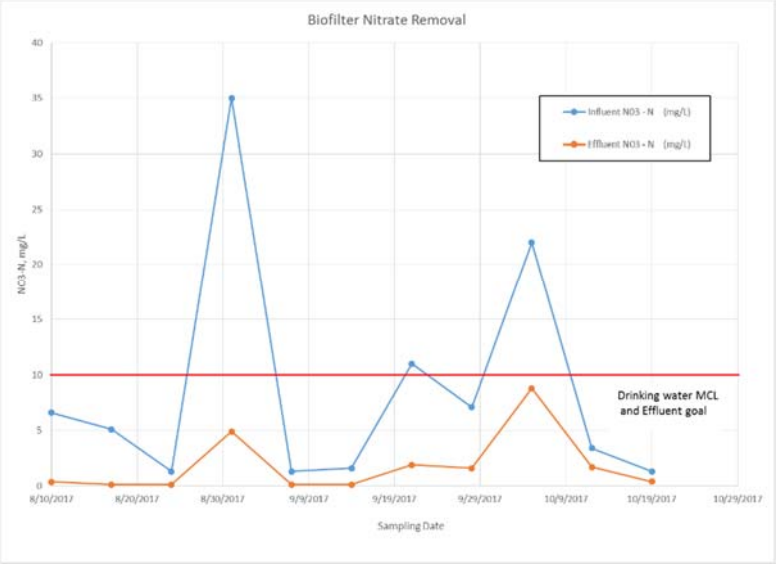

Figure 3: Biofilter Nitrate Removal

Outreach

The City conducted significant outreach associated with this project, including development of a logo, letters to upstream growers, development of a poster describing the project, installation of temporary and permanent signs, development and distribution of one page, full-color brochure of the project, and numerous presentations.

Figure 4: Project Logo

Conclusion

The Jim May Park biofilter project demonstrates that nitrate removal does not have to be limited to discharges from single operation: it can be removed from agricultural drainage for multiple sites. While the biofilter has only been operating for a few months as of the date of this summary, the data is promising that this biofilter will remove nitrogen loading in the Santa Maria Valley.

Although the system is being operated under specific parameters at this time, it has been built with numerous possibilities to allow different configurations to optimize its use in the future. Future testing may include programming adjustments that will allow more channel water when it is available, as it has significantly more nitrate than shallow groundwater well. We will also be able to test different detention times, flow rates, and other operating parameters.