Resource Recovery Facility



Project Proposer/Champion: Martin Griffin, Kim Meyer, and the Resource Recovery Team

Project Purpose:

The purpose of this project is to plan, study, and determine the best life-cycle process to manage district biosolids which will then inform the design and construction of a facility that will be used for that purpose. For example, if the planning and study determines that composting is the best way to manage district biosolids, then a facility dedicated to equipment storage, mixing, air-drying, composting, and distribution of a biosolids fertilizer product will be needed. Later phases of this project will only be completed if:

1) A market for dried biosolids product exists
2) The product can be produced economically

Project History and Status:

MMSD has been pursuing development of a Class A biosolids product to diversify its biosolids reuse program since the early 2000's. Diversification is looked at as the ability for the district to create many different products from a single product – Class A cake. The benefit of a Class A biosolids product is that it can be treated much like a commercial fertilizer with no setbacks and restrictions, little DNR oversight, and district time spent on record keeping and tracking of distribution would be nearly eliminated. Initial research focused on amending the dewatered biosolids with sand and sawdust. The cost of sand and sawdust additions was high and market interest was low in the final amended product. Current focus has shifted to investigate other Class A biosolids products, such as compost, air-dried biosolids, and others to diversify the district biosolids portfolio. With changing land use, regulatory requirements, etc., having a flexible platform on which to create a diverse product base will aid in the district being more resilient when facing challenges related to biosolids management.

Current investigation of composting and other products derived from dewatered biosolids was chosen as a preliminary way to investigate alternative ways to manage district biosolids. Starting with a compost product as an investigatory pilot makes sense for a variety of reasons:

- usability as a fertilizer product
- reduction in the volume of biosolids to manage and transport
- suitable for both urban and agriculture markets
- eliminate the need for tillage during application of biosolids
- reduction in the potential for phosphorus runoff from fields receiving biosolids as a fertilizer
- potential ability to break down and reduce the concentration of trace contaminants like pharmaceuticals, specifically through the composting process

Composting trials were conducted off site utilizing three carbon sources, at two locations including an outdoor site and an open shed in 2018 to determine if composting was a viable option as a way to further process the air-dried dewatered biosolids and result in a drier material. Due to the trials success, additional study will continue on a larger scale in 2019, to further inform the district if this method is a viable composting solution and understanding the environment and conditions necessary for success.

In addition, trials for air-dried dewatered biosolids were conducted on site at the plant to determine the viability of air drying as another method that could achieve an alternate biosolids product that fits with desirable end uses. The results of the 2018 small-scale study will be used to finalize the most efficient drying process and expand in 2019 to allow for final evaluation of the process, the product, and potential end uses of the product, especially with use for developing the compost product.

Although trials to evaluate composting and air-drying as alternate biosolids products will be completed in 2019, it was determined that before further planning happens around integration of a compost product as an alternative product offered by the district, a biosolids management evaluation was necessary before further program changes are to be considered.

To undertake this evaluation, a study aimed at taking a holistic look at the current program and developing a triple bottom line analysis on the current products being produced (including the current liquid Metrogro program) as well as other biosolids management options that are currently not done by the district will be undertaken in 2020. The triple bottom line analysis is intended to be used as a multi-criteria process to help compare the multitude of biosolids management options and allow for prioritization of alternatives. For example, the study would aim to answer questions such as: What are alternatives to a liquid land application biosolids program? What is the cost of those alternatives? What are the societal implications of those alternatives?

The results of this comparative analysis will be used to determine how the district would begin to focus efforts to move toward beginning diversification of the biosolids products produced. The overall goal of diversifying district biosolids management is to reduce pressure on the Metrogro liquid biosolids program. Once the best product(s) is determined to diversify the district's biosolids product portfolio, planning will be used to inform facility function and design, as well as distribution logistics.

Planning Scope:
At this time the full scope and timing of this project is yet to be determined. However, the scope of the biosolids management study to be undertaken in 2020 has been determined and the results of the biosolids study will be used to inform the full scope and timing of the project. Planning of new facilities would not occur until plans to increase production of a product are informed by the study. After that occurs, planning will be used to evaluate the following:

1. Whether the existing dewatering facilities will be adequate for the chosen biosolids management option
2. The size and type of facility needed
3. The best location for the facility

It should be noted that the scope and timing of this project is connected to CIP project A10 – Metrogro Applicators and Equipment Replacement. Decisions informed by the result of the 2020 biosolids management study may influence decisions on the replacement schedule for Metrogro equipment. Project A10 is aimed at the most cost effective way to replace needed equipment when it is at end of its useful life; as we explore diversification and decisions are made on the timing of the path to take in how we want to diversify, that may change how we look at equipment replacement.

Key Risks and Issues
If the preferred option involves diversification of the liquid Metrogro program by increasing production of Class A cake, which could then be used in a variety of products, the following issues related to the process to create those products will need to be addressed.

1. Polymer costs volatility
2. Dewatering biosolids to a cake product of adequate dryness
3. Odor concerns and control
4. Reliable market
5. Phosphorus impact of surface application

Economic Analysis
The economics of the current liquid biosolids program and the associated risk attributed to storage and hauling/application will be compared to the in risk with increased production of a new product (lifecycle cost vs a risk analysis) in the form of a triple bottom line analysis being completed in 2020.

This analysis will start with the premise that the district wants to produce a desirable fertilizer product by starting with the end use of any product and focusing on what the end user wants. This could include market and product study, including conducting surveys, etc., with potential customers to help inform an evaluation of the product.

The triple bottom line analysis being conducted in 2020 has a goal to be used in a multi-criteria process to help with comparison of the multitude of biosolids management options and also allow for identification and prioritization of alternatives.

Undertaking this study will allow us to answer questions around:

- What is a desirable product for our customers? (e.g. agronomic, non-agronomic)
    - If the product is agronomic , what do the farmers want in an agronomic product? (e.g. proper nutrient ratios)
    - If the product is agronomic, are there plant processes that influences and/or can predict biosolids product nutrient quality?
- Is the product robust long term?

Undertaking this study will allow us to better define the following as it relates to how the district manages its biosolids:

- Systems and drivers for nutrient balancing.
- Regional impacts (of existing and alternative biosolids management options)
- Quantifying the value of current liquid product and potential value of alternative products
- Technology pathway for future products (e.g. moving from a compost product to a pearl-type product like Crystal Green®)

Additionally, the 2020 study will be used as a step to inform the larger infrastructure project. From a financial perspective this will allow a comparative cost analysis to be performed, using the current liquid program as a baseline and comparing it to other biosolids management alternatives.

If we do not undertake this study as part of the larger picture look at the scope of a resulting infrastructure, we will have incomplete information in order to which make decisions on related to the scope of any new infrastructure project aimed at supporting resource recovery efforts and resulting biosolids projects.

Any economic portion of the triple bottom line analysis will consider the effect that a change to a solid, compost material could:

- Require additional facilities to: dewater biosolids, store biosolids and carbon additions, compost and possibly air-dry material, and store finished product for distribution
- Affect the management of thirty liquid land application assets that are depreciated out and could eventually be liquidated due to the fact that less equipment would need to be acquired and maintained to operate a solid, compost material program. Less assets mean less maintenance costs.
- Reduce staff time on administrative tasks related to obtaining state and local approvals and permits, and reporting.
- Reduce the amount of overtime paid to staff. Offering a solid compost material significantly increases the window of time needed for application.
- Increase the geographic area including outside the watershed where fertilizer is used. Offering a solid, compost material opens up the ability to use this product on fields that utilize no-till practices. Current liquid application requires some level of soil disturbance for sub-surface application.
- Reduce or eliminate current use of liquid biosolid storage tanks. Use of storage tanks assets could be shifted to
    - contribute to phosphorus reductions in the watershed by offering regional emergency manure storage for landowners as an alternative to land application during high risk months
    - help facilitate storage and acceptance of high strength waste to assist with overall energy plan of increasing methane production and use
    - Something else?
- Allow Vehicle Loading Building that is currently used for liquid fertilizer (Metrogro) distribution to be available for alternate use, potentially being used as part of single source organic waste acceptance (high strength waste) program.

Project Schedule:

The following project schedule is included in the Capital Improvement Plan (CIP) for planning purposes only. The schedule will be modified as its scope is clarified based on the results of the biosolids management study anticipated to be completed in 2020.

Study – 2020 Planning - 2021 Design– 2022-2023 Bid and Construction – 2023-2024

Financial Summary:

Study (consultant) 2020	Planning (consultant) 2021	Design (consultant) 2022-203	Bid and Construction 2023-2024
$250,000	$200,000	$350,000	$1,750,000