5.0 ALTERNATIVE ANALYSIS – FOG RECEIVING

The North Plant currently accepts septage and fats, oils, and grease (FOG) waste via a discharge manhole upstream of the Preliminary Treatment Building (PT Building). Trucks are required to back up to the discharge corridor east of the PT Building. Due to the location of the manhole, and the volume of septage and FOG received at the site, there is routinely a backup of trucks waiting to offload. Based on conversations ACWPD has had with some of their larger waste haulers, this inefficient unloading process has caused some haulers to utilize alternate facilities, reducing ACWPD's tipping fee revenue.

Once septage and FOG is received at the discharge manhole, it is comingled with the influent wastewater stream as passes through the mechanical bar screens in the PT Building. The FOG waste is ultimately skimmed off the primary clarifiers and manually removed. FOG skimmings are then placed in a dumpster. When the dumpster is full, it is transported to the sludge holding tanks, where FOG is manually pumped from the dumpster into the tanks.

The ACWPD desires to evaluate a more effective receiving system in order to protect downstream treatment processes, improve sludge dewaterability, increase revenue potential, and reduce operator labor associated with manual FOG removal. Vendor information related to FOG receiving processes can be found in Appendix I.

Historical separated FOG waste received at the North Plant is presented in Table 5-1.

Table 5-1: North Plant: Historical FOG Quantities

	Average Day (gal/day)	Max Day (gal/day)
2019	15,240	51,700
2020	13,260	65,500
2021	16,882	80,701

ACPWD desires to increase its revenue stream and thus equipment will be designed to handle 40,000 gallons per day on average received at the facility.

5.1. No Action

The North Plant's current FOG removal processes require significant operator effort, and does not effectively remove all FOG from the wastewater stream. Downstream treatment processes and equipment have been negatively impacted as a result. It is in the best interest of the ACWPD to upgrade their FOG receiving/removal capabilities.

5.2. FOG Hydronic Separation System (Alternative 1)

5.2.1. Proposed Preliminary Design

Under this alternative, a FOG receiving station would be installed at the North Plant. The receiving station would include a hydronic separation system designed to separate and process FOG waste from haulers.

The hydronic system would be designed to separate the FOG component from the overall grease trap waste, generating a low-moisture brown grease biofuel product which can be used as a #6 bunker fuel substitute or sold on commodities markets as a feedstock for biodiesel production. Biofuel production is estimated to be approximately 5% of the influent FOG volume. Another 3-5% of the influent FOG is separated into a layer of "batter", rich in organic material. This "batter" material can be anaerobically digested, composted, or returned to the head of the facility for conventional treatment. For the purposes of this evaluation the batter will be returned to the head end of the plant for treatment. The remainder of the influent waste volume is residual water, and decants back to the head of the plant for treatment.

Figure 5-1: Example FOG Separation System Installation

The proposed receiving station will be designed to accept 40,000 gpd of grease trap waste. Received FOG waste from haulers will be screened to protect downstream equipment from debris and stored in a 40,000-gallon storage/decant tank. It is expected that the decant tank will reduce received FOG waste volume by approximately 50% prior to entering the separation system. FOG from the storage tank would be pumped into the FOG separation system and processed. Residual water from the tank would be decanted and flow via gravity into an existing process drain and back to the head of the plant for treatment.

Currently peak days can exceed this 40,000 gpd capacity. ACPWD can either work with the haulers to manage receipt of these truck loads to minimize the peak days, add additional up front storage capacity, or handle any excess FOG at the front end of the WWTP similar to current operations.

Of the total brown grease biofuel produced, approximately 5% would be used to fuel a boiler which would heat the processing tanks. Excess biofuel produced can be utilized

elsewhere in the facility or sold as a fuel substitute on the market. It is anticipated that if this alternative is implemented, ACWPD would contract a third party to manage the market sales of excess biofuel. The proposed receiving station requires no chemical addition and minimal operator input.

5.2.2. Impact on Existing Facility

The improvements proposed under this alternative would greatly benefit the existing facility. The installation of a FOG receiving station would greatly reduce the amount of FOG loading on the primary clarifiers and downstream treatment processes, improving treatment and reducing wear on equipment. Reducing downstream FOG loading will improve performance of the belt filter presses and enhance the overall sludge management process selected for the facility.

Additionally, excess biofuel generated by the FOG separation process would create an additional source of revenue for the ACWPD, helping to offset the capital cost of the alternative. Lastly, the proposed system is modular and easily expandable. If the initial installation proves successful, ACWPD will have the option of installing additional reactor tanks, allowing an increase in FOG waste received from haulers, generating additional revenue from tipping fees and biofuel sales. Lastly, removal of grease from the incinerators may also result in a reduction of air emissions associated with the incineration of FOG.

A new building will need to be constructed to house the processing equipment. It will be located at the southwest corner of the property. This will allow the County to direct FOG trucks to an alternate offloading location which will eliminate truck congestion near the Administration Building and truck idling. This location would require minimal modification of existing access roads and can be constructed without any disruption of existing process equipment. The proposed separation system would be installed within the building, while the FOG decant tank would be constructed adjacent to the building.

5.2.3. Outfall Configuration Concerns

There are no outfall configuration concerns associated with this alternative.

5.2.4. Land Requirements

Under this alternative, new FOG decant tanks would be constructed adjacent to a new building. Minor site clearing and grading would be required, and no trees would need to be removed.

5.2.5. Environmental Impacts and Mitigation Measures

Any environmental impacts associated with this alternative would be temporary impacts associated with construction (noise, air quality, etc.). Appropriate measures would be taken to protect nearby environmentally sensitive areas and wetlands to prevent disturbance.

5.2.6. Seasonal Limits, Challenges, and Requirements

There are no seasonal limits, challenges, or requirements associated with this alternative.

5.2.7. Discharge Permit Requirements

This alternative would not adversely impact the facilities discharge permit requirements. Reducing the amount of FOG that enters the main liquid treatment stream would improve plant performance.

5.2.8. Water and Energy Efficiency Measures

This alternative would result in the generation of a renewable energy source in the form of brown grease biofuel, a fuel oil substitute. This renewable energy generation will provide an additional revenue source to the facility.

Process pumps and equipment associated with this alternative will be designed with energy efficiency in mind.

5.2.9. Storm and Flood Resiliency

The North Plant is located within the 100-year flood zone. Special consideration would be given to storm and flood resiliency during the final design of the proposed improvements.

5.2.10. Constructability and Schedule

There are no constructability issues with this alternative. It is expected that the improvements proposed under this alternative would require approximately six (6) months to construct.

5.2.11. Opportunities for Green Infrastructure

This alternative does not include any modifications to stormwater infrastructure, so there was no opportunity to implement Green Infrastructure.

5.2.12. Project Capital Cost

The estimated capital cost associated with the FOG receiving station proposed under this alternative is approximately $8,500,000. A full itemized cost estimate is included in Appendix M at the conclusion of this report.

5.2.13. Anticipated O&M Costs, Revenue and Payback

Anticipated annual operation and maintenance costs associated with implementation of Alternative 1 improvements are included below in Table 5-2.

Table 5-2: Annual Operating and Maintenance Cost Estimate (Alternative 1)

Item	Total
Hydronic Separation System Maintenance	
OEM Maintenance Contract ($2,000 per month)	$24,000
Electric/Misc Utilities	$12,000
Supplies/Wear Parts	$10,000
Total Estimate O&M Cost	$44,000

Note: Labor costs for Alternative 1 would be equivalent to current FOG management costs

The increase in the tipping fees for FOG and the sale of biofuel would result in additional annual revenues as presented in Table 5-3.

Table 5-3: Annual Revenues and Payback (Alternative 1)

Item	Current FOG Volumes	Projected FOG Volumes
FOG Tipping Fees		
Existing Daily FOG 16,900 gpd @ $0.05/gal	$308,000	$308,000
Additional Daily FOG 23,100 gpd @ $0.05/gal		$421,000
Biodiesel Resale		
Existing FOG yields 277,600 gal/yr brown grease at $1.50 - Management fee 20% = $1.20 gal	$333,000	$333,000
Additional FOG yields 169,000 gal/yr brown grease at $1.20 gal		$455,000
Total Annual Revenue	$641,000	$1,517,000
Total Annual O&M Costs (assumed same)	($44,000)	($44,000)
Net Revenue	$597,000	1,473,000
Opinion of Probable Cost	$8,500,000	$8,500,000
Payback, years	14.24	5.77

5.2.14. Short-lived Asset Costs

All improvements included in this alternative have a design life of 30 years. However, certain components, known as short-lived assets, will require replacement one or more times during the design life of the overall system. Short-lived assets associated with this alternative include FOG transfer pumps, instrumentation (level sensors, flow meters, etc.), and controls. These costs are included in the annual O&M estimate above.