SECTION 8: CONCLUSIONS & RECOMMENDATIONS

Summary of conclusions and recommendations for the GBRA – Calhoun County Regional Wastewater Facility Study are discussed below.

The provision of centralized wastewater collection and treatment for subdivisions with failing onsite sewage systems was evaluated. Collection systems evaluated consisted of conventional collection systems, vacuum collection systems and pressure systems using individual grinder pumps. Treatment systems evaluated included individual package wastewater treatment plants for each subdivision, regional wastewater treatment plants treating wastes from several subdivisions and collecting and transporting the wastewater to existing wastewater treatment plants in the closest municipality. Likewise, an analysis for the proposed developments in the southern portion of the county was also completed. The analysis for the proposed developments was similar to the analysis completed for the existing subdivisions with failing onsite sewage systems.

The analysis of alternatives was conducted on a cost basis. Each alternative was broken down to the monthly cost required to liquidate the amortized capital cost for collection and treatment systems and the monthly cost to operate the collection, conveyance and treatment systems. In this cost analysis, it was assumed that all the capital cost would be funded by loans from the TWDB either through the Rural Water Assistance Fund or the D Fund. The monthly costs for providing service to the existing subdivisions ranged from $79.05 to $190.91. The monthly cost for providing service to the proposed developments ranged from $81.17 to $239.76. For the proposed developments, the monthly cost to the homeowners will be significantly different than the value computed because a large portion of the capital cost to construct the collection and treatment system will be a developer cost that will be rolled into the cost of the lots. Hence, this cost will still be collected, but not as a monthly wastewater fee, rather it will be part of the home purchase cost and collected as part of the homeowner's mortgage.

For the existing subdivisions with onsite sewage systems, unless grant funding can be obtained to defray a large portion of the capital cost, it will be difficult to finance the improvements necessary to remove the residents from their onsite sewage systems. Each existing subdivision would have to be evaluated to determine what the average resident could afford on a monthly basis and the capital cost grant funding determined. If removal of the onsite sewage systems from these priority subdivisions is desired, then Calhoun County should pursue grant funding to help it achieve this goal. Without grant funding,

it would be difficult to build and maintain a regional system that will result, on average, in a monthly wastewater bill of $72.34 (EPA Affordability Index).

The reclaimed water options in Calhoun County were also evaluated. Sources of municipal reclaimed water include Port Lavaca, Point Comfort and Seadrift. The use of reclaimed water from Port Lavaca and Point Comfort for Formosa Plastics was evaluated. Moving reclaimed water from Point Comfort to Formosa Plastics is relatively simple. The average reclaimed water flow from Point Comfort is 0.042 MGD. Transporting water from Port Lavaca to Formosa Plastics is not simple or inexpensive. Flow from the Port Lavaca WWTP would have to be piped across Lavaca Bay to reach Formosa Plastics. The average flow from the Port Lavaca WWTP is 1.11 MGD and the cost per acre-foot for this reclaimed water is $878.9/ac-ft. The cost to deliver reclaimed water from the Port Lavaca WWTP to the industries in western Calhoun County was also evaluated. The cost per acre-foot for this option is $632.36/ac-ft.

DOW CHEMICALS - There are two water reduction mechanisms that have been identified for Dow. The first is using treated wastewater as a source of cooling water. The second is using a recirculating cooling device such as a cooling tower instead of the existing cycled cooling system. Further evaluation would be required to assess the viability of one or both of these options.

INEOS Nitriles - In order to evaluate the feasibility of water reuse opportunities, a complete water balance study would need to be performed. INEOS has developed a water balance, which is the first step. Next, water quality constraints need to be identified for facility processes that use water and individual waste streams, including treated effluents, need to be characterized for comparison with the identified constraints. Treatment requirements, as applicable, can be considered to facilitate reuse. Water reduction potential within the facility must be evaluated on a case-by-case basis. Candidate streams for potential reuse by other facilities include stormwater runoff and Outfall 001 effluent

FORMOSA - Formosa already reuses several wastewater streams internally.

- Condensate from many of the process units is routed to the cooling towers for use as makeup water.
- Effluent from Biological Treatment Train C is used as cooling tower makeup water.
- The majority of sanitary wastewater flow for the facility is used for cooling tower makeup water following treatment.
- Boiler blowdown is used for cooling tower makeup water.

- IEM Condensate is reused with the Ultra Pure water which is used in many of the process plants.
- Filter backwash returns to Raw Water Ponds A and B for reuse.
- Stormwater is reused within the Olefins Unit.

Additional water reuse opportunities and water reduction strategies may be discovered upon further evaluation. Formosa is exploring the additional reuse of stormwater. Formosa is also studying the further use of biological effluent in the cooling towers. However, the average reported Total Dissolved Solids (TDS) concentration for four recent effluent samples was approximately 17,000 mg/L. Elevated TDS concentrations likely limit additional reuse opportunities.

At present, the discharge from the Formosa complex represents approximately 20% of the water purchased from LNRA based on dry weather conditions. This relatively low discharge percentage results from the substantial water reuse measures already implemented by Formosa and from evaporative losses associated with process cooling requirements.

ALCOA - Since much of the water used at Alcoa is already being reused internally, the most prominent reuse opportunity would involve importing effluent water from another facility for dust suppression and process water needs. Alcoa, in conjunction with the Formosa Plastics Complex (Formosa), has been evaluating the feasibility of utilizing sources of water from Formosa for reuse at Alcoa.

SEADRIFT COKE L.P. **-** Seadrift Coke L.P. treats industrial wastewater through a corrugated plate interceptor (CPI) oily water separator, a dissolved air flotation (DAF) separator, and carbon polishing. The use of carbon polishing likely increases the reuse opportunity for the treated effluent. A reported average Total Dissolved Solids (TDS) concentration of 910 mg/L for four samples of treated effluent further suggests reuse opportunity. However, additional study would be required to assess the potential for reuse.

8.1 IMPLEMENTATION PLAN

This study has identified options to provide wastewater service to (1) existing subdivisions with failing OSSFs and (2) existing subdivisions with OSSFs that are not currently failing but have similar conditions to those with failing OSSFs. The study has also identified options to provide wastewater service to proposed developments in the southern portion of the county. Implementing the options for the existing subdivisions and the proposed developments are unique and are discussed below.

For the existing subdivisions, as identified in the cost analysis, the monthly cost to retrofit the existing OSSFs with pressure sewers, conveyance facilities and

wastewater treatment are higher than the EPA affordability index. To make any of these options financially viable, grant funding will be necessary. The first step in implementation of any of the proposed options would be to secure the funding sufficient to subsidize the capital cost so that the monthly cost of service is less than or equal to the affordability index. After funding is secured, the project can move forward to the preliminary engineering phase.

In the preliminary engineering phase, more detail to the wastewater collection, conveyance and treatment improvements can be developed. In this phase, the sizing of the facilities can be finalized given the initial number of customers on the system and the ultimate number of customers expected to be connected to the system. The cost per customer can be finalized based on the number of residents that will be served initially. Customer service agreements will need to be executed with the customers who will be joining the system as a show of commitment on the part of the customers. The system would then proceed to the design phase. In this phase, surveying, environmental and archaeological studies and detailed plans and specifications for the system improvements will be developed. During the design phase, land acquisition for the lift station sites would occur. After review and approval by the appropriate agencies, the project would be bid. Following execution of the construction contracts, the improvements will be constructed, tested and placed into operation.

The timeframe to obtain grant funding is difficult to estimate especially given the current fiscal condition of state and federal agencies. The preliminary engineering phase is estimated to take six months to complete. The design phase, including surveying, environmental and archaeological studies, and land acquisition will range in duration from 12 months to as long as 24 months depending on the environmental approval process commensurate with the funding source and land acquisition difficulties. The bidding phase typically lasts three months for advertisement, contract preparation and approval and issuing a notice to proceed to the contractor. Construction of the improvements depends on the final scope of the project, but for the improvements envisioned in the options to serve existing subdivisions, a construction period of 12 months is a reasonable estimate.

For the proposed developments, the collection and conveyance systems will be designed by the engineer hired by the developer as part of the site improvements necessary to prepare the raw land for housing development. The schedule for these improvements is dependent upon the construction schedule of the proposed development, which is difficult to estimate given the state of the housing market. For the regional wastewater treatment plant included in Option 3 for this area, the permitting, design and construction of the plant is described below.

For the regional wastewater treatment plant to move forward, service agreements between a regional entity and the developers would have to be executed that define the size and timing of the regional WWTP. Once these agreements are in place, the land for the treatment plant can be purchased or perhaps one of the developments can donate the land in exchange for reduced service costs. After the land for the plant is secured, a discharge permit application can be prepared and submitted to the TCEQ for the plant discharge. After the plant discharge permit is issued, preliminary engineering, final design, bidding and construction of the plant can proceed.

Preparation of the permit application and approval by TCEQ could be accomplished in as short a period as 12 months; however, depending on public opposition, the issuing of the permit could take as long as 24 months. Preliminary engineering and final design would take approximately one year. Included in the preliminary engineering phase are the environmental and archaeological studies on the plant site and outfall. The 12 month schedule assumes that there are no environmental or archaeological issues to overcome. For the plant, the bidding phase will last three months and construction of the plant will take 12 to 14 months.

Regarding the financing of the regional WWTP, it could be accomplished with upfront cash contributions by the developers. Collecting enough upfront cash seems unlikely. A more likely scenario would be that the regional entity would construct the plant using bond proceeds and that development agreements would be executed with the developers committing them to pay an impact fee for each lot brought online. The development agreement should also include a provision with a minimum reimbursement per year to cover the debt service on the plant.

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