

Stormwater Reuse: The Utility Business Practice

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ABSTRACT

A Stormwater Reuse Utility (not to be confused with a Stormwater Utility) was once an innovative approach to attain sufficient water for non potable uses and now has quietly become a business meeting the State's Sustainability/AWS goals and objectives. The Florida Public Service Commission has given certificated areas, set rates, and approved contracts for such utilities as ECFS, South Bay Utility Company, Schroeder-Manatee Ranch and others. The water management districts consider the practice as using the appropriate quality water for the appropriate use. The business practice is also being merged into the traditional reclaimed water reuse business as a lower cost product providing greater peaking capability. Data and costs for the Eagle Lakes/Flagler County, City of Miramar, Beverly Beach and others which take this approach will be provided. This paper provides the data and statistics of operating stormwater/irrigation water/raw water utilities. Such statistics are complemented by the success stories, generally how-to-set-it-up, the technical design aspects, the institutional requirements and entitlement opportunities, operations, and the financial data. Pictures of operating systems will be shown as well as example tariffs of actual operating companies reviewed. Reuse service are examples are shown as authorized by the FPSC (investor owned) or FDEP (governmental). A regulated utility system that has been valued and sold will be used as an example.

Key Words: Stormwater Reuse, Stormwater Reuse Utility, Stormwater Reuse Business Practices, Alternative Water Supply

Introduction

A stormwater reuse or irrigation quality reuse utility is a non potable closed conduit pressurized system conveying water to a customer or a customer base. The utility typically charges for the services provided with minimum monthly charges in Florida from \$0 to \$15 per month for a residential customer and with consumption rates from \$0 to \$1.50 per 1,000 gallons. Capital construction costs have ranged from \$0.30 per gallon of source capacity to \$1.65 per gallon of source capacity depending on type and method of system. Technologies have ranged from operational chlorination to reverse osmosis blending with reclaimed water (Ocean Reef Club – North Key Largo Utility Authority).

Nonetheless, such utility systems have lower pricing and cost requirements than either potable or wastewater utility systems as generally shown in Table 1:

Table 1
Generalized Comparison of Florida Water, Wastewater and Irrigation
Quality Water Systems (January 2007) ⁽¹⁾

Description	Unit	Stormwater Reuse/ Irrigation Quality	Potable Water	Wastewater
Minimum monthly charge	\$/month	\$0-\$15	\$5-\$30	\$8.70-\$41
Flow charge	\$/1,000 gal.	\$0-\$1.50	\$0.70-\$5.01	\$0.81-\$5.54
Source & Treatment Capital	\$/gal.	\$0.30-\$1.65	\$2-\$18	\$3-\$22

(1) Some values rounded, taken from Hartman Consulting and Design cost records.

Such stormwater reuse utility systems have quietly become significant enterprises in Florida and now are under much more scrutiny as a means to attain “sustainability” and an acceptable “alternative water supply”.

Markets

There are several markets for a Stormwater Reuse Utility, each market has differing capabilities for revenue generation.

- Environmental – Typically the uses for this market are to (1) investigate induced impacts such as from potable source wellfield pumping with replacement surficial flows which best fit the setting, (2) prove environmental enhancement through wetlands rehydration (See Broward County work) and/or habitat restoration activities, (3) stem saltwater encroachment via a saltwater encroachment barrier (SWEB) either with facilities in canals or as a pressure gradient in the groundwater regime, and (4) perhaps the largest is augmentation of wet detention ponds to remove storage water before discharge and thus reduce the mass of pollutants being discharged in both surface and ground waters. This market provides for existing activities to co-exist in an area with little to no revenue and annual expenses to assure appropriate operations.
- Fire Protection – In many rural areas, commercial areas (where only residential fire flows exist) and/or industrial areas (for insurance purposes and other purposes) certain qualifying wet stormwater treatment areas (with and without such supplementary facilities as underdrains, horizontal wells, collection areas) are used for fire protection purposes. Typically wet systems must show that a sufficient quantity of water is available in a one in fifty year drought. Such systems are cost avoidance in nature. They simply represent an acceptable means to have low cost peaking capacity available to augment or supply the fire needs of the customer. Such systems generate little to no revenue within Florida.

- Stormwater Storage Enhancement – Florida has a Karst geology in many areas which can contribute to smaller closed stormwater basins. Such basins are more sensitive to development and great variations in water levels within lakes, ponds, depressional areas may occur. Secondly, in certain low lying areas, intermittent flooding and/or ponding can occur. One way to enhance existing stormwater systems is to increase or optimize storage by reusing the stormwater conveyed to these locations thereby increasing the effective storage. Losses from evapotranspiration and/or relocated volumes help manage water levels. Again, little revenue is generated from such activities.
- Irrigation Quality Use – Each of the previous markets can be combined with this market. Reclaimed water, reject water and/or blow-down water can be integrated into certain systems with appropriate care. Irrigation quality use is the primary revenue generation market for stormwater reuse utilities. Customers such as power plants, commercial interest, golf courses, industrial entities, and primarily residential reuse. With conservation or inverted block rate structures customers who use potable water for irrigation are financially penalized and typically prefer irrigation meters. Several years ago Central Florida communities such as Altamonte Springs (Project APRICOT) developed reclaimed wastewater reuse systems. The demand for reclaimed water has outstripped the supply in many locales and Stormwater Reuse is filling the need in several ways, approaches and methods.

Sources

The primary sources are:

- Wet and Dry Stormwater Ponds
- Shallow Vertical Wells
- Lakes
- Canals
- Horizontal Well Systems
- Drainage Wells (retrofit)

Which are supplemented by other sources including, but not limited to:

- Reclaimed wastewater – (AST, AWT, MBR, etc.)
- Reject water from membrane processes – (membrane softening such as Dunedin County Road #1 WTP, etc.)
- Blow-down (from power plants, air conditioning units, etc.)
- Rain Harvesting – (From roofs see City of North Miami Beach, The New American Home (Ridgewood and Broadway, Orlando), and the UCF green roof.
- Air conditioning condensate.
- Near-by surficial aquifers.

The sources are evaluated for the volume and rate available diurnally, seasonally and annually. Water quality parameters such as total suspended solids, total dissolved solids, chlorides, corrosivity, calcium and magnesium hardness susceptibility for precipitation or solids accumulation, metals, odor, bacteria and virus content as well as others as specific circumstances dictate.

Regulatory Considerations

1. Water Use Permitting

Irrigation use and permitting is most stringent in the “Rules of the SFWMD Basis of Review for Water Use Applications. Within the South Florida Water Management District” amended and dated August 31, 2003 and with updates. The irrigation use and necessary permitting had deadlines for updated regulations. Similar procedures have occurred historically in the other water management districts (WMDs). While most WMDs have permitting thresholds such as for:

- (1) wells, intakes, etc. over 4” to be permitted
- (2) use of 100,000 gpd AADF or greater to be permitted
- (3) rules for critical water shortage areas supporting reclaimed water or mixed use.
- (4) water use and source aggregation rules
- (5) water source installed capacity rules (such as 1 MGD aggregate)

and others. The SFWMD’s current threshold is 3 million gallons for the maximum month which generates less than 100,000 gpd AADF (Rules, pp. 84-85), and must be consistent with the WMDs permit for stormwater systems.

2. Alternative Water Supply

Stormwater reuse utilities are considered by the WMDs (http://www.sjrwmd.com/programs/acq_restoration/watprotect_sustain/protect_sustain.html) as providing for conservation of freshwater resources and are S.B. 444 eligible as Alternative Water Supplies.

3. Comprehensive Planning - DCA Sustainable Growth

There are three Memorandums of Understanding linking the DCA, FDEP, FPSC and the five WMDs. On the water issue, sustainable growth as required. Growth does not occur without adequate water supply. To attain the necessary volumes for growth either demand reduction, AWS sources, appropriate matching of water quality and use, and other means are used. Stormwater reuse utilities are an excellent complement to new growth concerns. Such systems are accepted by the DCA as a supply source meeting a portion of the water demand.

4. Florida Department of Environmental Protection (FDEP)

This discussion relates to FDEP oversight for water quality considerations. Where Stormwater Reuse is used exclusively, the Stormwater Reuse Utility does not require additional permitting. If combined with reclaimed water (as many are) then the reclaimed water standards and regulations apply. Note that FDEP FAC Chapter 62-610 provides for reuse service areas to be established. The entire island of Sanibel is so designated as well as the City limit of the City of New Smyrna Beach and subregional areas in Marion County, as well as others. Such a designation allows sites of less than 100,000 gpd AADF to be pre-permitted for the utility. The vast majority of the customers fit within this description. Generally, this establishes a governmental utility reuse service area and partially establishes an investor-owned utility area.

5. Florida Public Service Commission (FPSC)

Though not required and can be exempted, most utilities wish the regulation by the FPSC. Raw water, reuse, irrigation and similar rates, charges and tariff, as well as certificated areas (exclusive service areas) have been and continue to be established. ECFS, Inc. serves the Reliant Energy power plant in Osceola County with a raw water rate initially slightly over \$0.18/1,000 gallons and presently in the twenty cents per thousand gallons range.

6. Right of Way Utilization Easements

As with any utility, the company must attain the ability to utilize the rights of way to economically reach the customer. Typically, the City, County, FDOT, State and others grant such easements with various terms and conditions.

7. State Water Policy

Chapter 40 and the various WMDs all promote the use of the lowest quality water for applicable use.

Technical Considerations

As shown in the Statewide Economy of Scale Evaluation (Hartman & Associates, Inc.), utility facilities and costs are greatly impacted by customer use trends or what is commonly known as peaking factors. The goal is to attain the most constant operation and highest degree of utilization for the most expensive components of the utility system. Stormwater reuse facilities are comparatively less expensive than water and/or wastewater utility systems. The technical consideration of:

- Users – constant, interruptible, etc.
- Use Characteristics – flow rates, diurnal curves, seasonal use, dry season facilities and need.
- Environmental Setting – wetlands, water table use, other.

- Influence Area – competing surficial lens/aquifer use, drawdowns in water table.
- Quality Required – based upon customer use.
- Supplemental flows availability – priority of use with each supply source and blending requirements.
- Soil characteristics – hydrogeology and hydrology.
- Electrical Power Feeds
- System Configurations and Integration Needs.

The technical design aspects for irrigation systems can be found in several references and the reader is referred to those.

How to Set One Up

Figure 1 presents a flow-chart of how to set up a Stormwater Reuse Utility. The first three activities involve the need assessment (development, power plant, other) and the quantification thereof. The Market Study results in the estimated use, use characteristics, targeted customers, and the system potential. These estimates are the first cut at the feasibility of the endeavor. The circumstances and drivers for moving forward.

The resources to meet the needs then are assessed and a conceptual facilities layout is developed.

A critical step is the contracting and agreements entered into by the entity. This provides need and customer documentation. From this step and with the previous ones, a logical service area can be established.

Now the entity is ready to submit its FPSC application (if an IOU) and to submit its reuse feasibility report and reuse service area application to FDEP.

The outcome from these two activities and the customer agreements allows a rational financial plan and financing package to be attained. Then the concurrent activities of the 1.) operational program implementation and staffing, 2.) vendor and support services decisions and/or contracting and 3.) the major activity of designing permitting and building (or assuming) the facilities take place. As facilities come into operations, then appropriately phased service to customers occurs.

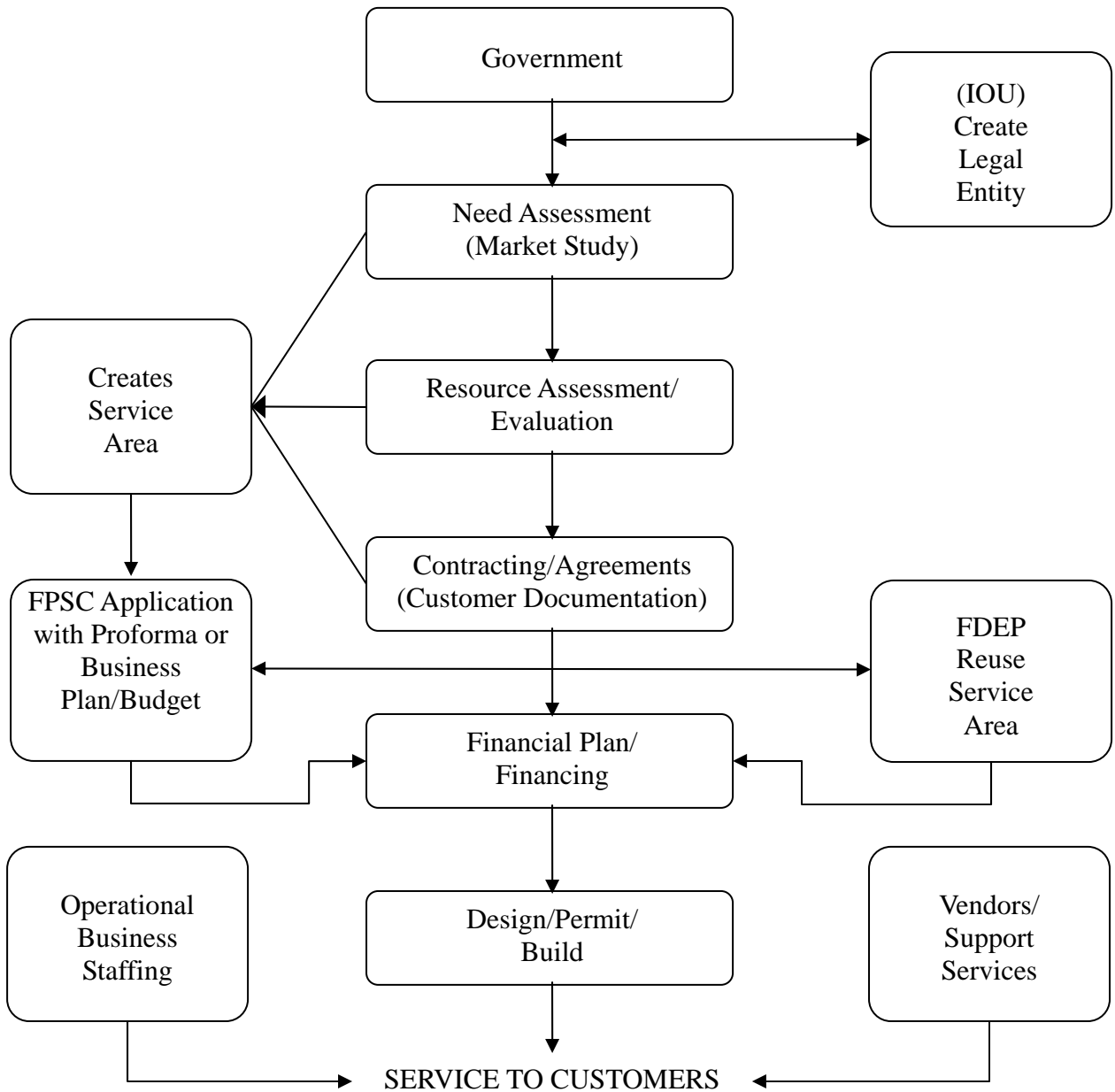


Figure 1. Stormwater Reuse Utility Formation.

Institutional Requirements

In order to be found financially capable or to be approved by local government, usually the creditworthiness of the entity, system, customers, etc. is evaluated. The FDEP utilizes creditworthiness criteria for SRF loans (Florida Department of Environmental Protection Creditworthiness Criteria for Drinking Water State Revolving Fund). The criteria change

for governmental to investor owned to special districts to non-for-profit entities to non-rate base entities. Typically data is provided and/or estimated (pro forma) and then the financial ratios of debt service coverage, interest coverage, return on assets, operating ratio, debt to equity ratio, current ratio, top 10 ratepayer analysis, number of connections, growth trend and rate affordability are the most used with other specific requirements. Next, the security requirements are agreed upon. The financial need, balance sheet before and after the financing, and the income statement for the historical and pro forma period are developed. From these institutional requirements, a sound business structure can be developed.

Case Studies:

1. Eagle Lakes Phase 1 – Flagler County

- Type – AWS and Fire Protection
- Source – Isolated Wet Stormwater Pond
- Source Capital Cost - \$426,000
- Capacity – 750 gpm
- Description – suction pipe below bottom of the borrow pit/STA and pumping with auxiliary power generator into developer contributed fire and reuse distribution system. Pressure transducer to sense fall in pressure then activates charging hydrants and lawn irrigation systems.
- Cost per 1,000 gallons - \$0.30/1,000 gallons

2. City of Miramar – Broward County

- Type – AWS/irrigation combined with reclaimed water (Stormwater Reuse Program Basis of Design Report, April 2007)
- Source – I-75 Interchange Stormwater Pond/Borrow Pit
- Source Estimated Capital Cost - \$467,000
- Capacity – 1 MGD
- Description – Suction system into the STA on the northwest corner of the I-75 and Miramar Parkway Interchange, filtration media. Wet well and duplex pumping station with paced liquid chlorine feed and short discharge into the reclaimed water transmission system. Pumps are controlled by a SCADA RTU and central/regional WWTP control center.
- Cost per 1,000 gallons (Reclaimed & IQ) - \$0.80/1,000 gallons
- Capital Cost – Waived – new development required as CIAC

3. Beverly Beach – Flagler County

- Type – AWS combined with reclaimed water (Construction Drawings for the Beverly Beach Water and Wastewater System)
- Source – Stormwater Pond and Surficial Sand Lens
- Source Capital Cost - \$386,000

- Capacity – 350 gpm
 - Description – Blended stormwater and surficial sand lens flows with MBR AST reclaimed water in the chlorine contact tank. Use of UCF I₂ water controller for mixing integration and water quality control minimizes Interacoastal water discharge
 - Estimated cost per 1,000 gallons (Reclaimed & IQ) - \$0.50/1,000 gallons
 - Capital cost - Waived
4. Tiger Point/South Santa Rosa Utilities, Santa Rosa County (American Arbitration Association Case No. 33 181 00412 04)
- Type – AWS combined with reclaimed water also provides wet weather storage for system
 - Source – Stormwater system surficial sands groundwater flow (significant relief) and reclaimed water
 - Source Capital Cost - \$442,000
 - Capacity – 1.3 MGD
 - Description – stormwater routing to enlarged wet weather storage lake system (3 lakes) and groundwater seepage into system and reduced stages. Impact area is underneath golf course and roughs with residential subdivision surrounding higher stages allow percolation and lower stages recover stored flows (non-discharging)
 - Cost per 1,000 gallons - \$0.50/1,000 gallons for commercial and residential customers. Waived by agreement for golf course.
 - Capital costs – CIAC at cost for commercial and residential customer. Golf Course – waived by agreement
5. City of Sanibel, Lake County
- Type – AWS with reclaimed water, also provides wet weather storage for system
 - Source – Stormwater, reclaimed water, and use of surficial shell lens for storage and recovery
 - Source Capital Cost - \$1.6 million
 - Capacity – 2 mgd
 - Description – integrated lake system and surficial aquifer/shell lens with AST WWTP effluent for source flows. Pumping stations in each lake and stage control. Non-discharging system.
 - Cost per 1,000 gallons – (Reclaimed & IQ) - \$0.10/1,000 gallons golf course and \$1.37/1,000 gallons residential customer use.
 - Capital cost – agreement waived for golf courses.
 - \$700 per residence or actual cost – CIAC
6. ECFS, Inc. Orange, Osceola, Brevard
- Type – Irrigation water/raw water

- Source – Lakes, reservoirs, canals, shallow wells, Floridan wells
- Source Capital Cost - \$3,383,000 (original cost)
- Capacity – approximately 20 MGD facilities limited by CUP
- Description – utilization of surface waters, drainage systems, etc. for agricultural purposes and shallow wells/collection system for Reliant Energy – 4 MGD MDF. Water to fire station and other customers in a variety of systems.
- Cost per 1,000 gallons – surface water \$51.36/month (per customer)
 - raw water - \$0.1813/1,000 gallons (2003)
 - capital fee - \$2,221.39 per 350 gallons AADF (2003)
- Capital cost – agricultural - \$502,000 (East Central Florida Services, Inc. Water Tariff Certificate No. 537-W)
 - raw water - \$1,540,000
 - Reliant - \$1,341,000

Reuse/Irrigation FDEP Service Areas

These are authorized by FDEP upon permit application, processing, advertisement and final permitting. The reuse service areas are used for permitting irrigational use for parcels using less than 100,000 gpd AADF. A service area depicts the authorized market area. System interconnections provide for extra-territorial service via agreement.

FPSC/County Certificated Areas

These are usually in conjunction with the water and wastewater certificate by providing a raw water and/or irrigation quality water service tariff page (see ECFS) The FPSC provides an exclusive service area for the type of service. The process requires an application, supporting documents, technical capability, financial capability, notice, documentation of need, cost of service study and engineering report, mapping and a legal description along with other items. Once granted, future rate modifications and the review of the adequacy of service are the jurisdiction of the FPSC/County.

Stormwater Reuse Utility Valuation

Value (Overview of Utility Valuation) is the amount a knowledgeable buyer would pay and that a knowledgeable seller would accept not under duress or compulsion to complete the transaction. There is a market and it must be tracked. The methods employed are the Cost, Income and Market (Sales Comparison) analyses. The appraiser reconciles the three approached pursuant to USPAP to render an opinion of value. An example of a valuation of 1,271 customers in Florida had the following data results:

- Cost Approach \$3,719,000
(Reproduction Cost Less Depreciation)
- Income Approach \$3,106,000
(Direct Capitalization)
- Market limited, not used.

(Sale Comparison)	
Opinion of Value	\$3,250,000
Final Sale Price in Transaction	\$3,100,000
Owner Investment	\$504,000/\$309,000 Depr.

Conclusion

Stormwater Reuse Utilities are increasing in number and are expected to mimic many of the same characteristics of their related water and wastewater systems.

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