

Environmental Stewardship Through a Public/Private Partnership in Atlantic Beach

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Atlantic Beach is a small coastal municipality in northeast Florida near Jacksonville. The privately-owned Selva Marina Country Club (SMCC), which includes a 146-acre golf course, is located close to the Atlantic Beach Wastewater Treatment Facility (WWTF), a 3.5-mil-gal-per-day (mgd) four-stage biological nutrient removal (BNR) plant. While the country club and driving range were within the Atlantic Beach city limits, the golf course property was located in Jacksonville.

The source of irrigation water for the golf course was a tidal lagoon that traversed the SMCC property. The high salinity of this water was problematic for SMCC, and over the years it attempted to negotiate with the City to provide reclaimed water for irrigation. The City was also interested in providing reclaimed water. Unfortunately, SMCC and the City were unable to agree on an acceptable pricing structure after several attempts.

Like many golf courses, the economic downturn of 2008 hit SMCC hard, and by 2012, it was looking at ways to optimize the property. At that time, SMCC explored the concept of adding a new single-family housing development on the property and upgrading the course. However, the brackish quality of the lagoon water made it unsuitable for growing high-quality turf.

The SMCC's consumptive use permit (CUP) allowed installation of up to 10 shallow wells for irrigation. There were concerns about the volume of water available and the cost compared to reclaimed water.

The City asked J. Collins Engineering Associates LLC (JCEA) to conduct a comparative study to determine the cost-effectiveness of using wells versus the cost of constructing a reclaimed water facility.

Research showed that the ten shallow wells would not produce sufficient water and additional wells would not be cost-efficient.

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The result of that study, "Evaluation of Options for Long-Term Irrigation Water Supply for Selva Marina Country Club," showed that a minimum of 25 wells would be required. A revision to the CUP would also be needed.

A number of options for construction of a reclaimed water facility were examined in the report. Some of these options included:

- ◆ Locating the reuse facility offsite at the golf course versus at the WWTF
- ◆ Options for chlorine contact tankage, including:

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Figure 1. Atlantic Beach Wastewater Treatment Facility and Selva Marina Country Club

Casing Depth	Total Depth	Diameter	Pump Type	Pump Depth	HP	GPM
90	145	4	Submersible	42	1.00	10
0	166	3	Submersible	60	0.75	15
130	180	3	Submersible	50	0.75	15
138	166	3	Submersible	40	0.75	15
140	172	4			1.00	25
110	145	3	Submersible	80	0.75	15
123	160	4			1.00	25
130	155	3	Submersible	80	0.50	15
126	145	3	Submersible	60	1.00	22
120	146	4	Heat pump & Inr.		1.00	25
122	144	3	Submersible	60	1.00	22
133	162	3		80	0.75	15
120	165	4			1.00	15
142	151	4	Jet		0.75	12
117	140	3	Submersible	40	0.75	16
122	157	3	Submersible	40	0.75	16

Figure 2. Flows from Existing Shallow Wells in Area

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- o Relocation and use of an existing abandoned tank
- o Using half of the plant's existing chlorine contact tank
- o Constructing a new chlorine contact tank
- ◆ Options for disinfection, including:
 - o Chlorine gas
 - o Sodium hypochlorite
 - o Ultraviolet light
- ◆ Reclaimed transmission routes, including use of an existing abandoned force main

The preliminary recommendation for the most cost-effective option for providing long-term irrigation water to the golf course was a reclaimed water facility located at the WWTF, using hypochlorite disinfection.

Cultural and Greenspace Preservation

Atlantic Beach is a cul-de-sac city. To the east of the City is the Atlantic Ocean, to the west is the Intracoastal Waterway, and to the north is Hanna Park and the Mayport Naval Station, bordered by the St. Johns River estuary. The City is shaded by a beautiful tree canopy of coastal oaks and other hardwoods. There is a strong sense of community and desire for cultural and environmental preservation.

The Atlantic Beach City Commission and many citizens considered the 55-year-old country club to be part of the local culture and heritage. Many citizens were concerned that the golf course property would be sold

and developed under Jacksonville's building requirements, which would mean that a high-density development of apartments or condominiums could be built on the property. The buildings would also be allowed to exceed Atlantic Beach's 35-ft height limit.

Ideas on ways the City could help to keep from losing the golf course and country club were debated, including an option to purchase and operate the golf course and amenities. That option was ruled out due to fiscal concerns, and SMCC's lack of desire to sell the golf course.

At the same time, SMCC was examining its options. The SMCC, which was renamed the Atlantic Beach Country Club (ABCC) joined with developers Atlantic Beach Partners (ABP) to completely rebuild the golf course, clubhouse, and amenities. The course would be redesigned and upgraded to a championship golf course and 178 high-end single family homes would be built within the course.

Having reliable, high-quality irrigation water was imperative for the plan to move forward and ABCC once more approached Atlantic Beach about providing reclaimed water.

Atlantic Beach citizens were fully supportive of ABCC's plans; however, the City commission could not approve funding to build a reclaimed water facility that would benefit a private business. The commission wanted to find opportunities where the City would obtain a benefit in return for spending approximately \$1.4 million to construct a reclaimed water facility.

After negotiating with ABCC/ABP, an agreement was reached: Atlantic Beach would design, construct, operate, and maintain a reclaimed water facility and distribution main to the golf course property. The reclaimed water facility would be designed to provide water for the golf course, common areas, and residents. In return, ABCC/ABP would:

- ◆ Provide all of the reuse distribution and irrigation piping for the golf course and subdivision.
- ◆ Provide a 2.5-mil-gal (MG) reuse storage pond on the golf course.
- ◆ Provide a recreation and greenspace conservation agreement. The agreement would essentially prevent any future additional building construction on the property in perpetuity.
 - o Use of the undeveloped property is limited to only low-intensity recreational or conservation uses.
 - o A native tree canopy must be maintained after development of the golf course.
 - o No further subdivision of the land is permitted.
- ◆ Work with Atlantic Beach to support annexation of the golf course property into the Atlantic Beach city limits.

The ABCC/ABP provided for additional environmental protections during their design as well:

- ◆ North Florida ecology integrated into the golf course design
- ◆ Water-conserving design for the golf course
- ◆ Drip irrigation for most common area landscaping
- ◆ Provision of constructed nesting sites for ospreys
- ◆ Clubhouse and homes are constructed with smart technology and water- and energy-conserving features

Atlantic Beach Reclaimed Water Facility

The reclaimed water facility was designed to provide an annual average daily amount of 0.5 mgd of reuse to the golf course and residential customers. Included in the project were chemical storage and feed facilities; chlorine contact piping, and wet wells; a reuse pumping station with hydropneumatic tank; an electrical building; and instrumentation/supervisory control and data acquisition (SCADA) integration.

In order to save costs, an existing abandoned 6-in. force main was disinfected and used to provide reclaimed water to the golf



Figure 3. Atlantic Beach Country Club Layout

course storage pond. A 12-in. reuse main was constructed up to the golf course for the residential development. Figure 4 shows the existing 6-in. force main.

Project Challenges

Schedule Limitations

Both the City and ABCC/ABP had an incredibly tight schedule. One of the major factors was that ABCC/ABP needed to complete the golf course construction in time for the growing season. In addition, while ABCC had advised that it would need up to 400,000 gal per day (gpd) of reuse water under normal conditions, they needed up to 1 MG per day for the grow-in period.

The City approved the engineering contract in May 2013. The project had to be designed, permitted, and bid, and a construction contract awarded by November 2013. The City was required to construct the facilities and deliver reclaimed water by March 2014.

In order to accommodate the short timeline and provide the extra reuse needed for grow-in, the project was designed and constructed in two phases.

The JCEA and City staff met with the Florida Department of Environmental Protection (FDEP) to get the conceptual designs for the two phases approved. The FDEP was very helpful and accommodating in allowing the City to design and construct temporary reuse facilities that could be used for the grow-in period while contractors completed the permanent reuse system.

Phase One: Temporary Facilities

In this phase, FDEP allowed the City to dedicate half of the existing chlorine contact tank for the temporary reclaimed water system. A spare sulfur dioxide feed line was purged and reused as a chlorine feed system for the high-level disinfection system.

A large pump was installed to pump reuse water to the golf course storage pond through the existing abandoned and disinfected force main. Instrumentation, including the chlorine analyzer and turbidimeter, was installed in a temporary control panel inside of a wooden box mounted by the chlorine contact tank.

The FDEP required a higher chlorine residual of 1.8 mg/L vs. 1.0 mg/L in order to provide the high-level disinfection in the smaller chlorine contact tank.

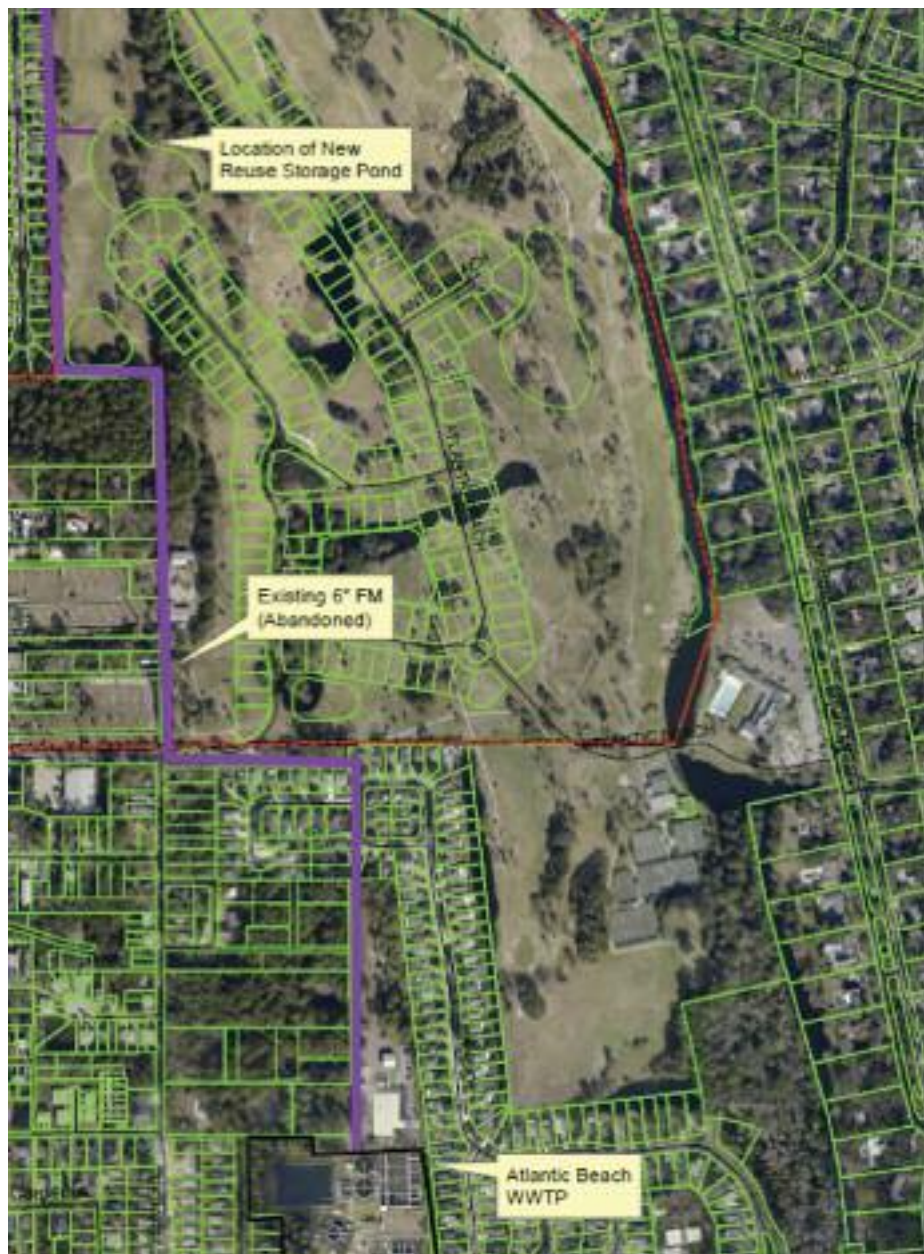


Figure 4. Location of Existing Force Main



Figure 5. Area Available for Reclaimed Water Facility

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Phase Two: Permanent Facilities

The permanent facilities included the electrical building (with proper control panels for the instrumentation), chlorine contact facilities, and a hypochlorite storage and pumping facility. The reuse pumping system consisted of three pumps with variable frequency drives and a hydropneumatic tank to maintain pressure in the distribution system. An off-site control valve was installed on the golf course to hold pressure in the residential distribution system at the same time that reuse water flows to the storage pond. This is a modulating valve that varies the amount of flow to the golf course pond or distribution system based on demand.

The City completed the engineering, permitting, and bid process and awarded a contract to Sawcross Construction in November 2013, as required; however, start of construction was contingent on ABCC/ABP's final closing on the property sale. While Atlantic Beach was ready to proceed with construction, the City had to wait to issue a notice to proceed (NTP) until the property sale between the country club and the developer was final and all parties were legally ready to proceed.

The ABCC/ABP completed its legal requirements in January 2014 instead of November 2013, and the Sawcross was issued an NTP in January.

The City completed construction of phase one and start-up of the reuse system at the same time the golf course completed construction of its reuse pond and began grassing the golf course. The City provided all of the reclaimed water needed to successfully start and complete the grow-in period.

Space Limitations

Because the reclaimed water facility was being built at the effluent end of the WWTF, only a small amount of land was available. There was essentially no room to install a standard chlorine contact chamber sized to allow high-level disinfection per contact time (CT) calculations. Therefore, a chlorine contact pipe system was designed. A 36-in. diameter lined ductile iron pipe with a serpentine design was used for appropriate chlorine contact and mixing time. Effluent from the WWTF filters is diverted to a wet well where sodium hypochlorite is added. The water then flows through the chlorine contact pipe and enters a second wet well where the chlorine level is measured.

The reclaimed water facility, including the location of the chlorine contact pipe installation, is located in a narrow strip of property adjacent to the effluent storage pond.

Budget

Utility budgets are always tight, and this was especially true due to the nature of having

an agreement with ABCC/ABP to ensure the City was not saddled with an undue fiscal burden.

City and JCEA staff prepared a cost-share grant application for the project. The project was awarded a grant of \$442,000 from the St. Johns River Water Management District. Also, to meet the strict budget, a quick-value engineering review was completed after the bid and negotiated with the contractor. This resulted in \$200,000 of savings and \$180,000 of deductions recommended and awarded.

Results

The WWTF was completed in time to meet all of the required deadlines and under budget. The project costs were \$151,528 for engineering and \$1,251,032 for construction. Funding from the City was \$960,560 and \$442,000 from SJRWMD. The phase-one temporary facilities worked well and FDEP made allowances for City staff to take hourly readings of chlorine and turbidity, instead of continuous readings, as long as the pumps were set to automatically shut off with any exceedances.

The ABCC was very pleased with the quantity and quality of the reclaimed water, and the championship golf course was grown-in and ready for play by the opening date.

Phase-one facilities were used until substantial completion of the phase-two improvements. The phase-two facilities were substantially complete in November 2014 and connected to the residential reuse distribution mains provided by the developer. In addition to reclaimed water for residences and common areas, ABCC is using reuse to water the new clay tennis courts.

Construction of the new ABCC clubhouse is complete; residents are playing golf and tennis, and beautiful, environmentally-efficient homes are being built. The entire 166-acre site will be protected from future high-intensity development forever, and Atlantic Beach, ABCC, and Jacksonville are all supporting annexation of the property.

The project will save up to 183 MG of groundwater each year; in addition, effluent discharged to the St. Johns River will be reduced by the same amount. This will reduce the amount of nitrogen and phosphorus discharged to the river by up to 4,870 pounds each per year. ◊

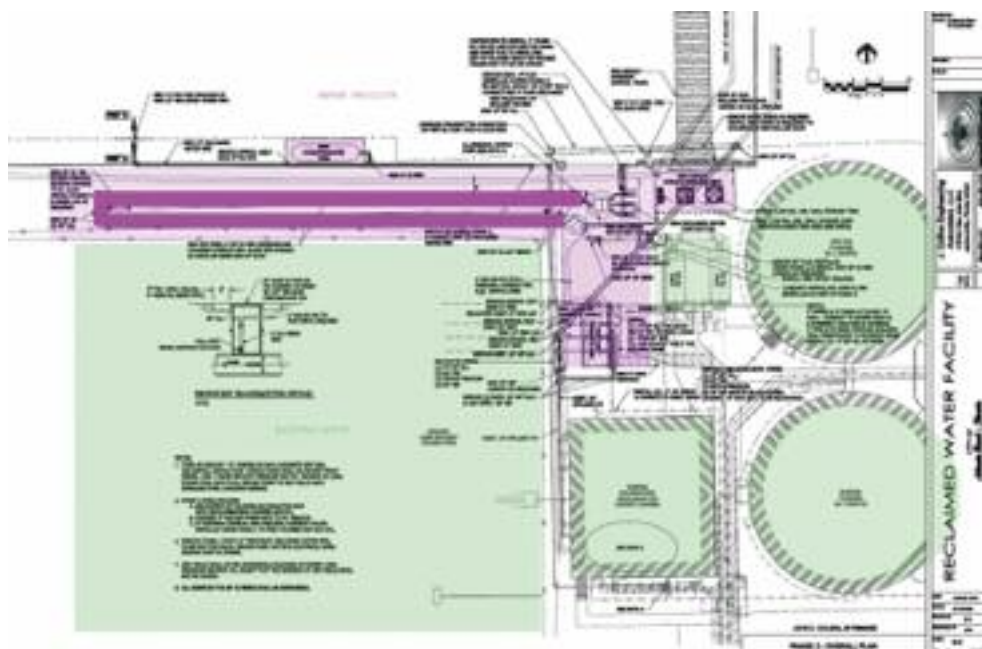


Figure 6. Final Siting for Reclaimed Water Facility/Chlorine Contact Pipe