**Sea Level Rise Subcommittee Meeting**

**Subcommittee of Town of Kiawah Island Environmental Committee**

**Town Meeting Hall**

**November 13, 2017**

**Minutes**

**Persons attending meeting**

John Leffler, Subcommittee Chairman Diana Mezzanotte, Town Council Member

Jim Chitwood Will Connor (KICA) David Elliott Matt Hill (KICA)

Jim Jordan (TOKI) Jack Kotz David Pumphrey Lyn Schroeder

Becky Dennis, Manager of Kiawah Island Utility

Members Absent: Jane Ellis, Bob Cheney, Bruce Spicher

**KIAWAH ISLAND UTILITY (KIU)**

Ms. Becky Dennis, Director of Operations of KIU, detailed KIU’s infrastructure and preparations to manage high water. She noted that KIU’s operations are staffed 24/7 including during hurricanes.

**Buildings**

KIU’s property on Sora Rail is elevated; it sits 12-14 feet above mean sea level referenced to NAVD88. The buildings sit on elevated cement pads offering further protection from flood waters. A second pumping station located on Governor’s Drive is 7.5 feet above MSL, or about 4 feet above MHHW.

In 1995 KIU built the Governor’s Drive pumping station control house. It has high windows and metal storm covers to protect the equipment within from flood waters. Ms. Dennis noted that the control center has never flooded, not even in October, 2015. The Control and Command system located at the main facility on Sora Rail Road operates 24/7. At this time it cannot be operated remotely. The utility monitors water flow and conducts water analysis at the Sora Rail site.

**Pumping Stations**

KIU has 52 sewage pumping stations, each with dual pumps. KIU personnel check the stations daily. The pumping stations are manually pumped down and the power is de-energized when water threatens. The pumping stations have audible alerts systems and flashing light alerts which indicate problems with the stations. KIU can bypass individual sewage pumping stations if there is a problem. Above ground control unit connections on the pumping stations are filled with sealant to keep water from entering the pumping station control panels. In the future control panels can be elevated if they become in danger of frequent flooding.

They have 3 portable pumps (back-ups) for sewage pumping stations. They can rent more if needed in anticipation of, or following, a major storm.

**Pipes**

KIU has about 60 miles of water pipes and another 60 miles of sewage pipes. Most of KIU’s pipes are 3-10 feet underground and as such, sit in groundwater. The pipes are PVC. The system uses gravity and pumping to move sewage to the plant. Gravity fed lines start at about 3 feet in depth and sink gradually to 8-10 feet in depth. Pumps at the low points lift sewage to the next pumping station. Sewage may flow through 4 pumping stations before reaching the plant.

KIU’s main water pipe runs along the Kiawah Island Parkway from Freshfields to the first gate. The pipe is ductile iron, is buried 3’-4’ underground, and is located off the road way.

All KIU’s pipes are underground, except where they are attached to the timber bridges. The Rhett’s Bluff supply lines run under the causeway.

**Sewage Processing**

KIU’s sewage plant can treat up to 1.7 million gallons per day. Average flows are 500,000 gallons/day; the peak in recent years is about 1.1million gallons per day. The pumping and processing stations are not troubled by the variation in the volume of flows, nor is there trouble with homes that are infrequently occupied. The plant provides secondary level sewage treatment.

**Water Infiltration and Flooding Problems**

KIU has experienced minimal water infiltration. During Hurricane Irma salt water entered the system and was pumped into the plant. Conductivity tests showed three times normal levels, but these were not high enough to disrupt the bacteria essential for secondary treatment. The plant did not experience any interruption in service and processing.

Tidal surges onto the island can cover manholes with saltwater. Ms. Dennis noted the system is very tight, so they do not generally receive measureable amounts of water in the system due to flooding. Mr. Connor noted some manhole covers are bolted down in neighboring utilities. Ms. Dennis added bolting down manhole covers is usually done to prevent theft.

KIU has never experienced any sewer overflows. Prior to storms, KUI pumps the system down to almost dry so there is very minimal sewage in the system at the time of a storm. Pumping down before a storm is labor intensive and requires several hours.

Ms. Dennis noted that heavy rain or tidal flooding can limit KIU’s access to the water meters. She noted they see flooding in low lying areas that threatens 2 of KIU’s 52 pumping stations. KIU has no major concerns until tidal surges reach 9.5’ of water. They are raising the two sewage pump station control panels based on flooding generated by Hurricane Irma.

There is no connection between the sanitary system and the storm drain system.

**Manholes**

KIU’s manholes are located on the roads, in driveways, but most are located a few feet off the roads.

Manholes can be raised by adding a riser to address SLR as needed.

**Water Sources**

The island has two water lines. The old, primary feed comes onto the island along the Kiawah Island Parkway. It has been subject to many repairs. The new, second feed goes under the river and comes onto the island on Marsh Island Drive. There is a second water pumping station on Governor’s Drive.

KIU buys water from John’s Island Water Company which in turn buys water from The Charleston Water Company. Charleston uses surface water from The Bushy Park Reservoir in Berkeley County and from the Edisto River in Dorchester County. Bushy Park is the primary source and water from the Edisto is delivered to the Charleston Water processing plant through a 40 mile long tunnel.

KIU supplements its water supply for golf course irrigation purposes with their own deep water well. The well is 2,300 feet deep and taps the Middendorf Aquifer. It remains an emergency back- up supply in the event that all off-island water delivery fails. The KIU pump in the deep well is at about 400’ feet. Water in the well is warm; it arrives on the surface at about 105 degrees.

In the 70’s KIU used to have a shallow well field in the current area called The River Course. Those wells were abandoned when KIU began buying water from St. John’s Water Company.

**KIU and KIGR**

All KIU’s treated effluent goes to the golf courses. KIGR is required to take all the treated effluent KIU delivers. KIU has storage ponds which allow them to store up to 14 million gallons of water on their sites.

KIU monitors nitrogen levels in treated effluent and Ms. Dennis noted the level is low.

KIGR also has deep water wells. Their wells are at 2,500 feet and also tap the Middendorf Aquifer. KIGR has supplemental wells at Osprey (the alligator hot tub is a storage basin), Cougar Point, and the Ocean Course. When KIGR taps their wells, they draw 500,000 – 750,000 gallons per day. KIGR also stores water in holding lagoons located around the golf courses.

Cassique has a deep well at about 2,600 feet deep in Black Creek.

**Middendorf Aquifer**

Isles of Palms, Seabrook Island, Mt. Pleasant and Briar’s Creek all have wells in the Middendorf Aquifer. Isle of Palms uses their deep well on a regular basis to supply water; the other entities use their deep wells as occasional supplementary sources.

Ms. Dennis believes use of the Middendorf is well managed by the communities tapping the aquifer. Current consumption allows the water to recharge within one season, and thus no one currently worries about water supply from the Middendorf.

Water in the Middendorf Aquifer flows from mid-state. Ms. Dennis has not seen any instances of salt water intrusion. The group of managers using the aquifer meets regularly to exchange information and ideas on how to protect the aquifer. She is has not heard of any subsidence caused by tapping the aquifer. Mr. Connor noted that subsidence is unlikely to be an issue in coastal South Carolina because surface water (mainly rivers), is so plentiful. Subsidence in more common in arid areas that are so dependent on groundwater (wells).

**Power Sources**

KIU has in house generators so if Berkley Electric Cooperative (BEC) turns off power, KIU generates their own power. The generators are in raised buildings upon raised platforms inside the buildings. They are tested monthly.

KUI stores 4,500 gallons of fuel in double walled containers on the island. 2,500 gallons are stored at the main pumping station on Sora Rail while the down island pumping station has 2,000 gallons in storage.

**Comments on Other Utilities**

Ms. Dennis noted that utilities like Comcast, BEC and the telecom companies want to protect their infrastructure. BEC is putting lines into conduits. BEC takes power down at times when they perceive significant flooding risk because recovering from damage when the power is “on” takes three time longer than repairing and re-starting a transformer that was powered down before flooding.

Ms. Dennis noted that transformers and junction boxes for Comcast and telecom may be vulnerable to flooding as they are located at ground level. She believes it’s likely this infrastructure could be raised.

Committee members commented on the possibility of eliminating all the Comcast junction boxes and orange cables in favor of becoming a wireless community.

Ms. Mezzanotte wondered about propane tanks and the committee members noted that unanchored propane tanks and in-ground pools could be forced upward during floods. Unanchored propane tanks, both below and above ground, could float around during floods which might lead to broken lines and major fire hazards.

**THE ROADS**

Mr. Connor described Kiawah’s road system.

**General Road Information**

KICA has 60 miles of roads. Most driveways and parking lots belong to individuals or associations. KIGR owns Sanctuary Drive.

The Kiawah Island Parkway was built in 1976. It and many of Kiawah’s roads were designed by Thomas & Hutton, and Mr. White from the Charleston County Public Works reviewed and approved the design.

Roads are required to be elevated, at a minimum, 6.0 feet above mean sea level.

Roads have underdrains which lie about 2-3 feet deep. The underdrains are designed to keep the subgrade of the road dry. Generally the under drain is made of perforated pipes, gravel and filter paper. Mr. Connor believes that in places the under-drain is likely to have been breached. As a result, the subgrade could be sitting in too much water too often. These wet conditions cause the subgrade, and eventually the road, to deteriorate too quickly.

Curbs are built to be about 2 feet deep. There are two types of curbs: pitch curbs, and catch curbs. Pitch curbs send water away from the curb; catch curbs collect water and channel it to a drainage area.

**KICA’s obligations to take Roadways from the Developer**

Prior to January 1, 2017 KICA was required to take from the developer any roads the developer ceded to KICA assuming the roads met all design standards. KICA did not inspect the roads, nor were they consulted in the design process. The County of Charleston may have inspected the developer’s work. Mr. Connor has not seen any records of the County of Charleston’s inspections. Ms. Dennis suggested that the county did inspect the roads, but there was no one at KICA or TOKI to review the road infrastructure. TOKI was formed in 1987.

KICA uses a reserve study to build and maintain roads. Mr. Connor hired a consultant, Stantec, to photograph and assess all the roads on the island. The report rated the roadways’ condition and will help KICA identify which roads need attention first. All of the Kiawah Island Parkway will be milled and replaced just after Thanksgiving.

As of January 1, 2017 KICA is no longer required to take any roads from the developer. Currently, KICA is developing an inspection process to review and evaluate roads or other infrastructure built by the developer. Any infrastructure after January 1, 2017 will be inspected by KICA before it is accepted.

KICA has a contractor who is cleaning and inspecting storm drains, and all pipes down to 6 inches. Nothing smaller than 6 inches is being inspected.

**Road Rejuvenation**

The rejuvenator product worked as expected; the contractor, Total Asphalt, did not. KICA hired a consultant who confirmed that the rejuvenator was applied correctly and is working properly expected. On the other hand, Total Asphalt, the contractor, did not meet expectations; they proved unable to manage the project and traffic flows properly. KICA will continue applying rejuvenator, but will hire a different contractor. Current plans call for all side streets to be coated in 2018. In 2019 Governor’s Parkway and Ocean Course drive will be coated.

Road rejuvenation is about 1/3 the cost of re-milling a road. The rejuvenator is a liquid applied to the road surface into which is seeps, rejuvenating the top ¼ inch of asphalt. It needs to be reapplied every 5 years. If the road is in bad condition, rejuvenator will not be applied.

**Raising Roads**

If KICA raises road, they must also rework the drainage. And, all the drainage systems are interconnected. Minimizing grades is likely to require new storm drains in more places than just the area where the surface road is raised.

Mr. Connor suggested raising only the low points in the roads. This type of modification would require new drainage and easements from some property owners in order to effect the change. He suggested using phases, concentrating on the main roads first. Mr. Chitwood suggested we consider fixing the main road first, and then wait for the community to ask for other roads to be addressed.

Mr. Connor emphasized the importance of reading the designs and analyzing the flooding. He cautioned that using Seabrook’s reported approach of filling in areas that flooded could produce poor results because flooding might be caused by clogged drains or other problems, not low spots subject to flooding.

Mr. Connor noted Stantec, the road consultant, did not record road elevations, but we could get that information by driving the roads with a GPS operating within the vehicle. He suggested the town consider passing a new ordinance governing road elevations, possibly raising the minimum elevation to 8 feet above MSL.

**Other Topics**

Mr. Chitwood emphasized the importance of maintaining island access by the main thoroughfares.

General discussion from many committee members centered about identifying a target for SLR and then using that as the guide to move forward. Mr. Elliott suggested the newly released National Climate Assessment report as a resource for picking SLR targets.

Mr. Chitwood thinks we must be prepared to lose properties to SLR, and it may make sense to pick targets to accommodate SLR. He suggested we start by giving out general information and then consider land acquisitions.

Committee members indicated it would be important to prepare a list of what individuals might do to prepare their properties and homes. The list of projects must comply with standards required by KICA, ARB, TOKI, DHEC and so on. Mr. Elliott noted he thought the average time of ownership for a Kiawah property was 10 years.

Mr. Connor noted he has urged the ARB to pay attention to drainage details when renovation and new build plans are submitted to them.

Mr. Kotz suggested it is time to begin community education. He noted that the “Our World” program is considering a three lecture series addressing SLR. He anticipates they will start with an official from Charleston outlining the city’s approach, followed by a lecture with Will Connor and Becky Dennis on Kiawah’s infrastructure, and conclude with the SLR committee’s conclusions and findings.

Additionally, he noted there are plans in place for a March, 2018 article in Naturally Kiawah addressing SLR. The submission deadline for the article is January, 2018 and urges the committee to consider what we want to say and the points we want to highlight.

Mr. Leffler concluded the conversation noting the December meeting will focus on reviewing and organizing what we have discussed so far, and discussing how we want to present that information in the report. This will also help Jack Kotz prepare his article for Naturally Kiawah.