MEMORANDUM

To: Dave Dunford, Alan McClennan

From: Mike Domenica

Date: July 13, 2015

Subject: Notes: Visits to Chatham Bars and Wequassett Inn WWTFs

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On the above date Scott Kraihanzel of Clough Harbour Associates (CHA), working from the firm's Massachusetts office in Norwell, MA, led a tour of the package wastewater treatment facilities service the Chatham Bars Inn (CBI) and Wequassett Inn (WI) on Cape Cod. The following is a summary of the information provided by Mr. Kraihanzel:

CBI WWTF

1. The plant has a maximum day design capacity of 60,000 gpd. The plant serves the CBI buildings and other facilities exclusively.

2. The plant is an Amphidrome Plus on-site package plant that uses a biological process for treatment, including nitrogen and phosphorus removal. The Amphidrome Plus system is used when nitrogen limits of below 10 mg/l must be met.

3. Wastewater flow from the various CBI buildings are collected and pumped to a single lift station that distributes influent to one of 4 - 20,000 gal. anoxic settling tanks at which grit, sanitary solids and other solids are removed by gravity. Flow from the settling tanks is distributed to the 4 Amphidrome units for biological removal of BOD and suspended solids. Effluent from the Amphidrome units flows to 2 filter units for nitrogen removal. Methanol is used to supplement the carbon feed for denitrification. The plant has an ultraviolet disinfection system that was required by DEP but is not used because treated flow is discharged below the surface to groundwater and travel times are adequate to ensure sufficient disinfection for bacteria. The plant has a small wood frame building for chemical storage, electrical systems, pump and system controls, ventilation blowers for the aeration tanks and odor control, flow recorders and other miscellaneous equipment.

4. Treated effluent discharge is pumped from the plant to one or three subsurface disposal beds located on CBI grounds. Two of the disposal beds are located on site under the unpaved parking lot.

5. Solids removed in the treatment units and filters are returned to the influent settling tanks. Solids for these tanks are pumped annually by septage hauler. The destination

of the solids is uncertain, but probably goes to either the Tri-Town or Chatham WWTFs.

6. The restaurants at CBI each have separate grease traps that are managed separate from the wastewater systems.

7. The WWTF receives close to the maximum flow during the Summer months. Flow in off-season is as low as 500 – 1000 gpd.

8. The plant was designed by CHA, with equipment design and specifications provided by, F. R. Mahoney of Rockland, MA (781-982-9300). The construction contractor was Robert Our from Chatham, MA.

9. The first phase of the plant was built in 1999. An expansion of the facility was designed and installed in 2007.

10. Total area of the plant excluding the disposal beds is approximately 3 acres. The settling tanks, Amphidrome units, pump stations and filter system are underground, using part of the parking lot adjacent to the control building.

11. Operations require a Grade 4 operator certification.

12. The plant has back-up power.

13. Actual capital and operating costs for the plant were not available, but are being requested from CHA and others. Mr. Kraihanzel provided the following estimates based on his recollection:

    - Capital costs were in the range of $50 – 80 per gallon of design treatment capacity, including the collection system. It was not clear whether this was design average flow or peak day capacity.
    - The cost range variation depends on the length of collection pipe and the pumping requirements.[i]

14. Annual operating costs, according to Mr. Kraihanzel, are approximately $50,000 per year for a facility of this size. About $28,000 to $33,000 of the annual cost is for labor and the remained for monitoring. It was not clear where the cost for equipment, parts, materials, chemicals, power, training and other non-labor costs are accounted. The operators have to spend about 2 hours per day at the plant five days per week, which is typical of other plants as well. Emergency response and repairs are not covered in the above annual costs.

15. CHA also operates the Ocean Edge, Wequassett, Stratford Ponds, and Bourne systems on the Cape. Lab testing is performed by Rhode Island Analytical Services.

16. Some minor odors were evident in the area above the influent, anoxic storage tasks. Odors were also noticed inside the control building. Neither source appeared to be of concern with respect to the nearby hotel, residential units or service buildings at the site.

WEQUASSETT WWTF

1. The Wequassett planet is very similar to the CBI facility. Both are Amphidrome systems, influent and effluent pumping systems, groundwater discharges, are operated by CHA, locate the have the treatment systems under a parking lot, have small control buildings similar solids pumping schedules, oder control systems and other similar features. Both systems are heavily seasonal with the Wequassett facility shutting down in the offseason months.

2. The WI plant discharges to infiltration systems covering about 2.5 acres and located below the adjacent tennis courts.

3. The system is designed for a maximum daily flow of 45,000 gpd. The WU system uses its UV disinfection system because of it discharge to nearby Round Cove.

4. The WI system was designed by Coastal Engineering of Orleans.

5. Minor odors were also evident near the influent storage tanks, however, being immediately adjacent to the tennis courts it is not expected that they are a problem.

6. CHA estimated that construction and operating costs for the WI facility would be very similar to the CBI system.

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[i] *It is noted that, while CHA operates 33 similar package systems in Massachusetts, none are municipal systems. All have been designed and built by developers to serve their particular developments which tend to be homogeneous in design, contain relatively few commercial establishments such as laundries, restaurants, etc., and have collection systems that are limited to the buildings in the planned development. The use of the range of costs quoted will have to be confirmed for municipal collection systems that usually have a more spread-out, complex and heterogeneous service area.*