To: Mike Domenica and Stacie Smith

From: Paul R. Ammann and Ed Daly

Subject: Comments on Stantec's Slides for WQAP Meeting #5, October 22, 2014

Date: November 17, 2014

We have reviewed the slides presented by Stantec at the Meeting and have a few comments about specific items contained in the first nine pages of the meeting notes.

- Stantec should document at least 10 years of Tri-Town septage receipts which are readily available from the plant. Eastham generates about 12% of the septage, Brewster and Orleans about 24% each and 40% is generated by other towns on the Lower Cape.

- Stantec noted that ***"Septage may be replaced by higher volume sewage"***, presumably from Orleans. Stantec should provide a 20-year projection for each town that generates septage for Tri-Town.

- Stantec noted that there is ***"No reason to expect increase with septage for the design life (20-years)."*** In fact there is a large amount of evidence that suggests ***septage deliveries should decrease significantly within the 20-year project design life***.

- The Chatham sewage treatment plant represents a major challenge to the future success of Tri-Town septage treatment because it has the capability to process septage at a significantly lower cost than the Orleans plant.

The details are described on the following pages.

1) **Slide #5**: The quantities of septage contained in the table titled "Annual Cape Wide Septage Production" are (1) based on 2005 data and (2) have errors. Stantec should collect actual data from Tri-Town Plant for the last 10 years. Actual data for eight years, 2003 through 2007 and 2010 through 2013, are shown below. Note that about 40% of the septage deliveries were generated by towns other than the owners - Brewster, Eastham and Orleans.

Figure 1. Historic Tri-Town Septage Data

History of the Tri-Town Septage Treatment Quantities

Fiscal Year	Total	Orleans	Brewster	Eastham	1 Prov'town	2 Truro	3 Well'eet	4 Harwich	5 Chatham	6 Dennis	7 Other	Out-of-District Ptown, Truro, Etc	
2004	11,205,577	2,645,653	2,937,252	1,266,412	2,617,462	194,355	195,126	396,958	550,520	283,569	118,270	4,356,260	39%
2005	10,634,996	2,471,461	2,204,455	1,144,288	1,372,912	476,926	915,159	931,629	753,116	217,501	147,549	4,814,792	45%
2006	10,382,361	3,654,347	2,256,023	1,136,020	1,336,240	253,920	268,755	659,600	509,071	187,430	120,955	3,335,971	32%
2007	10,027,701	2,499,500	2,539,963	1,185,256	1,239,925	502,603	295,614	593,669	510,956	196,679	463,536	3,802,982	38%
2008													
2009													
2010	9,567,514	2,015,607	1,997,729	1,235,867	1,034,612	499,862	740,558	860,476	549,133	335,809	297,861	4,318,311	45%
2011	9,799,342	2,321,426	1,892,441	1,165,547	1,096,689	433,049	772,828	798,493	631,582	358,565	328,722	4,419,928	45%
2012	9,967,765	2,406,478	2,208,429	1,512,696	1,091,111	796,957	848,559	476,698	517,775	56,950	52,112	3,840,162	39%
2013	9,301,163	2,090,155	2,346,479	1,253,271	1,006,916	542,490	898,394	527,875	497,084	72,628	65,871	3,611,258	39%
Average	10,110,802	2,513,078	2,297,846	1,237,420	1,349,483	462,520	616,874	655,675	564,905	213,641	199,360	4,062,458	40%

There is an expanded view of this table in the Appendix at the end.

Stantec should note that its septage quantities for Eastham and Orleans are incorrect, and the average quantities are for each town are not consistent with the averages for the years shown in the previous exhibit.

2) Slide #7: ***"Prediction Based on CCC Water Use Too High?"***

- ***"Septage may be replaced with higher volume sewage"***

  Stantec should consider this claim for each town and year-by-year in the future. Conventional gravity sewers are not likely to be installed in the next 20 years in Truro, Wellfleet, Eastham or Brewster. According to the Stantec concept as of October 2014, most of Orleans, with the exception of possibly "downtown", would have STEP systems installed; these systems would continue to generate septage. Septage from Harwich and Chatham, about 1.22 million gallons per year, may disappear from Tri-Town over the next 10 years as both Chatham and East Harwich construct conventional gravity sewer collection and treatment systems.

- ***"No reason to expect increase with septage for design life (20 Years)"***

  In fact, there are three very important ***reasons to expect septage deliveries to Tri-Town to decline…or even go away***.

  a) Increase in pumping intervals. At present, septic tanks in Orleans are pumped out about every three years on average; pump-out intervals may be similar in surrounding towns.

     i. There is a lot of documented evidence that a 3-year pump-out interval is more frequent than necessary. At communities where septic tank maintenance is managed by a municipal water and

sewer authority, septic tank pump-outs are typically every 5 to 9 years.

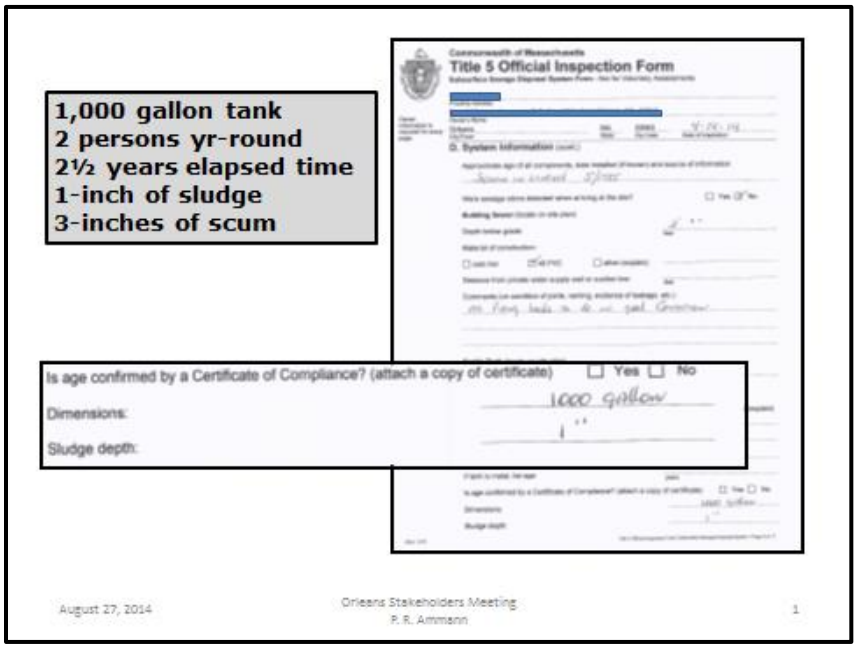
ii. Approximately 50% of homes in Orleans are used seasonally, that is, perhaps for 10 weeks per year. Assuming that a 3 bedroom house is occupied by 6 people for ten weeks, it is equivalent to: [6 X 10 weeks/52 weeks per year] = 1.2 people on an annualized basis. The other 50% of homes in Orleans are occupied year-round. The average number of year-round occupants in Orleans is ***two***.

iii. While septic tanks are sized for the maximum daily wastewater flow (i.e., number of occupants at 55 to 60 gallons per day per person), the rate at which a septic tank accumulates solids and scum is based on the annual average number of ***occupants*** in a residence

iv. The frequency at which septic tanks need to be pumped is based on occupancy. Typically, properties which have only two occupants continuously need to be pumped no more frequently than once every 5 to 6 years, according to extensive publications. See the inspection data in the Figure 2. Collectively these facts indicate that septage quantities from the lower Cape should decline significantly in the near future.

v.

Figure 2. Septic Tank Inspection After 2½ Years



vi. If the towns of the Lower Cape were to adopt a policy of (1) measuring the sludge and scum levels of every septic tank on 3 year intervals, and (2) make a determination on pumping each tank based on the recorded levels of sludge and scum over time, the septage deliveries to Tri-Town would decrease significantly…say even to 50% of the current load. This approach to management of septic tanks is well established. At many locations in the U.S. where large Septic Tank Effluent (STE) systems have been operating for more than 10 or 20 years, the "sewer authority" measures the contents of all septic tanks on a routine basis. Publications show that pumping 1,000 gallon septic tanks every 5 to 9 years is standard.

In addition, prior to the completion and beginning of operation of the Tr-Town Septic Treatment Plant in 1990, the practice of monitoring the contents of septic tanks was in place in Orleans and Brewster.

b) Available septage treatment capacity at other locations. On Slide # 9, the Stantec Meeting notes describe the Tri-Town Plant as containing 28% (45,000 gallons per day) of the Cape-wide capacity (58.5 million gallons per year, or 160,000 gallons per day).[1] Since the Tri-Town septage treatment plant has only been operating at 30,000 gallons per day for more than 10 years (Figure 1)[2] the collective Cape facilities have been operating at [145,000/160,000 =] 91% of total capacity. If Barnstable County were to undertake septic tank management and reduce pump-out frequency to ***an average of every four years instead of the current three***, the septage generation rate in the County would be (3 years/4 years) = 75% of the current level of 145,000 gallons per day, or 108,800 gallons per day. Without Tri-Town, the septage capacity on the Cape is 115,000 gallons per day. Hence there would be sufficient septage treatment capacity ***without Tri-Town***.

Another factor to consider is the potential for Chatham to invest a couple of million dollars in its sewage treatment plant to and thereby have the capacity to handle the 30,000 gallons of septage currently delivered to Tri-Town and generate income for the Town.

[1] **Table on Slide 5 of Stantec Presentation.**
[2] 10,000,000 gallons per year divided by 333 days per year equals 30,000 gallons per day.

c) Changing Demographics. According to the US Census Bureau and local real estate agents, there is a trend in the purchase of properties in Orleans (and perhaps adjacent towns) by middle-aged buyers who are looking for "second homes" with the goal of retirement when they reach to appropriate age. These new buyers would only add two occupants to a property with larger numbers only occurring during visits in the summer months. Apparently this trend, plus the high cost of living, has led to a declining population in Orleans since 2000. The projected estimate of effective population for the next 20 years is trending clearly negative (from -2% to -5 %). Every indicator -- from CC Community College student enrollments, restaurants now closing during the winter months, residents moving their legal residence out of state (to avoid onerous Mass. State income tax), large homes with 3,4 and 5 bedrooms (and multiple bathrooms) with only one or two occupants, and lack of jobs on the Cape for young couples unable to afford our expensive housing is contributing to this trend.

Four scenarios have been developed for Tri-Town septage deliveries. The four scenarios are described briefly. ***In each scenario, septage deliveries to Tri-Town are suspended for 1½ years while the new plant facilities are under construction***.

i. Sewage systems are implemented in Chatham and East Harwich. By 2018 septage deliveries from Chatham cease and from Harwich are reduced by 25%.

ii. The Orleans Board of Health implements a new policy that results in average septic tank pump-out frequencies that are twice as long as current practice by 2018, but only in Orleans.

iii. Boards of Health in all towns that generate septage for the Tri-Town plant (i.e., the Lower Cape) implement new policies that result in 50% of septage compared to current levels.

iv. Chatham expands the capacity of its sewage treatment plant to handle up to 30,000 gallons of septage per day by 2019.

d) Two alternatives for future septage treatment at the Tri-Town Site are considered in this document.

i. First, Stantec considered an alternative in which Brewster, Eastham and Orleans would invest over $5 million for an ***independent septage treatment plant*** at Tri-Town (whose condition has deteriorated over the last decade) to make it functional for the next 20 years and to meet the nitrogen discharge requirements. The plant should be able to recover this investment by future tipping fees The operating costs, without recovery of capital are assumed to be the same as the current plant, 10¢ per gallon or about $1,000,000 annually at full capacity.

The four septage delivery scenarios have been considered and the minimum tipping fee calculated for each scenario to recover the $5 million investment over 20 years is summarized in the next table. ***The "gray area" in the table indicates conditions in which the investment cannot be recovered.*** For the largest amount of septage delivered over the next 20 years (Scenario I) a tipping fee of at least 13¢ per gallon would be required. The required tipping fee increases as the volume of septage decreases. If Chatham were to construct capacity to handle up to 10 million gallons of septage per year (Scenario IV), Tri-Town could never recover its investment, as shown in the table.

A request has been made for Stantec to calculate the available capacity and the cost to transport septage to other locations on the Cape and Southeastern Massachusetts. This review of alternatives will help determine a competitive pricing structure for Tri-Town.

Summary of Tri-Town Septage Scenarios

	Marginal Septage Treatment Cost:	10	Cents Per Gallon			
	Tipping Fee, Cents Per Gallon	18	16	14	13	12	10
Scenario	Total Septage [20 Years]						
I	180,047,175	$14,403,774	$10,802,831	$7,201,887	$5,401,415	$3,600,944	
II	156,096,383	$12,487,711	$9,365,783	$6,243,855	$4,682,891	$3,121,928	
III	100,688,804	$8,055,104	$6,041,328	$4,027,552	$3,020,664	$2,013,776	
IV	20,834,860	$1,666,789	$1,250,092	$833,394	$625,046	$416,697	

Assumption: Septage Collection over 20 years.

ii. A more likely plan for Tri-Town would be to combine new septage treatment capacity with either (1) a plant designed to treat sewage or (2) a plant designed to treat only septic tank effluent from the "Downtown" section of Orleans. Either of these situations would allow for reduced operating labor and some common processing facilities. Under either of these circumstances it has been assumed that the marginal cost (chemicals, utilities, allocated labor, maintenance and waste disposal) for treating septage is about 4¢ per gallon. The tipping fee required to recover the investment is presented in the next table for the four scenarios. ***The "gray area" in the table indicates conditions in which the investment cannot be recovered.***

Scenarios III and IV are most likely to evolve over time as awareness of the opportunities to pump septic tanks less often than every three years becomes better known. If Chatham were to expand its capacity to handle 30,000 gallons of septage per day (Scenario IV), it would make no sense for Orleans (and Brewster and Eastham) to invest in the Tri-Town facility. In fact, Chatham would always represent a competitive risk to the Tri-Town plant. Scenario III would only make sense for the Tri-Town operation if it were ***assured a septage tipping fee of 10 cents per gallon or more over the next 20 years***.

Summary of Tri-Town Septage Scenarios

	Marginal Septage Treatment Cost:	4	Cents Per Gallon	
	Tipping Fee, Cents Per Gallon	10	8	6	4
Scenario	Total Septage [20 Years]				
I	180,047,175	$10,802,831	$7,201,887	$3,600,944	
II	156,096,383	$9,365,783	$6,243,855	$3,121,928	
III	100,688,804	$6,041,328	$4,027,552	$2,013,776	
IV	20,834,860	$1,250,092	$833,394	$416,697	
	Assumption: Septage Collection over 20 years.				

Investing in new Tri-Town septage processing would only make sense if there were no chance that pump-out times for septic tanks, at least in the Tri-Town vicinity, would increase beyond every three years in the future (Scenarios I and II).

As described previously, it is important for Stantec to develop the competitive pricing structure for septage produced on the Lower Cape but transported Barnstable, Yarmouth-Dennis or off-Cape.

3) **Slide #9**: ***"Tri-Town cannot be replaced by on Cape (sic) Facilities"***

See comments above.

Appendix

Figure A-1. Historic Septage Deliveries to the Tri-Town Plant

History of the Tri-Town Septage Treatment Quantities														
						1	2	3	4	5	6	7	Out-of-District	
Fiscal Year		Total	Orleans	Brewster	Eastham	Prov'town	Truro	Well'eet	Harwich	Chatham	Dennis	Other	Ptown, Truro, Etc	
2004		11,205,577	2,645,653	2,937,252	1,266,412	2,617,462	194,355	195,126	396,958	550,520	283,569	118,270	4,356,260	39%
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