



## TOWN OF SHELTER ISLAND

### Office of the Town Engineer

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March 31, 2023

Supervisor Gerald Siller and  
Members of the Town Board  
Town of Shelter Island  
38 North Ferry Road  
P.O. Box 1549  
Shelter Island, NY 11964

The following are questions submitted by Drew Bennett, P.E. in a letter received March 30, 2023. Original comments from Mr. Bennet are shown in this font and **responses by the project team are in this font.**

#### **Additional Context:**

**At the invitation of SM, Town officials walked SM property with Sara Gordon, Stephen Searl and Drew Bennet P.E. on February 11, 2022 to assess the viability of locating the municipal wastewater system on SM property. SM Executive Director Stephen Searl and Planning and Sustainability Director Sara Gordon expressed interest in SM connectivity to this system in support of future SM site development. Subsequent discussions with SM leadership explored the sale of SM property or granting of an easement to SM property to SI Town for locating the wastewater system.**

**Attached is a letter of support for the proposed system at 16 Manwaring dated July 13, 2022 and signed by SM Executive Director Stephen Searl. The proposed system at 16 Manwaring is materially unchanged since the July 13 support letter. However, no concern regarding the environmental impact had been raised by the SM team until November 30, 2022. Subsequent environmental modelling and assessments have further demonstrated the project at 16 Manwaring will have no adverse impact to SM operations, facilities, or water quality.**

#### General

1. The groundwater modeling we requested confirms that the effluent will travel through Sylvester Manor (SM) and through or in close proximity to a number of our water supply wells, including our public water supply well #3 (more on that later).  
**Incorrect statement. The effluent does not flow through nor in close proximity to any SM wells. With separation distances of greater than 60-ft, the effluent is not in close proximity to any SM well.**

2. We have learned that the design flow has increased from 6,300 gpd to 8,000 gpd. This is a 27% increase. **The basis of the increase, which includes contingency, is clearly stated in the Addendum # 1 report. Additional volume was added to accommodate the proposed SI Library expansion and replacement of existing Town-owned residence.** How much more flow can be squeezed into the 16 Manwaring Road site? **Question is not relevant to the project. Site has capacity for the proposed connections. Any subsequent expansion of connectivity is subject to district formation and permissive referendum.**

In addition, there is no provision in the design for treatment of emerging contaminants (just studies and suggested possibilities). **Incorrect statement. The project is committed to treat for emerging contaminants and candidate technologies have been identified – see page 14 of Addendum #1.** Because of this, the Town would need to commit to Covenants and Restrictions limiting the future expansion of flow and the required monitoring of effluent, with requirements to augment treatment to manage future contaminants.

**Basis is incorrect and false. Request for covenants and restrictions are meaningless when expansion via additional connections requires district formation and permissive referendum as mentioned above.**

3. SCDHS states in their letter to the Town that the proposed 16 Manwaring Rd discharge location does not comply with their Appendix A Standards. It is within a 0-2 year travel zone to public supply wells. This is typically considered a fatal flaw to siting, yet the addendum makes no reference to this letter or this standard. We reserve further comment on this issue until we hear SCDHS's input.

**This project is permitted by NYSDEC, not SCDHS. Although not applicable, compliance with SCDHS regulations were achieved to the maximum extent possible with regard to setback and separation distances. MODFLOW provides delineation travel time to well and shows no impact on well. Groundwater does not flow uphill to the neighboring public supply well, and the modelling presented is a more accurate representation than the 0-2 year travel time model provided by SCDHS.**

4. Addendum #1 supplements the siting study. It adds some rigor to the analysis that was not done in the prior engineering reports dated 1/10/22 and 7/11/22. The conclusion that 16 Manwaring Road is the best/only site is not compelling.

**This statement is subjective and without context. Hours of public discussion have demonstrated the advantages of the selected site and the extensive review of alternative properties.**

5. The use of local treatment units within the Town Center (as within its own watershed) was discounted because of "regulatory variances required." The SCDHS has emphasized that the SCDHS has a "best fit" policy that would likely permit such an approach administratively. Hence it is feasible.

**SCDHS has previously rejected a separation distance variance needed for one of the municipal buildings included in the proposed project. While we appreciate the cooperation of SCDHS to find a "best fit" Mr. Bennet understates the regulatory complexity of an individual system layout for all of the municipal buildings.**

In addition, it would cost less and be easier to manage.

**Management of multiple systems receiving high nitrogen strength wastewater (which will require alkalinity feed systems) with highly varying flows is not easier to manage.**

6. Most importantly it would return the treatment effluent from the "soiled" aquifer segment in the Town Center and gradually provide treatment. The concern of untreated emerging and other contaminants is exactly what SM is concerned with. The soiled aquifer segment already has the contamination which may take decades to cure; why dirty another higher quality aquifer segment like SM's with a point source of contamination? It is not logical.

**The allegation of a higher quality aquifer at SM has no data to serve as basis. Rather Addendum # 2 illustrates that the Gardiners Creek watershed is contaminated by a factor of 3+ from existing discharges which include SM wastewater and agricultural practices. It is further understood that SM wells have nitrogen levels in excess of potability limits, which restrict their use as public wells and also suggest this area is undesirable for future drinking water supplies. The project team has made repeated requests for SM water quality data to explore this very matter. Documented requests for SM water quality data were ignored by Mr. Bennet.**

7. The engineer bases the analysis on a treatment level of 3 mg/L N from the Nitrex system. We feel this is an overly optimistic projection that is not supported by peer review of the technology.

**Nitrex technology has been in service for 25 years and was independently evaluated by SCDHS in 2013 to achieve effluent Total Nitrogen of 1.58 mg/L. Mr. Bennet's "feeling" is contradicted by publicly available test data.**

The level of treatment assumption makes it look better than it will likely be. That level of treatment is difficult to achieve consistently with this type of wastewater.

**No basis presented. Nitrex has achieved effluent TN of < 2 mg/L at comparable facilities**

8. There are other parcels within the Town Center Watershed that appear to be suitable for a community system but were not evaluated. Why was the Youth Center/Ball fields not fully considered for a community system? It would be cheaper than the 16 Manwaring site and would keep the effluent in the same watershed. Why was the Fire House property not considered feasible? It would be in the same watershed. We understand the property is not Town owned, but the FD is a participating member and the "ownership" issues can be addressed via easements and inter-agency agreements. Sites within the Town Center will result in a lower project cost and discharge effluent within the same aquifer segment. Also, we understand that the Town is intending to undertake a Town Facilities Master Plan in the near future. It would be logical to include wastewater treatment and water supply planning in this process; this proposal appears to put the cart before the horse.

**Basis stated in Addendum # 1.**

9. The engineering study should consider potential future community well site locations. The Town Center is obviously not one of them which is more suitable for WWTP effluent discharge. The Sylvester Manor property has been discussed as a candidate for a future public water well site if needed.

**SCWA performed an independent review and analysis of the proposed action in consideration of potential future public well siting. Their analysis revealed no risk of compromising sites under consideration for future public water supplies and subsequently issued a letter of support for the proposed project at 16 Manwaring.**

#### **Detailed Technical Comments**

10. Addendum #2 concludes that the model particle tracks from the sewage effluent discharge point are not captured by the model simulated SM supply wells. The model predictions are a tool not a fact.

**The model predictions are the best tool to assess factual impacts- widely practiced and accepted by experienced qualified professionals. This model was developed by an independent, professional hydrogeologist, with relevant project experience in neighboring coastal communities (Southampton, Cape Cod, etc.).**

We find the model application in this case very useful, but the model results are sensitive to assumed pumping rates, assumptions on aquifer hydraulic properties, etc. We find this conclusion premature and request SCDHS's review and opinion.

**The Long Island groundwater flow model developed in partnership with the SCDHS, is open source public information produced by the internationally respected U.S. Geological Survey. Hydraulic aquifer properties are from the USGS Model and the local pumping rates were deduced from data provided by SM.**

**The project team is actively communicating with SCDHS and NYSDEC and no similar comments have been made by these regulators.**

We also suggest that some model assumptions be refined.

**The model assumptions are explicitly described in the USGS report and Local Model presentation.**

11. Model particle tracks predict treated effluent will travel to or near SM Well 1 & 3. Both of the wells are public water supply wells. SM received a Suffolk County permit in 2022 to convert Well 3 to domestic water supply and to convert Well 6 to non-potable use. This conversion is being constructed as we speak. The model should use recent well 6 pumping rates for well 3, and should also anticipate increased flows from planned expansion of facilities and program users at SM.

**Repeated requests for information were made to Mr. Bennet. No such data was shared with the project team.**

12. SM has an application with the NYSDEC to increase overall annual pumpage to support increased sitewide use and irrigation. The irrigation demand is predicted to double. The model simulations need to be updated to accurately reflect SM pumping rates and near-term irrigation and site use changes.

**SM failed to provide such data when requested. It is recommended SM make available details on expanded irrigation use for immediate review of possible environmental impacts and to ensure conformity with SI Town irrigation law.**

13. Some model calibration info is provided in Addendum #2. However, it did not present predicted vs actual groundwater table contours and it did not present predicted vs actual vertical hydraulic gradients. I do not believe there is actual data on the vertical hydraulic gradients in this area of the aquifer. These data would need to be collected to support the model calibration.

**The local model water table contours were calibrated to the USGS calibrated model for Long Island which is the basis for TMDL watershed delineations.**

14. Therefore, we request model calibration and validation information be provided. We request that predicted vs measured water table contours be presented so we can determine whether the predicted flow direction vectors in the model reasonably represent groundwater level monitoring data.

**The calibration results are on Slide 7 showing Water Budget .0005 percent error (insignificant), a Residual Head of -0.01-ft, and Mean Absolute Residual Head of 0.29-ft. These are strong calibration values.**

15. Key information produced by the model includes the prediction that the effluent travel time is 24 years to Gardiners Creek and that the effluent is recharged nearly vertically downward through the Upper Glacial aquifer and then migrates laterally toward a discharge point in Gardiners Creek. The model predicts that the effluent would travel below the supply wells and not be captured by the supply wells. This determination is critical to SM and requires a high degree of confidence in the prediction supported by adequate groundwater quality monitoring to verify the predictions play out.

**In our opinion, there is a high degree of confidence in the prediction.**

16. First, they need to get the pumping rates correct in the model.

**SM needs to identify what they claim is incorrect and provide the needed flow and groundwater quality data on SM property.**

17. The model predicted characteristic of initial downward deep migration of the effluent in the aquifer followed by lateral migration is typically a function of the effluent discharge rate (assumed to be 8000 gpd), the horizontal and vertical hydraulic conductivity of the Upper Glacial aquifer, and the vertical hydraulic gradients in the aquifer (groundwater flow is three-dimensional). How certain are we that these parameter estimates are accurate?

**The Local Model is a 3-dimensional model, and the aquifer characteristics are from the USGS Groundwater Model for Long Island (Scientific Investigations Report 2020-5091).**

18. The discharge rate is assumed to be 8,000 gpd. Will the effluent dive as deep in the aquifer if the discharge rate is 6,300 gpd as expected?

**Slides 11 and 12 show the particle paths under 8,000 GPD and 4,000 GPD effluent discharge conditions. There is insignificant alteration in either the effluent path or cross-sectional paths.**

19. The Sole Source Consulting LLC slide "Shelter Island Local Model North" shows an unusual distribution of hydraulic conductivity assumptions in the model (a series of stripes). We are not clear on what conceptual hydrogeologic model would create such "stripes." The model assumes that the horizontal hydraulic conductivity (Kh) at 16 Manwaring and SM is 60 ft/day. No information is provided on your engineer's model assumption for vertical hydraulic conductivity (Kv). It needs to be provided.

**The hydraulic conductivity array was taken from the USGS Groundwater Model for Long Island. The configuration of HK is consistent with the geostatigraphic or "lithologic texture model" deposition of glacial sediments with a coarse zone in the north (proximal deposits) transitioning horizontally to finer sediments to the south (distal deposits) and also becoming finer at depth. The HK in the vicinity of the discharge and SM wells is 77-ft/day. The USGS vertical hydraulic conductivity is 3-ft/day.**

The SCDHS groundwater model of Shelter Island appears to have assumed  $K_h = 185$  ft/day and  $18.5$  ft/day  $K_v$ . The SCDHS model was prepared to support the County's Water Management Plan and was calibrated and verified. The Town's consultants' assumptions for  $K_h$  and  $K_v$  are very different from the SCDHS model. What is the significance of this? We estimate that the SCDHS model would predict groundwater flow rate to be 2 to 3 times greater than was predicted by your engineer.

**The USGS groundwater model was calibrated to observe water table conditions from long term monitoring wells on Shelter Island. The calibration process identified that the prior hydraulic conductivity of the Shelter Island aquifer had to be reduced by 50% in order to match the observed water table elevations.**

Also note that the  $K_h/K_v$  ration in the SCDHS model is 10:1. This will cause the model prediction of effluent to be more lateral and less deep. Less deep will threaten the SM wells. All of this requires consideration and explanation by your Team. This is a critical issue to SM and the community.

**The hydraulic conductivity array was taken from the USGS Groundwater Model for Long Island. The HK in the vicinity of the discharge and SM wells is 77-ft/day. The USGS vertical hydraulic conductivity is 3-ft/day. The ratio of horizontal to vertical HK then is approximately 25 to 1 which is even more resistant to vertical flow than the noted 10 to 1 ratio of the SCDHS model. Thus, the HK ratio of 1:25 used in the local model results in more conservative shallow particle paths whereas the suggested 1:10 ration would result in deeper particle paths.**

20. One of the reasons stated for moving the WWTP out of the Town Center is that the groundwater flow conditions are stagnant and the buildup of pollutants is not able to flush itself out. The model results suggest that is NOT correct. The current Town Center effluent travels south-southwest and west and is not stagnant as suggested.

**That has not been stated in project reports.**

21. We have learned that the buildup of nitrogen in groundwater in the Town Center is mostly in the form of ammonia.

**Incorrect, nitrogen buildup is in nitrate form which is mobile with water and no retardation.**

Ammonia (NH<sub>4</sub>) has a charge and is adsorbed to aquifer materials and therefore travels in groundwater at a rate slower than groundwater. This concept is referred to as "retardation" in applied fate and transport predictions of contaminants in groundwater. For example, if groundwater travels at a rate of 1 ft/day, ammonia in that groundwater would travel at a rate of 0.25 ft/day. This suggests the buildup of nitrogen in the Town Center is due to the discharge of high concentrations of ammonia and its slow migration through the aquifer due to geochemistry not hydraulic stagnation.

**Nitrogen form is in nitrate. Also, the suggestion of retardation factor for ammonia needs a scientific reference that is applicable for site conditions. We understand any ammonia retardation factor would be less than 3, and not 4 as stated. Though this factor is not relevant as very little, if any, groundwater is in the form of ammonia.**

22. Treatment and discharge in the Town Center watershed would still be of great benefit to the aquifer. There is no benefit to the aquifer in relocating it outside the Town Center watershed. It only serves to further broadcast contaminants that are not treated or only partially treated by the WWTP.

**This comment lacks credibility and is over-generalized. Addendum #2 section 4.3 analysis of Gardiners Creek shows impact of proposed WWTP to be de minimis and that existing water quality in the creek is impaired due to overdevelopment.**

23. High concentrations of pharmaceuticals have been detected in groundwater in the Town Center (reportedly some of the high concentrations are near the school).

**Mr. Bennett / SM need to present data along with any commentary. Such findings would support centralized treatment at 16 Manwaring with ability to remove emerging contaminants.**

24. Treatment of pharmaceuticals is a worthy goal and an evolving and complex technology. However, the engineer has stated that they are only required to treat for N.

**Treatment requirements are dictated by SPDES permit requirements and Town decisions. Treatment for emerging contaminants is proposed.**

SCDHS has pointed out concerns with pharmaceutical treatment by-products. Why transfer high strength pharmaceuticals out of the Town Center watershed and discharge it in a more pristine aquifer segment such as SM?

**The Gardiners Creek watershed is not pristine. As shown in Section 4.3 of Addendum #2, the existing development in Gardiners Creek watershed is discharging greater than 397% of the estimated Total Maximum Daily Load (TMDL) requirement of Gardiners Creek. The proposed effluent discharge represents a less than 1.4% increase over existing TN discharges.**

The Town has committed to study the issue of emerging contaminants that could be treated or emitted by the WWTP. But there is no commitment from the Town or approval from regulatory agencies to effectively treat the emerging contaminants. Then why relocate this discharge to a higher quality aquifer segment?

**There is a Town commitment and preliminarily selected technologies. Refer to page 14 of Addendum #1.**

25. Please describe the monitoring the Town will undertake to ensure there is no effluent impact to Sylvester Manor's wells.

**Treatment plant effluent and upgradient and downgradient wells will be monitored.**

26. Please describe all contingencies the Town will undertake to avert impact to Sylvester Manor's water supply, and to respond in case of contamination of wells, including but not limited to covering the costs to relocate wells or provide treatment for water supplies.

**Engineering reports document, using state of the art techniques, that adverse impact to SM wells will not occur.**





## SYLVESTER MANOR

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### EXECUTIVE DIRECTOR

Stephen A.W. Searl

July 13, 2022

Gerry Siller, Town Supervisor  
Town of Shelter Island  
38 North Ferry Road  
Shelter Island, NY 11964

Dear Supervisor Siller,

I am writing to support your grant development efforts to secure funding for the Shelter Island Center Municipal Wastewater Treatment System. The system is intended to serve all municipal buildings located within in the Island Center and has the potential to reverse the historical trend of rising nitrogen levels in our groundwater.

Shelter Island is unique among our neighboring communities in that the majority of households depend on private well service from a single freshwater aquifer. Protection of both the quality and the quantity of this aquifer is of the utmost importance in maintaining a diverse and vibrant community on Shelter Island and this project would be the most significant infrastructure effort ever made by the Town of Shelter Island to improve groundwater quality.

Sincerely,

Stephen A.W. Searl  
Executive Director

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