Memo

To: **Steven Zieff, Eden Management, Inc.**

From: **David Formato, PE, Onsite Engineering, Inc.**

Date: **February 5, 2018**

Re: ***Robsham Village water resource recovery facility (on site sewer system)***

This memo shall serve to assist in understanding this project at the local level in regards to the proposed private onsite water resource recovery facility for Robsham Village in Milford, Massachusetts. For this project, wastewater generated from the site will be treated and disposed of via an on-site water resource recovery facility with subsurface land disposal. It is anticipated that wastewater generated from the 300 dwelling development will be consistent with a residential strength wastewater. The proposed development will be expected to generate approximately 30,000 gallons per day (gpd) of sewage on an average day, with a maximum sewage generation of approximately 55,000 gpd (per MassDEP technical documents on actual flow vs. maximum Title 5 design flows).

These sewage estimates were calculated using the anticipated development's full build-out schedule in concert with sewage flow design criteria established by 310 CMR 15.000, Title 5. Since the total calculated design flow for the site exceeds 10,000 gpd, the project requires a Groundwater Discharge Permit. While the design flow for the site has been established using 310 CMR 15.000, Title 5, the development will utilize low flow plumbing fixtures in an effort to reduce overall water consumption.

As shown on the site civil engineering plans prepared by Beals and Thomas, sewage collection shall consist of a gravity collection system around the proposed buildings (following the ring road) using PVC pipe and manhole structures to direct the sewage from the buildings to the treatment facility location. Sewage collected from the project will be directed to the headworks of the water resource recovery facility. The sewage collection system and water resource recovery facility tanks will be tested for water tightness prior to being placed into service in accordance with project specifications.

The proposed water resource recovery facility will employ an aerobic biological process to accomplish treatment and therefore have the potential to produce an effluent far superior to that provided by a conventional subsurface sewage disposal system. Aerobic biological treatment processes are capable of removing substantially greater amounts of Biochemical Oxygen Demand (BOD) and Total Suspended Solid (TSS) than a conventional subsurface sewage disposal system. Additionally, the treatment process is capable of nitrifying the

ammonia-nitrogen present in the wastewater to nitrate-nitrogen, which can subsequently be removed through an anoxic denitrification process. Disinfection at such facilities, if required by MassDEP, provides significant reductions in the number of pathogenic organisms in the wastewater prior to discharge to the environment. As currently proposed, the on-site water resource recovery facility would utilize a membrane bioreactor (MBR) wastewater treatment technology in order to reduce these wastewater constituents to below the anticipated Groundwater Discharge Permit levels.

The MBR process is a modified activated sludge treatment process, which combines a conventional activated sludge treatment process with a membrane filter that acts as a physical barrier by combining clarification and tertiary filtration into one step. For small facilities, this physical barrier allows multiple treatment units to be combined into one basin, reducing capital costs, facility footprint, and treatment complexity. The high level of operator control and regulatory acceptance has led to more use, proven reliability, and a better understanding of the long term concerns for life cycle costs associated with membrane system performance and maintenance.

One of the primary attributes of the MBR wastewater treatment system is the variation of the activated sludge process provides an enormous degree of flexibility in the design variations available to meet the requirements of specific waste treatment applications. Due to this flexibility and other inherent advantages, MBR systems are being employed in a variety of process design situations with increased frequency in residential, municipal and industrial wastewater treatment applications.

Furthermore, MBR's are capable of producing an extremely high quality effluent while operating over a wide range of hydraulic and organic loadings. The biological growth providing waste treatment develops in response to the imparted load and the MBR can contain a very high level of solids and organisms within the system because of the membrane barrier. Therefore, the treatment level achieved is typically excellent and is more often than not at the level of water reuse quality. During periods of low hydraulic or organic loading, the biological growth can be concentrated and maintained within the reactor by reducing the frequency of sludge wasting. However, as the flow (or organic load) is increased, the organisms begin to proliferate and a larger percent can remain in the system and be used for high levels of treatment. Therefore, sludge wasting from an MBR system is typically much less than in conventional activated sludge systems. Thus, the system is quickly able to adjust to the strength and volume of the influent wastewater stream.

In addition to removing organic matter, MBR treatment systems are also capable of oxidizing influent nitrogen typically present in the reduced ammonia-nitrogen and organic nitrogen forms. Treatment facilities equipped with anoxic treatment process have proven capable of further treating the oxidized wastewater, performing a treatment step referred to as denitrification. This process releases nitrogen to the atmosphere as nitrogen gas, enabling the treatment facilities to comply with the stringent total nitrogen and nitrate-nitrogen limitations, which will be included in the site's Ground Water Discharge Permit.

A number of safety factors will be incorporated into the design of this system. First, design calculations for the size of each unit operation will include industry standard safety factors to account for variations in flows and waste strength. High water level switches activating both audible and visual alarms will be provided to alert the operator of a potential problem. Additionally, an electronic auto-dialer telephone paging system will be installed to provide the operator with notice of an alarm. All pumps in the system will have duplicate units plumbed and wired to automatically start should the primary pumps malfunction. Any pump malfunction will also activate the alarm system. A spare parts inventory will be maintained on site to minimize the downtime of any unit due to a malfunction.

The treatment facilities will be equipped with a permanently mounted standby generator of sufficient size to provide enough electricity to operate the entire facility including all pumps, treatment processes and lighting. The treatment plant generator will be equipped with an automatic transfer switch to activate the unit in the event of a prolonged power outage. The main control panel will be equipped with a sequential starter to prevent an overload of the circuitry upon transfer to the alternate electric source.

Wastewater disposal would be accomplished using a subsurface effluent disposal system consisting of drip dispersal beds located in the three areas of the most permeable soils at the site. Based upon loading rates established by field infiltration (percolation) tests, the leaching facilities would have a combined capacity of 55,000 gpd. The leaching areas have been modeled for groundwater mounding and sensitive receptor impacts per MassDEP requirements and have been approved by MassDEP for sizing, configuration and loading in accordance with the requirements of 314 CMR 5.00. A copy of the MassDEP hydrogeological approval is attached for your reference.

The area designated for on-site wastewater disposal was determined after extensive field testing of the soils and hydraulic conditions of the site. The field testing program included witnessed deep hole testing, soil evaluations, percolation tests, borings, monitoring well installations and testing to determine soil types, groundwater levels, flow direction and the in-situ permeability of the soil.

The project proponent, as part of the permitting for the project, will secure a MassDEP Groundwater Discharge Permit in order to meet the Commonwealth of Massachusetts Groundwater Discharge Permit Program requirements associated with the design and construction of the sewage collection system, water resource recovery facility, and subsurface effluent disposal system. The permitting of the wastewater treatment works is under the purview of MassDEP. As part of the permitting process, the proponent will prepare a design report, drawings and specifications for review and approval by State agencies. As the 300 unit affordable housing project is permitted on the local level under M.G.L. Chapter 40B, any local regulations pertaining to Groundwater Discharge Permit will not apply, as State (MassDEP) requirements will be implemented. In addition, since the tertiary treated discharge will be subsurface, permitting associated with the US E.P.A. National Pollution Discharge Elimination System (NPDES) permit program for a surface water discharge does not apply.

Through the design, permitting, operation and maintenance process of the water resource recovery facility (WRRF), the proponent will meet all regulatory treatment, reporting and compliance standards set for by MassDEP. The WRRF will be designed, installed, operated and maintained, under the supervision of the proponent, to meet all applicable standards.

Specifically; the Groundwater Discharge Permit, issued by the MassDEP, will set forth minimum monitoring requirements for facility's influent and effluent as well as the monitoring wells to be installed upgradient and downgradient from the subsurface effluent disposal systems. The Groundwater Discharge Permit requires the results of the sampling periods are submitted to the MassDEP on a monthly basis for compliance monitoring. These are known as Discharge Monitoring Reports (DMRs).

The permitted sewage treatment facility will be operated by a Certified Wastewater Treatment Plant Operator in accordance with the requirements in "Rules and Regulations for Certification of Operators of Wastewater Treatment Facilities" (257 CMR 2.00). The permittee bears the ultimate responsibility of providing the proper operation and maintenance of the facilities in accordance with "Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges" (314 CMR 12.00).

The treatment system operations will receive regular supervision and maintenance requiring trained and skilled personnel. The MassDEP requires a licensed operator be present at the treatment facility at least two hours per day, five days per week, to perform operational supervision and routine maintenance. The MassDEP also recommends a Massachusetts Registered Professional Engineer inspect the treatment facility at least once per month to monitor the operation and collect samples to determine facility compliance with the Groundwater Discharge Permit. A monthly inspection report must be submitted by the engineer to the MassDEP and the Town (if required). An annual compliance fee is submitted to the MassDEP to cover the expense of the Department's independent compliance inspection.

In order to sustain both the short and long term operating condition of the water resource recovery facility, the MassDEP requires a Capital Reserve Escrow Account is established. The account funding amount is determined by the MassDEP in order to address the immediate replacement / repair as well as the long term replacement of normal wear items. This account is typically required to be in place and funded prior to the start-up of the facility.

As a means for the MassDEP to monitor this reserve funding information, the permittee is required to submit an annual financial report by May 1 of each year for the previous year. This report contains all of the previous year's financial transactions for the facility, summarizes the account balances and disbursements, provides a summary of operation and maintenance expenses, and details the charges to individual users of the wastewater treatment system (if any).

Daria Smith Renewal & Arbitration Cases

The foregoing is taken from Lowell School Committee v. United Teachers of Lowell, 12 Mass. L. Rptr 672 (2001).

See School Committee of Holbrook v. Holbrook Education Association, 395 Mass. at 655 ("bargained for procedures governing the appointment and reappointment of teachers such as posting and evaluation requirements are specifically enforceable," but arbitrator's award ordering school committee to recall individual teacher to particular position exceeded authority; (School Committee of West Springfield v. Korbut, 373 Mass. at 796 (contractual requirement of notice of hearing before disciplinary non-renewal held enforceable as procedural; order of 1-year renewal as remedy for violation held within arbitrators authority); School Committee of Danvers v. Tyman, 372 Mass. 106, 113 (1977) ("Although a school committee may not surrender its authority to make tenure decisions, there is no reason why a school committee may not bind itself to follow certain procedures precedent to the making of any such decision"); compare Berkshire Hills Regional District Committee v. Berkshire Hills Education Association, 375 Mass. 522, 528 (1978)(staying arbitration of claim violation of contract provision granting district employees preference over outsiders for principal position, because such preference conflicted with the School Committee's non-delegable authority, and was not "a question of adherence… to procedures").