

MEMORANDUM

Date: May 26, 2022; Revised June 3, 2022

To Nicolas Milano, Town of Medfield

From Eric Kelley, PE

CC Maurice Goulet, Town of Medfield
Medfield Water & Sewerage Board

Subject Medfield State Hospital Strategic Reuse Project
Review of Preliminary Utilities and Infrastructure Memorandum

This memorandum presents Environmental Partners Group, LLC (Environmental Partners or EP) review and evaluation of the preliminary water, sewer, and stormwater utilities proposed for the Medfield State Hospital Strategic Reuse project. Environmental Partners completed a similar preliminary utilities review in November 2019. The memorandum summarizes our findings and recommendations from our updated evaluation of the proposed preliminary utility improvements and has been updated to reflect discussions with Town staff.

Project Understanding

The Town of Medfield purchased the Medfield State Hospital (MSH) property from the State of Massachusetts in 2014. The Town created the Medfield State Hospital Planning Committee (MSHPC) to lead the Town's master planning efforts, which resulted in the issuance of a Strategic Reuse Master Plan in August 2018. The Town publicly solicited development proposals in April 2021 and received two submissions in August 2021. In November 2021 the Town's Board of Selectmen voted to designate the proposal submitted by Trinity Financial, Inc. (Trinity Financial) of Boston, MA as the most advantageous proposal. In March 2022 the Board of Selectmen voted to approve an initial agreement with Trinity Financial to allow for a period of due diligence regarding their proposed redevelopment proposal.

Trinity Financial's due diligence activities included hiring a professional engineering services consultant, Vanasse Hangen Brustlin, Inc. (VHB), to complete a preliminary due diligence evaluation of utility and infrastructure design including drinking water, sanitary sewer, stormwater, electric, and telecommunications service for the project. The Town provided Environmental Partners with a copy of VHB's draft memorandum dated May 20, 2022 for review.

This memorandum summarizes Environmental Partners' findings and recommendations based upon our review of VHB's draft utilities and infrastructure memorandum.

Proposed Improvements

Trinity Financial's project proposal includes a combination of 334 apartment units with 502 bedrooms, a Clubhouse, and a Cultural Arts Center. As identified in Exhibit A1 (refer to Figure 1) of VHB's memorandum, the existing buildings will either be redeveloped by Trinity Financial (green highlight), demolished (buildings #10 and 27A), redeveloped by the Cultural Alliance of Medfield (CAM) (buildings # 24 and 25, yellow highlight), or retained by the Town (buildings #30 through 36, red highlight). This varies slightly from the 2019 redevelopment plan, which did not identify buildings

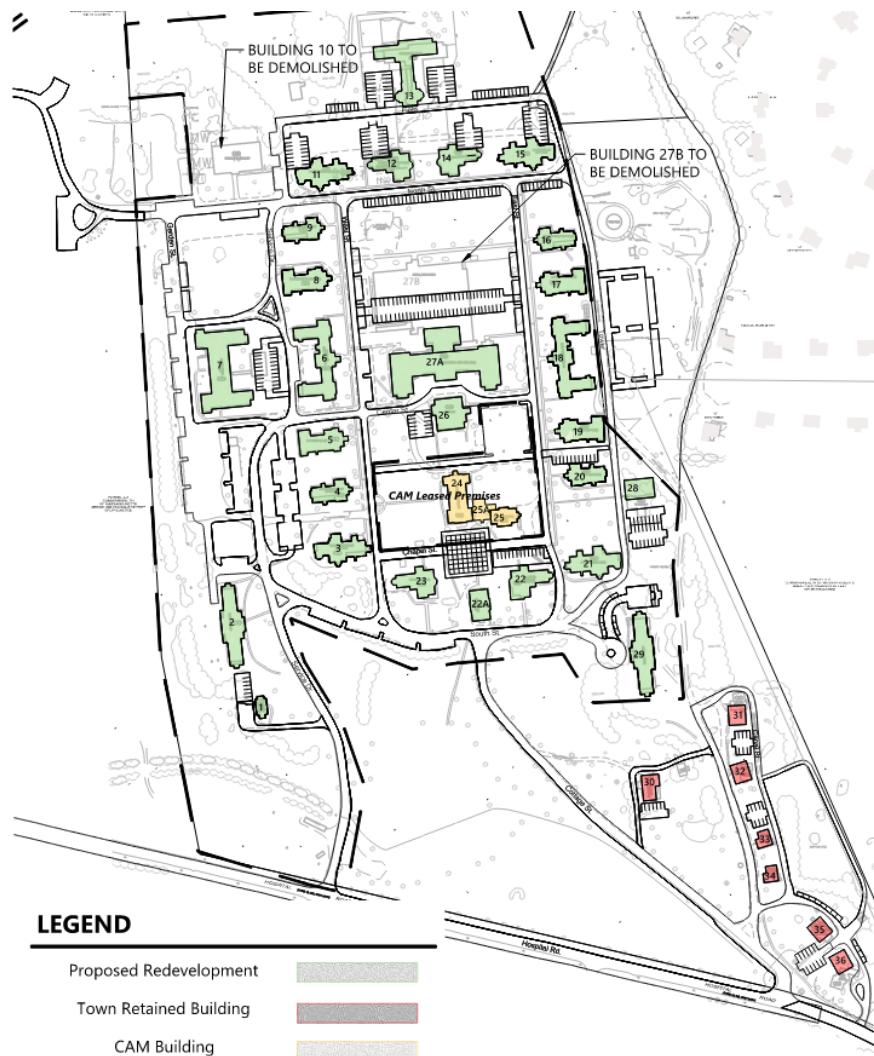


Figure 1 - Exhibit A1 - Trinity Financial Project Locus

#10 and 27A for demolition or buildings #30 through 36 to be retained by the Town. As compared to the Town's 2019 preliminary plan Trinity Financial's proposal results in a net reduction of 263,995 square feet of total building area and 164 total bedrooms. The reduction in total building area and bedrooms thereby reduces the estimated water and sewer system demands as discussed further in the following sections.

Utility Demand Estimates

Following discussions with Town staff, Environmental Partners evaluated the utility demand estimate methods utilized by VHB. The estimated sewer generation estimates provided in the VHB memorandum are based upon Massachusetts Title V standards for residential

use (110 gpd per bedroom) and non-residential use (75 gpd per 1,000 square feet). VHB's estimated the project's water system demands as 110% of the sewer generation estimate to account for non-consumptive uses. This is slightly less than the method used in the 2019 preliminary utility evaluation completed for the Town that estimated the water usage as approximately 117% of sewer

usage (i.e. water usage = sewer demand / 0.85). Using the 2019 water usage methodology VHB's estimated peak daily sewer generation of 61,803 gpd would result in an estimated peak daily water usage of 72,709 gpd, which is 4,726 gpd higher than the 67,893 gpd water usage estimate in Exhibit A-1 of the VHB memo. This variance between estimation methods is not considered to be significant as the usage estimates are conservatively estimated peak day demands and Trinity Financial's proposed development has a significant reduction in the number of residential units as compared to the Town's 2019 preliminary redevelopment plan. In general, the estimates for sewer generation and water usage are appropriate for this stage of planning for the MSH project.

Water System

The proposed water system infrastructure outlined in VHB's memorandum includes the following:

- The project will provide a minimum of two connections to the existing public water system's 16-inch water main extending between Hospital Road and the Town's existing elevated water storage tank. The proposed connection point near Stonegate Drive has been updated from the 2019 proposal to avoid the recently abandoned segment of the 16-inch water main. VHB identifies a potential third system connection to the existing 12 inch main in Hospital Road (near Cottage Road) if additional system looping is needed.
- The project proposes to install new 8 inch cement lined ductile iron mains for the water distribution system within the limits of the project. The pipe network is proposed to be installed within the limits of existing interior roads (e.g. East Street, North Street, South Street) as shown on Exhibit A-3. The project proposes a water main loop between Tower Road and Service Drive along Field Street, which was not included in the 2019 proposal.
- The proposed system improvements will include new fire hydrants, gate valves, and water services (copper) in accordance with Town, State, and industry guidelines and regulations.
- The project proposes fire service connections to renovated buildings as required. Hydrants shall be provided at a minimum 500 feet spacing and no less than 100 feet from any building's exterior fire department connection. Fire sprinkler systems are assumed required for redeveloped buildings.
- The updated project water system demand is estimated to be 61,925 gallons per day (gpd) for the peak day demand, which is significantly less than the 2019 estimate of 114,000 gpd. This estimate represents a 10% increase over the estimated daily sewer system flows to account for non-consumptive uses.
- Conservatively, Environmental Partners assumed an additional 0.06 MGD in average daily demand due to the MSH project. Table 1 summarizes the reported average annual day demand (2011 through 2021), the estimated average annual day demands including the additional 61,925 gpd demand from the MSH project, and the Town's current Water Management Act (WMA) limits authorized by the Department of Environmental Protection (DEP).

Table 1 – Summary of Estimated Water System Demands

Year	Actual Reported Avg. Annual Day (MGD)	Estimated Avg. Annual Day with MSH 0.06 MGD Demand (MGD)	WMA Avg. Annual Day Limit (MGD)	Variance (MGD)
2021	1.06	1.12	1.51	0.39
2020	1.15	1.21		0.30
2019	1.10	1.16		0.45
2018	1.16	1.22		0.29
2017	1.25	1.31		0.20
2016	1.31	1.37		0.14
2015	1.48	1.54		(0.03)
2014	1.46	1.52		(0.01)
2013	1.40	1.46		0.05
2012	1.30	1.36		0.15
2011	1.24	1.30		0.21

Sewer System

The proposed sanitary sewer system infrastructure outlined in VHB's memorandum includes the following:

- The project proposes to extend the existing gravity sewer on Hospital Road to the intersection of Cottage Street, where it will then continue into the proposed development. The existing gravity sewer on Hospital Road between the proposed connection point and Copperwood Road is proposed for replacement as part of the project. This is consistent with the 2019 proposed sewer improvements on Hospital Road.
- The proposed sanitary sewer system within the development will be constructed of new PVC gravity sewer pipes and pre-cast concrete sewer manholes. Gravity sewer is proposed for installation within the limits of existing interior roads (e.g. East Street, Field Road, Service Drive). One slight modification from the 2019 proposal is the routing of the development's sewer main along Cottage Street between South Street and Hospital Road. The 2019 proposal included a cross-country sewer main between Service Drive and Cottage Street. In general the proposed sewer layout appears consistent with the 2019 proposal.
- The project does not identify any sewer grinder pump stations unlike the 2019 proposed layout that included grinder pump stations at buildings #7 and #10 due to their elevations being lower than Service Drive. However, building #10 is now proposed for demolition.
- The project's peak estimated sewer generation is 56,295 gpd, which is significantly lower than the 2019 estimated sewer generation of 96,910 gpd. This is accounted for in the reduced number of residential units from the original master plan.
- The proposed sanitary sewer system components are proposed to be installed in accordance with Town, state, and industry guidelines and requirements. The existing sewer system downstream of the project's proposed connection appears to serve approximately 29 single-family residences, one commercial facility (the Kingsbury Club), one municipal facility (the Center), and the 49 unit Country Estates development on Hospital Road. Assuming 4 bedrooms per single family residence and 182 bedrooms for Country Estates,

the existing residential sewer flow is approximately 32,780 gpd (110 gpd per bedroom). This does not include any flows from the Kingsbury Club or the Center. The design capacity for an 8-inch PVC sewer is approximately 250,000 gpd (assuming minimum slope per TR-16 and flowing 50% full to allow for future system expansion and infiltration), but can accommodate approximately 500,000 gpd at full capacity. The MSH estimated sewer flow is 56,295 gpd. Therefore, the combined flow of the MSH development plus downstream residential properties is estimated to be approximately 89,075 gpd. Title V flows are approximately two-times the average daily flow, which represents 45,000 gpd for the existing residential flows plus the MSH project. Sewers are designed for peak hourly flow, which in this case is estimated to be 5.6-times the average daily flow of 45,000 (per TR-16). Therefore, the peak hourly flow for the combined MSH and residential flow is 252,000 GPD (45,000 GPD x 5.6 = 252,000 GPD). While the peak hourly flow estimate is only slighter higher than the conventional design capacity (250,000 GPD), it does not exceed the full capacity of the sewer at minimum slope (worst case situation).

- Environmental Partners reviewed the Town's wastewater treatment plant (WWTP) monthly flows as part of our preliminary utility review. Table 2 summarizes the WWTP's spring (April) and summer/fall (September) average and peak flows. April average daily flows are approximately twice as high as those observed in September. The peaking factor for April and September periods (2015-2021) ranges from approximately 1.3 to 2.5.

Table 2 – Summary of April and September Wastewater Treatment Facility Flows

Year	Month	Monthly Average Flow (MGD)	Peak Daily Flow (MGD)	Peaking Factor
2015	April	0.935	1.4	1.5
	September	0.413	0.7	1.7
2016	April	0.759	1.6	2.1
	September	0.357	0.7	2.0
2017	April	0.941	2.2	2.3
	September	0.498	0.8	1.6
2018	April	0.871	1.8	2.1
	September	0.547	0.9	1.6
2019	April	0.85	1.3	1.5
	September	0.39	1.0	2.6
2020	April	0.885	1.2	1.4
	September	0.546	0.70	1.3
2021	April	0.678	1.0	1.5
	September	0.70	1.20	1.7
WWTP Design Capacity 1.52 MGD (average day), 3.12 MGD (peak day)				

Stormwater Management

The 2019 utility improvements plan did not include discussion of proposed stormwater system improvements and Environmental Partners did not provide recommendations regarding

stormwater management in our 2019 memorandum. The proposed municipal storm sewer system infrastructure outlined in VHB's memorandum includes the following:

- The limits of the proposed MSH redevelopment do not include regulated flood plain or wetland resource areas based upon the documents provided.
- The proposed redevelopment includes a net decrease of 1.1 acres of building footprint, an increase of 0.3 acres in impervious area, and an increase of 0.8 acres of pervious area.
- The project's stormwater management system is proposed to be a closed system that will not connect to the Town's existing stormwater infrastructure on Hospital Road.
- VHB's preliminary evaluation has identified Hydrologic Group C/D and C surficial soils within the limits of proposed development based upon Natural Resources Conservation Service (NRCS) data. These soil types are identified as generally not conducive to infiltration.
- The project proposes to design stormwater management systems in accordance with the Massachusetts Department of Environmental Protection Stormwater Standards for quantity and water quality.
- The project proposes to prioritize low impact development approaches where feasible and provide water quality treatment for new site impervious surfaces.

Findings and Recommendations

Water System

Environmental Partners' initial evaluation finds that current proposed project's estimated peak day water demands of 61,925 gpd (0.06 MGD) could be accommodated under current authorized limits provided that the Town continues to be proactive with its water conservation programs. The Town should consider the following findings and recommendations to evaluate the MSH project's water system impacts further:

- Conservative estimates for annual average day demands for 2011 to 2021 including the additional daily demand of 0.06 MGD from the MSH project indicates the following:
 - The additional peak MSH daily demand of 0.06 MGD could have been accommodated under the Town's existing authorized average daily withdrawal limit of 1.51 MGD in 9 of 11 years and was at or above the withdrawal limit in 2 of 11 years.
 - In 2017 through 2021, the remaining system withdrawal capacity, based on average annual day, ranged from 0.20 MGD (13% remaining in 2017) to 0.45 MGD (30% remaining 2019).
- The Town should continue its proactive water system management strategies including meter replacement, semi-annual leak detection, and water main replacement to continue reducing Unaccounted For Water (UAW). Further reductions in UAW can increase available water system capacity for future development at this location or other locations in town.
- The Town should continue to evaluate its water conservation measures to address peak seasonal demands (April to September).
- The proposed Hospital development demands are for typical residential use (Title V) and do not include any specific projections for lawn irrigation use. Due to the size of the project's peak demands (approximately 4% of the 1.51 MGD withdrawal capacity) the Town should

consider limiting the Hospital development from connecting irrigation systems to the public water system.

- When more details of the Hospital development become available, a formal fire flow analysis should be conducted to support fire service connection design and identify building specific needs for increasing fire protection system pressures.
- Proposed water system connections should be reviewed for accuracy against available water system record drawings.
- Proposed water system layout (isolation valves, hydrants, loops) should be discussed with the Water System operations staff.
- Preliminary geotechnical investigations should be completed along proposed water main alignments to evaluate subsurface conditions due to presence of shallow bedrock at Hospital Tank site.
- The project should include provisions for extending new 8 inch cement lined ductile iron water main from the existing 12 inch main on Hospital Road to the Arboretum area (buildings #30 through 36). Extending a new water main from Hospital Road to the southern intersection of Stonegate Drive and Canal Street would provide the Town with a system connection for future reuse of the Arboretum. Completing this work concurrent with the MSH project would also minimize the need for water utility construction impacts on Hospital Road/Cottage Street in the future.
- Due to the proposed water system demands and system connections (domestic and fire) the Town should evaluate the project against current water system use regulations to determine the potential system connection fees associated with the MSH project.

[Sewer System](#)

Environmental Partners' initial evaluation finds that the MSH project's peak daily sewer flow of 56,295 GPD could be accommodated by the existing 8-inch PVC sewer system from Hospital Road to West Mill Street based on the assumptions identified in this memorandum. The Town should consider the following findings and recommendations to evaluate the MSH project's sewer system impacts further:

- The design capacity of an 8" PVC sewer at the minimum recommended TR-16 slopes (0.004) is approximately 250,000 gallons per day (pipe flowing 50% full), but over time systems routinely operate at greater flows.
- The existing sewer serves approximately 29 single family residences, 1 commercial property (Kingsbury Club), and 1 municipal property (The Center). The existing sewer also serves the Country Estates development's 49 residential units on Hospital Road. Assuming that the sewer flows from these properties and any existing I/I contributions along the sewer alignment is less than 190,000 gallons per day, the existing 8-inch sewer has capacity for the MSH development and remain at or below the design capacity of 250,000 GPD.
- The Town should review the recent metered water flows for the existing properties to estimate their average daily sewer flows.
- The existing sewer manhole inverts along the 8-inch sewer (between Hospital Road and West Mill Street) should be verified to confirm the existing pipe slopes to confirm the available sewer capacity.
- The existing 8-inch sewer, sewer manholes, and its connection to the West Mill Street interceptor should be physically inspected (visual and CCTV) to assess its existing condition.

- The 8-inch sewer should be evaluated for Inflow/Infiltration (I/I) including the depth of flow within the 24-inch interceptor where the 8-inch sewer discharges to allow for hydraulic modeling of the 8-inch sewer under free discharge and high interceptor level conditions.
- Based upon a review of recent historical April and September WWTP flow data (2019 through 2021), the Town's existing WWTP can accommodate the estimated sewer generation from the MSH development. The Town is currently working on reducing I/I issues in the sanitary sewer system. The MSH development is located in Sewershed Area 1. The Town should identify an equivalent level of I/I reductions in Sewersheds Areas 1 and 2 (contributes to Area 1) to offset the proposed MSH development flows.
- Due to the proposed sewer system demands and system extension the Town should evaluate the project against current sewer system use regulations to determine the potential system connection fees associated with the MSH project.
- The Town's wastewater master plan should be updated when more details of the MSH development become available and to reflect the Town's I/I program.
- Preliminary geotechnical investigations should be completed along proposed sewer alignments to evaluate subsurface conditions due to presence of shallow bedrock at Hospital Tank site.

Stormwater Management

The current proposed project's stormwater management design has not been developed. Environmental Partners proposes the following recommendations for consideration as the project's stormwater management approach is developed:

- Stormwater best management practices (BMPs) should prioritize green infrastructure and low impact development approaches for managing stormwater runoff, disconnecting impervious cover, and providing stormwater treatment.
- Stormwater BMPs should be designed in accordance with the Town's stormwater management bylaw, which was recently amended during the 2021 Annual Town Meeting. The amended provisions incorporate requirements for stormwater recharge, total suspended solids (TSS) removal, and nutrient removal (e.g. phosphorous) in compliance with the Massachusetts MS4 General Permit.
- Formal hydraulic/hydrologic analysis shall be conducted in accordance with Town, State, and industry guidelines and requirements to evaluate existing conditions and proposed conditions under design storm conditions for the 2, 5, 10, 25, and 100-year storm events.
- Site subsurface investigations should be performed to evaluate existing soil conditions for suitability for stormwater recharge and infiltration.
- The project proponent should coordinate with the Town's Planning and Zoning Department and Board of Health to confirm stormwater permitting requirements for the project.
- The proposed stormwater management design should include considerations for long-term operation and maintenance of BMPs, winter road maintenance, and snow storage.

Attachments:

Medfield State Hospital Strategic Reuse Preliminary Utilities and Infrastructure Memo (VHB, Inc., May 20, 2022)