
To: Mr. Charles Dam, PE, Director of Public Works
Mr. Nate Desrosiers, PE, Town Engineer and Facilities Manager
Manchester-by-Sea Department of Public Works

Cc: Tony Omobono, PE, Officer in Charge

From: Chris Koehler, PE, Client Manager
Bob Parsons, PE, Senior Project Manager

Date: December 5, 2022

Subject: Final Department of Public Works Facility Site Options Review

EXECUTIVE SUMMARY

In the Fall of 2021, the Town of Manchester-by-the-Sea (MBTS) engaged Tetra Tech Inc. (Tetra Tech) to assist in developing a conceptual strategy and design to optimize the Department of Public Works (DPW) operations by evaluating the potential improvement and/or redevelopment of two (2) town-owned properties. One property is the existing compost facility located at 197 School Street and currently operated by Black Earth Composting. The second property is the existing DPW Facility located at 85R Pleasant Street. In addition to evaluating these properties for improvements, Tetra Tech was tasked to consider and evaluate renewable energy sources, specifically solar energy.

Tetra Tech developed this conceptual plan and layout in conjunction with a review of spatial limitations, permit implications, and constructability challenges. Based on our early findings, it became evident that the most practical solution was to focus relocating the existing DPW facility to the town-owned property on School Street. While the existing DPW Facility located on Pleasant Street is a large town-owned property, only about half (3-acres) of the lots 6.97-acres is readily available for development due to its steep and rocky terrain or its proximity to resource areas. The added expense of coordinating the redevelopment of this property while DPW continues its operations, is not ideal. It is also a legacy project located in what is now a residential neighborhood (Zone B). The current zoning does not support this type of construction or operation.

The School Street site is also far from ideal, but it does have some distinct advantages. The location is ¼ mile north of the Exit 50 interchange off Rt 128. Traffic to and from a new DPW facility will be less disruptive to the surrounding community. The site is made up of three town-own parcels totaling +/- 7.23-acres, zoned Limited Commercial District (LCD) which is better suited for a DPW Facility. The site has no residential abutters and there is a large buffer from existing commercial abutters. Like the Pleasant Street location, the site is steep and rocky, but there is a plateau area of about 2.75-acres that can be developed. The access road to the plateau is steep, nearly a 10% grade, which may need to be addressed/reduced.

The School Street site is currently occupied by Black Earth Compost, a local composting operation. There are no permanent structures on the site except for a Sprint PCS cell tower on the southern side of the plateau. Black Earth has agreed to relocate its operation to the former Manchester landfill site and take over the existing transfer station operation.

The intent of this report is to:

- 1) Review the existing DPW Facility infrastructure
- 2) Develop a list of needs and assumptions for a new facility
- 3) Present and describe a conceptual layout of a new DPW Facility
- 4) Discuss environmental and regulatory requirements
- 5) Explore solar and wind options
- 6) Present an opinion of probable construction cost
- 7) Provide recommendations regarding a future DPW facility

Tetra Tech developed conceptual designs for both the Pleasant Street and School Street town-owned parcels. Both conceptual designs capture as much of the “wish list” developed by the DPW. It should be noted that the wish list is consistent with modern standards for DPW facilities. The least disruptive option will be to continue to use the existing Pleasant Street DPW facility as a new facility is designed, bid, and constructed at the School Street site.

As a next step, Tetra Tech recommends investigating the School Street site further by initiating a site survey and a geotechnical investigation. These steps should follow the relocation of the composting operation in which Black Earth should remove all compost, waste, and non-native soils returning the property to the Town in a similar condition to which they accepted it 6-years ago.

EXISTING DPW FACILITY OPERATIONS AND DESIGN CRITERIA ASSUMPTIONS

The following DPW Maintenance/Storage planning options were developed Fall 2021-Spring 2022. This compilation is provided for Town’s review and use. Square footages (SF) are program space only and additional area would need to be added for internal corridors, mechanical spaces to finalize. If the Town proceeds with an associated Capital Project, additional development will be needed for specific program, schedule, and budgets (construction, contingencies, and incidentals appropriate to the current market).

2022 Town of Manchester-By-The-Sea Department of Public Works info:

Fleet:

• SUV	1
• Pickups	5
• Dump Trucks	6
• Front-End Loader	1
• Excavator (mini)	1
• Backhoe/Loader	1
• <u>Sidewalk Snowplow (AMT)</u>	<u>2</u>
TOTAL	17

Personnel:

• Admin	4	DPW Director; DPW Asst; Town Engineer; PT Water Clerk
• Highway	7	Foreman; Mech; 5 Laborers/Equipment Operators
• <u>FT Staff - Water</u>	<u>3</u>	Water Foreman; 2 Water Assistants/Labor
TOTAL	14	
• <u>Seasonal - DPW</u>	<u>0-5</u>	Varies by season

Existing DPW Facility – 85 Pleasant Street

The property located at 85 Pleasant Street consists of one (1) parcel with an overall size of approximately 6.97 Acres. Currently the Pleasant Street site is occupied by the MBTS Department of Public Works including the Water Division.

One (1) Parcels

58 0 55

- Noted Owner – Town of Manchester-By-The-Sea
- 6.97 Acres
- District B – Single Residence
- Zone III Water Resource Protection District



Zoning Map



Aerial View – Looking East

Existing Highway Garage

- Size: Approximately 6,900 SF
- General Use
 - DPW (5,700 ± SF)
 - Vehicle maintenance shop with two (2) vehicle lifts
 - Three (3) bay garage
 - office / breakroom / bathroom
 - equipment storage
 - office (mezzanine)
 - Water Division (1,200 ± sqft) (Building Addition)
 - parts maintenance shop
 - equipment / parts storage (ground level and mezzanine)
 - vehicle garage
- Construction:
 - Main DPW portion of building - block walls internal steel columns, with an EPDM over steel truss roof
 - Water Maintenance – timber frame, T1-11 siding, with an EPDM over wood truss roof
 - Concrete floor
- Available Utility Services:

- Natural Gas: Yes – Municipal
- Electric: Yes – Municipal
 - Small (16kW) natural gas generator located on north side of building
- Water: Yes – Municipal
- Sanitary Sewer: Yes – Municipal



Maintenance Garage – Aerial View



Maintenance Garage – Front (east)



Maintenance Garage – Rear (west)



Maintenance Garage – Front (east)

Main Portion of Building (DPW)
 Three (3) overhead doors
 One (1) access door



Maintenance Garage – Rear (west)

Main Portion of Building (DPW)
 Two (2) overhead doors (10-ft tall & 14-ft tall):
 One (1) access door

Water Department (left side)
 One (1) overhead door (12-ft tall)

Salt/Sand Storage Building

- Size: Approximately 2,750 SF (40' x 60')
- General Use
 - Cold storage of bulk sand and salt for winter road maintenance
- Construction:
 - Timber frame, T1-11 wood siding, with a corrugated metal roof
 - Concrete floor
 - Sliding doors on west side of building.
- Utility Services:
 - Natural Gas: No
 - Electrical: Yes – Municipal
 - Limited to lighting and convenience outlets
 - Water: No
 - Sanitary Sewer: No



Salt Shed – Aerial View



Salt Shed (west side)



Salt Shed (east side)



Salt Shed (front)



Salt Shed (interior)

Storage Garage “Honey Shed”

- Size: Approximately 1,000 SF (25' x 35')
- General Use
 - Cold storage of materials.
- Construction: timber frame, cedar shake, with an asphalt shingle roof
- Utilities
 - Electric – Yes
 - Water – Available nearby
 - Gas -Yes
 - Sewer - No



Honey Shed – Aerial View



Honey Shed (front – looking north)



Honey Shed (east/front side)



Honey Shed (west/rear side) (fuel island lower right)

Fuel Island

- Above ground fuel storage
 - Tank No. 1: Gasoline – Storage Volume: 2,000 Gallons (Not in service)
 - Tank No. 2: Diesel – Storage Volume: 2,000 Gallons (Not in service)
- Fuel management system - (Reference Service Manual)



Fuel Island (looking south)

Former DPW Structures

Storage Building No. 1 – Demolished 2014

- Size: Approximately 3,000 SF
- Former Location: northeast of main maintenance building.
- General Use
 - Vehicle / Equipment cold storage.
- Construction: Timber frame with asphalt shingle roof



Historic Aerial Image – Former Storage Building

Storage Building No. 2 – Demolished 2018

- Size: Approximately 1,400 SF
- Former Location: northeast of main maintenance building.
- General Use
 - Vehicle / Equipment cold storage.
- Construction: Timber frame with asphalt shingle roof



Historic Aerial Image – Former Storage Building

EXISTING DPW FACILITY NEEDS

Tetra Tech visited the DPW Facility several times to meet with DPW and other personnel and tour the facility. Based on our conversations the following improvements were identified:

- The Maintenance Garage building is in need a complete renovation or replacement. The building envelope is antiquated and inefficient as compared to modern construction including siding, masonry, foundation, flooring, space, heating/ventilation/cooling (HVAC), insulation, electrical and lighting systems, fire alarm, security, etc.
- Create a separation between the garage bays and the administrative areas, i.e., separate entrances to the garage areas and the administrative areas/locker rooms and break area.
- Maintain two large lifts (large enough for the largest dump truck). Currently, there a new lift and a 5-year-old lift. These may be relocated to a new facility.
- The functionality of the building needs to expand to include:
 - Secure parts storage
 - Locker/break facilities
 - Administrative Offices
 - Two (2) large vehicle work bays including DOT lifts
 - Wash-bay (with water reclamation system).
 - Equipment maintenance bay.
- The existing Salt/Sand Storage Building is nearing its functional life.
- Additional covered/indoor vehicle storage (pick-up trucks; smaller vehicles; and landscaping equipment).

PROGRAM/SPACES FOR NEW OR RENOVATED DPW FACILITY (WISH LIST)

- Admin and Maintenance Shop: **~15,000 SF**
 - Maintenance:
 - Four (4) maintenance bays
 - Two (2) bays large enough to allow maintenance on two (2) 10-wheel dump trucks (DPW) with lifts
 - Assume 18' clear span from floor to bottom of ceiling rafters or equipment/fans.
 - One large lift in each bay
 - One (1) bay sized for a heavy-duty pick-up (DPW)
 - One (1) Vehicle Wash Bay (Drive Through) (Shared)
 - Interior Vehicle Parking / Storage – four (4) vehicles
 - Office for Senior Mechanic
 - Parts Storage
 - Vehicle maintenance equipment (20' x 20')
 - Other considerations
 - Air Compressor
 - Oil / Grease storage and delivery
 - Waste Oil and Grease Storage
 - Tool Chests
 - Tire Storage Racks
 - Water Department:
 - Material Storage (20' x 25')
 - Parts Storage (15' x 10')
 - Water Meter Pressure Testing equipment (10' x 10')
 - Misc. Equipment

- Administration
 - Building Facilities Space
 - Storage for general building maintenance and building care and custodial supplies
 - Break Room / Meeting Room / Training Room
 - Provide enough room to comfortably accommodate 25 people.
 - Include food prep / kitchen
 - Include technology for training / communication.
 - Office Space:
 - Three (3) offices
 - Town Engineer
 - Public Works Director
 - Highway Foreman
 - One (1) Work Area (cubes) – support staff and admin (2 people)
 - One (1) office for Water Department (2 people)
 - Office Storage
 - Technology / servers
 - Archives
 - General office supply storage
 - Bathrooms / Locker Rooms
 - Provide two (2) bathrooms with shower and changing space
 - Two (2) (M/F) Admin/Public single fixture bathrooms
 - Provide space for staff lockers (Assume 20 Lockers)
 - General Requirements
 - ADA Compliant
 - Back-up generators
 - Aesthetic
 - Upgraded exterior on public facing entrance at office.
 - Modern exterior with neutral colors.
 - Maintenance/office space should not be visible from Street.
 - Design Life – 50 to 75 Years
 - Design for a salt rich environment
 - Building could be used for emergency management during emergency events

Covered Cold Storage

Water Department maintenance/vehicle storage: **~1,500 SF** for 1 large work vehicle and material storage.

- Included in Maintenance Garage
- Parks / Cemetery Maintenance Equipment Storage (30' x 40'): **~1,200 SF**
- Storage for maintenance equipment including:
 - Lawn mowers
 - Hand tools
- Covered Vehicle Storage (30' x 150'): **~4,500 SF** for up 12 full size dump trucks and other comparable size vehicles.
 - Cold Storage
 - Specific (Assumed three (3) sided building with concrete floor
 - Assumes that this spaced does not need to be heated, but will enclosed using Garage Doors (Sliders or Roll-ups)
 - Two (2) bays tracker/sidewalk plow/snow blower storage
 - Eight (8) bays for dump trucks/plows vehicles
 - One (1) bay for street sweeping attachments/equipment

- One (1) bay for response boat
- Other Items spatial considerations
 - Skiff boat
 - Miscellaneous equipment
 - Mobile Generator/Air Compressor
 - Erosion control materials
 - Seasonal equipment/materials
- Bulk Salt/Sand Barn (40' x 75'): **~3,000 SF** for bulk storage of general-purpose sand and road salt.
 - 1/3 Salt Storage (~14' x 45') current space available/used (Confirm)
 - 2/3 Sand Storage (~ 26'x 45') current space available/used
 - Code requires capture all salt runoff (see code section for details)
 - Provide interior lighting
 - Provide convenience outlets/electric.
- General Equipment Outdoor Storage (Open to elements/Not Covered):
 - Snowplows – Seventeen (17)
 - Potential storage in front of trucks parked in 30' x 150' cold storage
 - Salter / Spreader Storage Racks – eight (8)
 - Potential to hang from rafters on cold storage or in racks on side of salt shed
 - Trailers
 - Leaf box
- Material Storage Bins (Open to Elements/Not Covered):
 - Bulk Stone – Assume six (6) bays (15' x 35')
 - Granite Curb Storage (30' x 40')
 - Manhole/Catch Basin Storage (30' x 40')
 - Pipe Storage (30' x 50')
 - Road signs and traffic control equipment (30' x 40')
 - Waste / Scrape Metal (30' x 50')
 - Other Material (30' x 50')
- Parking
 - Staff Parking – ±20 Stalls
 - Visitor/Misc. Parking – ±6 Stalls
 - Public/Recreation Parking - ±10 Stalls during workday.
 - ± 4 EV charging stations for public parking stalls (toward entrance as opposed to within facility)
- Fuel Storage Facility:
 - 2,000-gallon gasoline storage tank with dispenser (if possible, relocate from existing facility)
 - 2,000-gallon diesel storage tank with dispenser (if possible, relocate from existing facility)
- Back-up Power / Emergency Power Generator
 - Provide an emergency power generator to allow the facility to function during typical power outages and emergency conditions. Extent of power needed and fuel to be determined.
 - Currently have a 16kW Generac Generator (if possible, relocate from existing facility)
- Future EV Charging for municipal vehicles
 - Provide the ability install future EV Charging facilities for municipal vehicles
- Alternative Energy Options
 - Look for opportunities to generate power on site via Alternative Energy sources such as solar or wind.

REDEVELOPMENT OF EXISTING PLEASANT STREET SITE

Critical Considerations:

Topography
Natural Resource Areas
Residential Abutters
Zoning
Construction phasing challenges
Existing utilities +/- based on updated equipment and code requirements

Site Description

The site is located on a 6.97-acre parcel owned by the Town of Manchester-by-the-Sea of which the northern 4-acres are dominated by woods and steep ledges. The topography of the northern area rises from an elevation of 68 to 127 over approximately 400-feet; a 14.75% grade. It is assumed these steeps are created by rock and ledge which will render those 4-acres undevelopable; leaving approximately 3-acres that are suitable for development.

Natural Resource Areas

According to the Town GIS maps, there are several Natural Resource Areas within the property boundaries or close to the property boundaries that will require various off-sets and buffer zones including the following:

Intermittent Stream

The GIS mapping and the USGS topographic maps both indicate an intermittent stream running from a small pond located on the abutting property to the west. The stream begins at the northwest corner of the lot and bifurcates the Town lot just north of the salt shed and continues east where it eventually connects with a tributary of Sawmill Brook. Intermittent streams are not subject to the Massachusetts River Protection Act, but they are protected under the Wetlands Protection Act because they may be considered streams. Tetra Tech saw no evidence of an intermittent stream crossing the property. However, a wetland delineation was not conducted. The local conservation commission will have authority over the certified vernal pool, the potential vernal pool, the wetlands, and the stream associated with this pond area.

Certified Vernal Pool & Potential Vernal Pool

The Town's GIS mapping indicates a Certified Vernal Pool (CVP) and Potential Vernal Pool located near the abutting properties pond. The Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) protect certified vernal pools and up to 100-feet beyond the pool boundary by preventing alterations which would result in impairment of the wildlife habitat function of the CVP. The local conservation commissions are empowered to prevent the impairment of the capacity of Vernal Pool Habitat to function as wildlife habitat.

Based on Town of Manchester-by-the-Sea Conservation Commission regulations:

The "No Build Zone" includes the area fifty (50) feet horizontally landward of:

- the edge of any salt marsh, freshwater wetland, or vernal pool; or
- the top of coastal bank, or the top of the bank of any stream or river.

The "No Disturb Zone" means the thirty (30) feet horizontally landward of:

- the edge of any salt marsh, freshwater wetland, or vernal pool; or
- the top of coastal bank, or the top of the bank of any stream or river.

Pond

The abutting property to the west has a pond that is approximately 150' long by 75' wide. This pond feeds the intermittent stream that crosses the Town owned lot. It is assumed that this pond is part of the certified vernal pool and state regulated wetlands associated with this area. As such, the entire system will be covered by the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) up to 100-feet beyond the associated vegetative wetland areas by preventing alterations which would result in impairment of the wetlands. The local conservation commissions will be the regulating authority for the pond, CVP and the associated wetlands.

State Wetland/Marsh/Swamp

As indicated above, the Town's GIS mapping shows a State Marsh/Swamp located in the same area as the pond and the CVP. The wetland extends approximately 50-feet east and south on the pond perimeter. The entire system will be covered by the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) up to 100-feet beyond the associated vegetative wetland areas by preventing alterations which would result in impairment of the wetlands. The local conservation commissions will be the regulating authority for the pond, CVP and the associated wetlands.

Zone III Water Resource Protection District

The entire Town owned property is in a Zone III Water Resource Protection District. See more details in Zoning section below.

Residential Abutters

The property is abutted by residential housing to the east, northeast, south and southwest. To the west is a cemetery and to the northwest is vacant land and the municipal water storage tower.

To have residential neighbors in such proximity to DPW operation is a significant drawback to redeveloping this property. Residents are subjected to additional commercial traffic, deliveries, early hours and the occasional weather or emergency all-night operations. The property is in Zone B which does not prohibit non-residential development outright, but it severely curtails what can be constructed and favors residential development. Specifically, car washes and vehicle repair facilities are not permitted in this zone.

Zoning

The existing lot is within both a "Zone III" and a "District B – Single Residence."

District B – Single Residence Districts

In a single Residence District, no building or land shall be used, and no building shall be erected or altered, which is intended or designed to be used for any purpose except one or more of the following:

- A dwelling having not more than one dwelling unit.
- Non-nuisance agricultural, horticultural, and floricultural uses, except those requiring a special permit pursuant to Section 4.1.10(1). [Amended 2007]
- Church and related use.
- Educational use, not conducted for profit.
- The taking of boarders or the leasing of rooms for not more than four (4) persons by a family residing on the premises with common cooking and living facilities, providing there is no sign or display to advertise such use. (But it shall not be permissible to construct or operate overnight camps.)
- Municipal parks, playgrounds and other municipal recreational uses, municipal wells, water storage and processing and sewage lift stations, and related buildings and parking facilities.

- The office of a doctor, dentist or other member of a recognized profession provided there is no display or advertising except for a small professional sign not over one square foot in area.
- Customary home occupations including home-cooking, dressmaking, millinery, hairdressing, and other similar occupations, by a person resident on the premises, provided there is no visible display of goods from the street and no exterior advertising, except an announcement sign of not more than two (2) square feet in area, and provided such occupation shall not be carried on in an accessory building.
- Accessory use on the same lot with and customarily incident to any of the above permitted uses, or to the uses permitted in accordance with the following section 4.1.10, and not detrimental to a residential neighborhood, including specifically the following:
 - As part of an existing garage, stable or other existing structure approved by special permit of the Board of Appeals, family living quarters for and to be occupied only by an employee of the owner occupant of the dwelling while such garage, stable or other existing structure, approved by the Board of Appeals, is an accessory use. Said employee must be employed on the premises. [Amended 1983]
 - The garaging or maintaining on any lot of not more than 1 commercial vehicle.

Any of the following uses, must be authorized by special permit issued by the Zoning Board of Appeals or by the Planning Board (SPGA):

- Private Club, not conducted for profit; Planning Board is the SPGA
- Cemetery, not conducted for profit; Planning Board is the SPGA
- The garaging or maintaining of more than 4 automobiles when accessory to a dwelling; Zoning Board of Appeals is the SPGA
- Charitable or philanthropic use, hospital, sanitarium, nursing, rest, or convalescent home, not conducted for profit, or other similar use; Planning Board is the SPGA
- **Public utility or public communications building not including a service station or outside storage of supplies; Planning Board is the SPGA**
- A permanent swimming pool or a tennis or similar court when accessory to a dwelling; Zoning Board of Appeals is the SPGA
- The offices within a single building for not more than three medical doctors; Zoning Board is the SPGA.
- **Wind energy conversion systems (windmills). Planning Board is the SPGA**
- The raising or keeping of livestock, including poultry, horses, or cows. The Planning board is the SPGA
- Matters (including the construction or alteration of any structure or the use thereof) all or any part of which is within tideland lying below Mean High Water (per U.S. Geodetic Survey) for which an application for a state license under Section 18 of Gen. Laws Chapter 91 is required thereunder to be submitted for comments to the Planning Board. The Planning Board is the SPGA.

Zone III Water Resource Protection District

"Zone III" means that land area beyond the area of Zone II from which surface water and ground water drain into Zone II, as defined in 310 CMR 22.00. The surface drainage area as determined by topography is commonly coincident with the ground water drainage area and will be used to delineate Zone III. In some locations, where surface and ground water drainage are not coincident, Zone III shall consist of both the surface drainage and the ground water drainage areas. The following are prohibited in Zone III:

- All underground storage tanks.
- Automobile graveyards and junkyards, as defined in M.G.L.c.140B, §1.

- Stockpiling and disposal of snow or ice removed from highways and streets located outside Zone II/Zone A that contains sodium chloride, chemically treated abrasives or other chemicals used for snow and ice removal.
- **Storage of sodium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate.**
- **Storage of commercial fertilizers, as defined in M.G.L. c. 128, §64, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate.**
- Storage of animal manures unless such storage is covered or contained in accordance with the specifications of the Natural Resource Conservation Service.
- Residential approval not required (ANR) land divisions and/or subdivisions pursuant to M.G.L. c.41, §§81L, 81P, 81S, and 81U, at a density greater than one dwelling unit per 30,000 SF unless connected to the municipal sewage treatment facility.
- Landfills and open dumps, as defined in 310 CMR 19.006.
- Landfills receiving only wastewater residuals and/or septage approved by the Department pursuant to M.G.L. c.21, §26 –53; M.G.L. c.111, §17; M.G.L. c.83, §6-7, and any regulations promulgated thereunder.
- **Petroleum, fuel oil and heating oil bulk stations and terminals, including, but not limited to, those listed as of January 1, 2002, under Standard Industrial Classification (SIC) Codes 5171 and 5983. SIC Codes are established by the U.S. Office of Management and Budget and may be determined by referring to the publication, “Standard Industrial Classification Manual,” and any subsequent amendments thereto.**
- Treatment or disposal works subject to 314 CMR 5.00 for wastewater other than sanitary sewage. This prohibition includes, but is not limited to, treatment or disposal works related to activities under the Standard Industrial Classification (SIC) Codes set forth in 310 CMR 15.004(6) (Title 5), except the following:
 - the replacement or repair of an existing system(s) that will not result in a design capacity greater than the design capacity of the existing system(s); and Town of Manchester-by-the-Sea Zoning By-Law - Page 84 – Revised: April 2018
 - treatment works approved by the Department designed for the treatment of contaminated ground or surface waters and operated in compliance with 314 CMR 5.05(3) or 5.05 (13); and
 - publicly owned treatment works, or POTWs.
- **Facilities that generate, treat, store or dispose of hazardous waste that are subject to M.G.L. c. 21C and 310 CMR 30.000, except for the following:**
 - very small quantity generators, as defined by 310 CMR 30.00;
 - household hazardous waste collection centers or events operated pursuant to 310 CMR 30.390;
 - waste oil retention facilities required by M.G.L. c. 21, §52A; and
 - treatment works approved by the Department designed in accordance with 314 CMR 5.00 for the treatment of contaminated ground or surface waters.
- Storage of sludge and septage, as defined in 310 CMR 32.05, unless such storage is in compliance with 310 CMR 32.30 and 310 CMR 32.31.
- **Storage of liquid hazardous materials, as defined in M.G.L. c. 21E, and/or liquid petroleum products unless such storage is:**
 - above ground level; and
 - on an impervious surface; and
 - either:
 - (i) in container(s) or above-ground tank(s) within a building, or ii) outdoors in covered container(s) or above-ground tank(s) in an area that has a containment system designed and

operated to hold either 10% of the total possible storage capacity of all containers, or 110% of the largest container's storage capacity, whichever is greater; however, these storage requirements shall not apply to the replacement of existing tanks or systems for the keeping, dispensing or storing of gasoline provided the replacement is performed in a manner consistent with state and local requirements.

- The removal of soil, loam, sand, gravel or any other mineral substances within four (4) feet of the historical high groundwater table elevation (as determined from monitoring wells and historical water table fluctuation data compiled by the United States Geological Survey), unless the substances removed are redeposited within 45 days of removal on site to achieve a final grading greater than four (4) feet above the historical high water mark, and except Town of Manchester-by-the-Sea Zoning By-Law - Page 85 – Revised: April 2018 for excavations for the construction of building foundations or the installation of utility works.
- Land uses that result in the rendering impervious of more than 15% or 2,500 SF of any lot, whichever is greater, unless a system for artificial recharge of precipitation is provided, that is satisfactory to the Planning Board and will not result in the degradation of groundwater quality.
- Commercial outdoor washing of vehicles.
- **Commercial car washes**
- **Motor vehicle repair operations.**
- Solid waste combustion facilities or handling facilities as defined at 310 CMR 16.00.
- Any floor drainage systems in existing facilities, in industrial or commercial process areas or hazardous material and/or hazardous waste storage areas, which discharge to the ground without a department permit or authorization. Any existing facility with such a drainage system shall be required to either seal the floor drain (in accordance with the state plumbing code, 248 CMR 2.00), connect the drain to a municipal sewer system (with all appropriate permits and pre-treatment), or connect the drain to a holding tank meeting the requirements of all appropriate DEP regulations and policies.

From Tetra Tech's review of the Zoning Code, The DPW facility does not meet any of the allowable uses under the District B Code. The Town may argue that the facility falls under "public utility." The Town will need to file a Special Permit Criteria and Decision (SPCD) for salt storage and loading. To meet the Zone III Code, at a minimum the facility will need to store the salt indoors and capture potential runoff from the salt operation (including loading operation). The facility will also likely require a Special Permit Criteria and Decision (SPCD) for the motor vehicle repair and the car wash (although this will be a municipal vehicle wash not a commercial car wash). The Planning Board will be SPGA for these permits.

Tetra Tech recommends that the Town, prior to submitting any applications, arrange a meeting with the Planning Board and Conservation Commission to discuss these Special Permits and the submittal requirements.

Construction Phasing Challenges

Should the Town proceed to redevelop the current DPW Facility, current operation must be maintained throughout the construction process, approximately 18-24 months. This will require the construction of the Administration and Maintenance Garage on the western or northern side of the property. After construction of the main building is completed, demolition of the existing garage, honey shed and salt shed will be required to make room for a new salt shed, covered storage garages, and other storage structures. The Town should give serious consideration to the construction phasing and maintenance of plant operations (MOPO) if the site is to be redeveloped.

Utility Connections

- Sanitary Sewer
 - Sanitary Sewer is available along Pleasant Street.
- Water Service
 - Town water service is available along Pleasant Street.
- Natural Gas
 - National Grid provides natural gas along Pleasant Street.
- Electric
 - National Grid provide three-phase and single-phase electric along Pleasant Street.
- Communication/Fiber
 - Comcast is the Cable TV/Internet provider for the Town of Manchester-by-the-Sea.
 - Fiber Optic Cable is available along Pleasant Street.

Setbacks

DISTRICT	MINIMUM LOT AREA (SQ. FT.)	MINIMUM FRONTAGE	MINIMUM LOT WIDTH	MINIMUM FRONT SETBACK	MINIMUM SIDE SETBACK	MINIMUM REAR SETBACK
District B	15,000	75 ft	60 ft.	20 ft.	15 ft.	20 ft

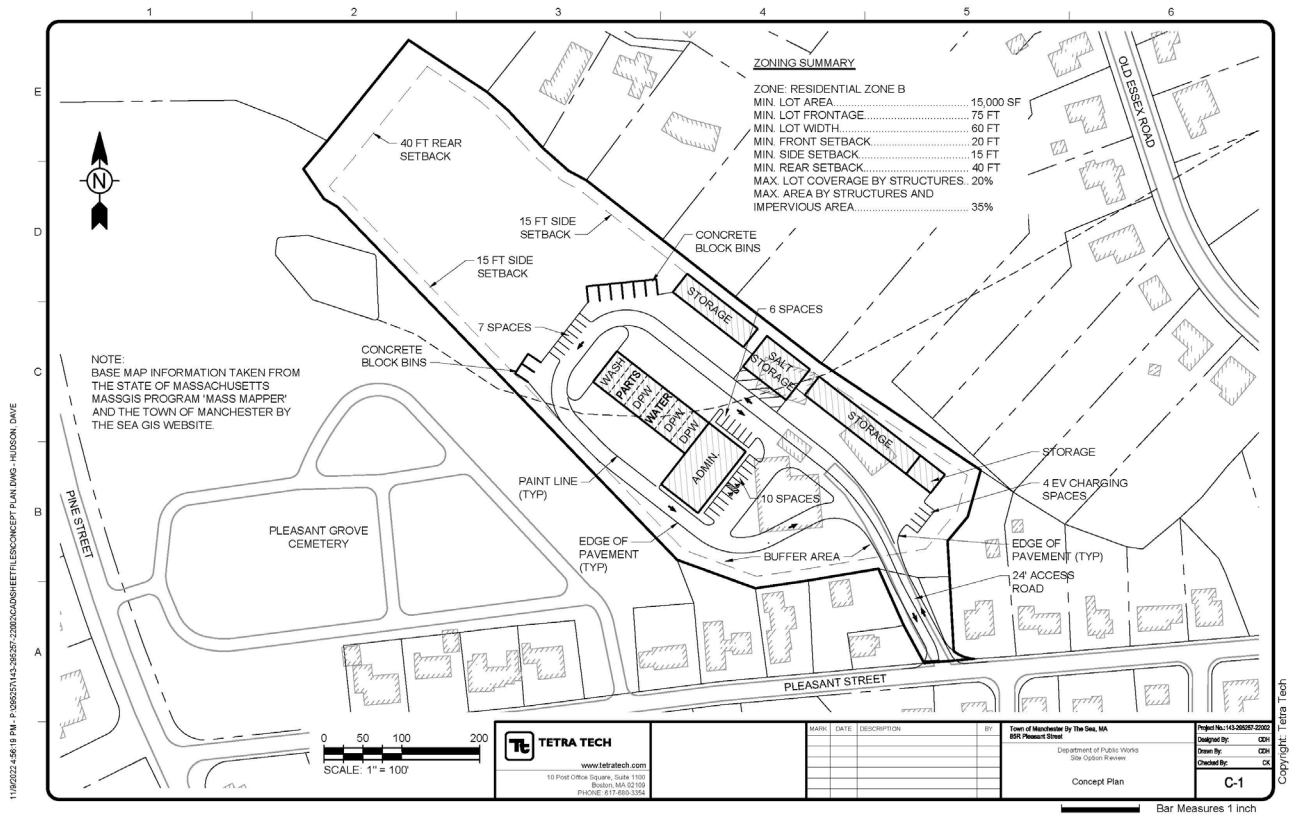
LOT COVERAGE REQUIREMENTS

DISTRICT COVERAGE	BY STRUCTURES	MAXIMUM % LOT BY STRUCTURES AND IMPERVIOUS SURFACES
Single Residence		
District B	20%	35%

Conceptual Layout

Based on conversations with DPW staff, the following major features could be included in this layout.

- DPW Administration and Garage Building: Approximately **15,000 SF** is provided to develop a DPW Facilities that meets current staff office and storage spatial needs, provides for adequate training space, provides maintenance bays large enough for modern truck sizes, and provide essential space for staff and equipment needed for a modern DPW operation.
- A drive-through wash bay is included in this facility layout (**25' x 60'**)
- The DPW Facility described above contains a **~1,500 SF (25 x 60)** garage bay for Water Department maintenance and storage.
- In addition, the Water Department is provided with **~3,000 SF (30' x 70')** of covered cold material/vehicle storage for pipe and equipment.
- DPW will have **~4,500 SF (30' x 150')** of covered cold storage to accommodate 14 dump trucks and salt/sand spreaders and snowplows.
- Parks and Cemetery require **~1,200 SF (30' x 40')** of covered cold storage.
- DPW also is provided with **~3,000 SF ((6) 30' x 20' bins)** and a second **~1,800 SF ((2) 30' x 30' bins)** set of concrete block outdoor storage for pipe, precast concrete structures, cold patch, sand, gravel, and various other materials and equipment that can be subjected to the weather.
- Four (4) EV charging parking spaces at bottom of access driveway just to the right as you enter the site off Pleasant Street.
- At least 23 parking spots are available, including potential parking along the north side of the facility.



Pleasant Street Conceptual Layout

SCHOOL STREET SITE

Critical Considerations:

Relocate the DPW operations from 85 Pleasant St. to 197 School St.

Re-construct existing access road to have less pitch (<10%)

Construct a second access point from Kit Glass Drive to allow a one-way traffic pattern

No Town water or sewer readily available at street

Site Description

The property at 197 School St is located within the Town's "Limited Commercial District" (LCD) Zoning district and is made up of three (3) parcels with an overall size of approximately 7.23 acres, but only approximately 2.67 acres is available for development on the plateau area. The site also falls within the Zone III Water Resource Protection District. Currently the School Street site is occupied by Black Earth Compost, which manages the Town's organic waste program. In addition to Black Earth, the site also hosts a ±125 ft tall telecommunication tower that services multiple mobile telephone providers and antennas for the Town's emergency radio system. The existing tower was permitted and constructed in 1997 and 1998, respectively.

Three (3) Parcels

43 0 21A

- Noted Owner – Town of Manchester-By-The-Sea
- 1.53 Acres

43 0 22

- Noted Owner – Town of Manchester-By-The-Sea
- 2.6 Acres

43 0 25

- Noted Owner – Town of Manchester-By-The-Sea (lease/easement to Sprint PCS)
- 3.1 Acres



Approximate limit available for development

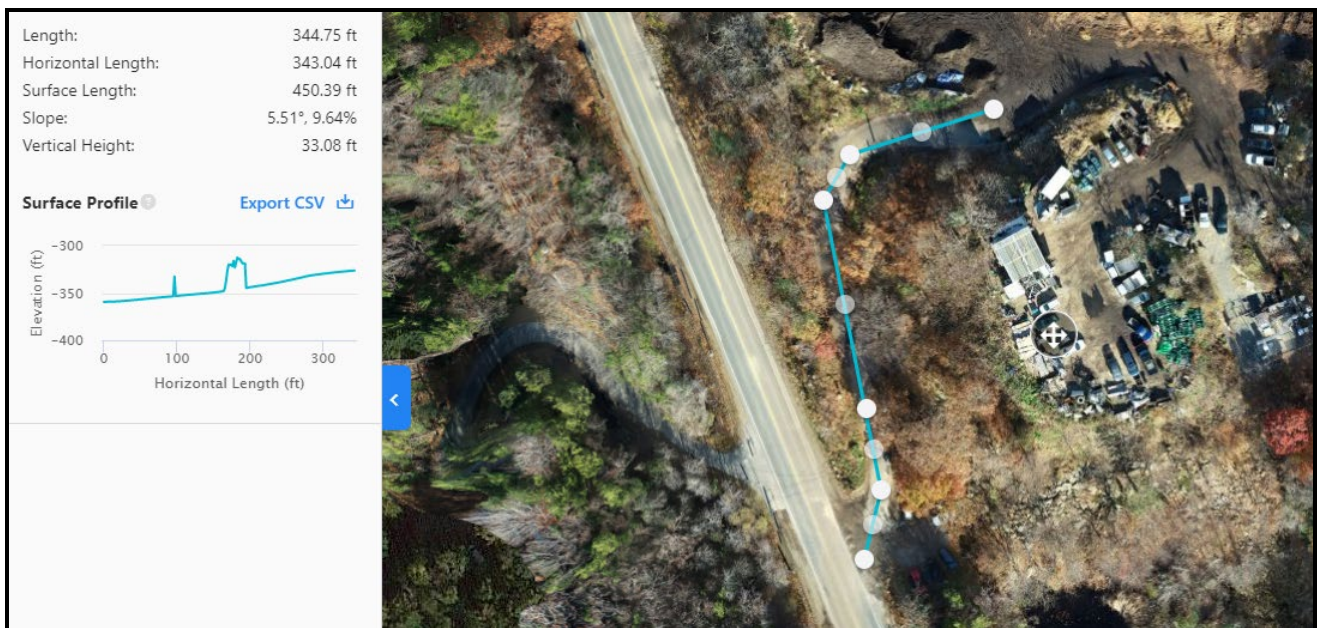
The property is located 0.25 miles north of the Exit 50 interchange from State Route 128 and is bound by School St to the west, Atwater Ave to the north, and Kit Glass Drive to the south and east. Other site

boundaries include wetland and wooded areas to the north, a medical practice to the east, wooded areas followed by State Highway 128 to the south, and wooded areas to the west.

School Street Access Road

The current driveway slope from School Street to the anticipated building elevation is approximately 10%.

- Driveway Length: 400 ft
- Approximate Elevation Change: 35 ft
- Note: It is expected that a driveway intersection with School Street will need to have a slope of 2 to 3 percent to allow for vehicles to access or exit the site without having to negotiate the driveway slope.



Potential Realignment of School Street Access Road

It may be possible to reduce the slope of the School Street access road by extending the driveway north for another 100-feet prior to bending east into the plateau area. This alignment is shown on the Concept Plan.

Natural Resource Areas

According to the Town GIS maps, there are several Natural Resource Areas within the property boundaries or close to the property boundaries that will require various off-sets and buffer zones including:

Certified Vernal Pool

The Town's GIS mapping indicates a Certified Vernal Pool (CVP) is located on the southwest corner of the site. The Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) protect certified vernal pools and up to 100-feet beyond the pool boundary by preventing alterations which would result in impairment of the wildlife habitat function of the CVP. The local conservation commissions are empowered to prevent the impairment of the capacity of Vernal Pool Habitat to function as wildlife habitat.

Based on Town of Manchester-by-the-Sea Conservation Commission regulations:

The "No Build Zone" includes the area fifty (50) feet horizontally landward of:

- the edge of any salt marsh, freshwater wetland, or vernal pool; or
- the top of coastal bank, or the top of the bank of any stream or river.

The “No Disturb Zone” means the thirty (30) feet horizontally landward of:

- the edge of any salt marsh, freshwater wetland, or vernal pool; or
- the top of coastal bank, or the top of the bank of any stream or river.

State Wetland/Marsh/Swamp

The Town’s GIS mapping as well as wetland flags present during Tetra Tech’s site walk indicate State Marsh/Swamp located on the northern side of the property along Atwater Avenue. Across Atwater Avenue is a large wetland area associated with Sawmill Brook. The Sawmill Brook system will be covered by the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) up to 100-feet beyond the associated vegetative wetland areas by preventing alterations which would result in impairment of the wetlands. The local conservation commissions will be the regulating authority for the pond, CVP and the associated wetlands.

Zone III Water Resource Protection District

This zoning will impact the use of the property, particularly requiring any salt stockpiles to be covered and any runoff collected to be treated on-site prior to discharge to the storm drain system. See more in the Zoning section below.

Zoning

The site is zoned Limited Commercial District (LCD). Within a LCD area no building, structure, or land shall be used and no building or structure shall be erected or altered, except for the following uses.

- Business and professional offices and office buildings;
- Recreational club or facilities operated for profit;
- **Municipal use;**
- Any accessory use in an accessory building when completely screened from the abutting streets or lots;
- Large-scale Ground-mounted Solar Photovoltaic Installations.
- By Special Permit from the Planning Board, and limited to the land areas west of Pine Street, a/k/a Pipe Line Road and east of School Street, laboratories and establishments devoted to scientific research and development; light manufacturing, assembly and processing of materials related thereto and incidental accessory uses.
- By special permit from the Planning Board, Medical Marijuana Treatment Centers, as defined by Section 8.3 of the Zoning By-Law.

For all above uses, a SPGA site plan review approval is required from the Planning Board.

Furthermore, LCD zoning requires:

- Each business, defined as a single use under one ownership, shall be located on a parcel of not less than five (5) acres and a minimum width at all points of not less than five hundred (500) feet.
 - This may require the combining of lots
- The structures on the lot shall cover not more than twenty percent (20%) of the area of the lot, and at least twenty-five percent (25%) of the area of the lot shall be of natural or landscaped area. Not more than twenty-five percent (25%) of the area shall be used for parking.
- All structures shall be set back from any street at least one hundred and fifty (150) feet, and from any other lot line at least one hundred (100) feet.

Zone III Water Resource Protection District

“Zone III” means that land area beyond the area of Zone II from which surface water and ground water drain into Zone II, as defined in 310 CMR 22.00. The surface drainage area as determined by topography is commonly coincident with the ground water drainage area and will be used to delineate Zone III. In some locations, where surface and ground water drainage are not coincident, Zone III shall consist of both the surface drainage and the ground water drainage areas.

The following are prohibited in Zone III:

- All underground storage tanks.
- Automobile graveyards and junkyards, as defined in M.G.L.c.140B, §1.
- Stockpiling and disposal of snow or ice removed from highways and streets located outside Zone II/Zone A that contains sodium chloride, chemically treated abrasives or other chemicals used for snow and ice removal.
- **Storage of sodium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate.**
- Storage of commercial fertilizers, as defined in M.G.L. c. 128, §64, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate.
- Storage of animal manures unless such storage is covered or contained in accordance with the specifications of the Natural Resource Conservation Service.
- Residential approval not required (ANR) land divisions and/or subdivisions pursuant to M.G.L. c.41, §§81L, 81P, 81S, and 81U, at a density greater than one dwelling unit per 30,000 SF unless connected to the municipal sewage treatment facility.
- Landfills and open dumps, as defined in 310 CMR 19.006.
- Landfills receiving only wastewater residuals and/or septage approved by the Department pursuant to M.G.L. c.21, §26 –53; M.G.L. c.111, §17; M.G.L. c.83, §6-7, and any regulations promulgated thereunder.
- Petroleum, fuel oil and heating oil bulk stations and terminals, including, but not limited to, those listed as of January 1, 2002, under Standard Industrial Classification (SIC) Codes 5171 and 5983. SIC Codes are established by the U.S. Office of Management and Budget and may be determined by referring to the publication, “Standard Industrial Classification Manual,” and any subsequent amendments thereto.
- Treatment or disposal works subject to 314 CMR 5.00 for wastewater other than sanitary sewage. This prohibition includes, but is not limited to, treatment or disposal works related to activities under the Standard Industrial Classification (SIC) Codes set forth in 310 CMR 15.004(6) (Title 5), except the following:
 - the replacement or repair of an existing system(s) that will not result in a design capacity greater than the design capacity of the existing system(s); and Town of Manchester-by-the-Sea Zoning By-Law - Page 84 – Revised: April 2018
 - treatment works approved by the Department designed for the treatment of contaminated ground or surface waters and operated in compliance with 314 CMR 5.05(3) or 5.05 (13); and
 - publicly owned treatment works, or POTWs.
- **Facilities that generate, treat, store or dispose of hazardous waste that are subject to M.G.L. c. 21C and 310 CMR 30.000, except for the following:**
 - very small quantity generators, as defined by 310 CMR 30.00;
 - household hazardous waste collection centers or events operated pursuant to 310 CMR 30.390;
 - waste oil retention facilities required by M.G.L. c. 21, §52A; and

- treatment works approved by the Department designed in accordance with 314 CMR 5.00 for the treatment of contaminated ground or surface waters.
- Storage of sludge and septage, as defined in 310 CMR 32.05, unless such storage is in compliance with 310 CMR 32.30 and 310 CMR 32.31.
- **Storage of liquid hazardous materials, as defined in M.G.L. c. 21E, and/or liquid petroleum products unless such storage is:**
 - above ground level; and
 - on an impervious surface; and
 - either:
 - (i) in container(s) or above-ground tank(s) within a building, or ii) outdoors in covered container(s) or above-ground tank(s) in an area that has a containment system designed and operated to hold either 10% of the total possible storage capacity of all containers, or 110% of the largest container's storage capacity, whichever is greater; however, these storage requirements shall not apply to the replacement of existing tanks or systems for the keeping, dispensing or storing of gasoline provided the replacement is performed in a manner consistent with state and local requirements.
- The removal of soil, loam, sand, gravel or any other mineral substances within four (4) feet of the historical high groundwater table elevation (as determined from monitoring wells and historical water table fluctuation data compiled by the United States Geological Survey), unless the substances removed are redeposited within 45 days of removal on site to achieve a final grading greater than four (4) feet above the historical high water mark, and except Town of Manchester-by-the-Sea Zoning By-Law - Page 85 – Revised: April 2018 for excavations for the construction of building foundations or the installation of utility works.
- Land uses that result in the rendering impervious of more than 15% or 2,500 SF of any lot, whichever is greater, unless a system for artificial recharge of precipitation is provided that is satisfactory to the Planning Board and will not result in the degradation of groundwater quality.
- Commercial outdoor washing of vehicles.
- **Commercial car washes**
- **Motor vehicle repair operations.**
- Solid waste combustion facilities or handling facilities as defined at 310 CMR 16.00.
- Any floor drainage systems in existing facilities, in industrial or commercial process areas or hazardous material and/or hazardous waste storage areas, which discharge to the ground without a department permit or authorization. Any existing facility with such a drainage system shall be required to either seal the floor drain (in accordance with the state plumbing code, 248 CMR 2.00), connect the drain to a municipal sewer system (with all appropriate permits and pre-treatment), or connect the drain to a holding tank meeting the requirements of all appropriate DEP regulations and policies.

From Tetra Tech's review of the Zoning Code, The DPW facility does not meet any of the allowable uses under the District B Code. The Town may argue that the facility falls under "public utility." The Town will need to file a Special Permit Criteria and Decision (SPCD) for salt storage and loading. To meet the Zone III Code, at a minimum the facility will need to store the salt indoors and capture potential runoff from the salt operation (including loading operation). The facility will also likely require a Special Permit Criteria and Decision (SPCD) for the motor vehicle repair and the car wash (although this will be a municipal vehicle wash not a commercial car wash). The Planning Board will be SPGA for these permits.

Tetra Tech recommends that the Town, prior to submitting any applications, arrange a meeting with the Planning Board to discuss these Special Permits and the submittal requirements.

Abutting Properties

Abutting properties include Utopia Farms to the northwest across Atwater Avenue and the Sawmill Brook Wetland system to the north and northeast, also across Atwater Avenue. To the east and south is Gurley Eye Care Associates, an ophthalmology practice. To the west, across School Street are three (3) privately owned parcels including a 23.72-acre lot owned by Andrew Brown; a 2.6 acre lot owned by Vista De Lomas, LLC; and a 1.1-acre lot owned by Connolly Bros. Inc. All three lots are zoned LCD.

Construction Phase Challenges

The development of this site will allow DPW to continue operations at the Pleasant Street site during the 18 to 24-month construction phase. However, there are still construction challenges. First, the site access road is relatively steep at approximately 10 percent, this will need to be kept plowed and salted during the winter months. Also, the subsurface conditions are currently unknown, but based on visual inspection, they are expected to be dominated by boulder and rock. The foundations for the garage and administration areas may be difficult to excavate and may require blasting and/or crushing. However, the contractor will have the entire plateau area to stage their work. Overall, this site appears to have less construction and MOPO issues than the Pleasant Street site.

Utility Connections

- Sanitary Sewer
 - The closest 6" gravity sewer connection is located ½-mile south on School Street.
 - If it is not possible to connect to the gravity sewer, either via gravity or force main, an on-site Title 5 septic system will be designed and installed.
 - It should be noted that there is a 24" RCP sleeve already installed under Rt. 128 starting south of the Manchester Athletic Club and extending to just north of Mill Street. This sleeve could be used to facility a gravity sewer or a force main. However, there is no sewer connection point on Mill Street so once across Rt 128, any system would need to be installed in Mill Street going west to School Street where the previously mentioned gravity sewer is located. This route is approximately 2,500 linear feet (LF) from the proposed DPW building.
- Water Service
 - Either a well will need to be drilled to provide water for the facility; or
 - Water service can be provided by extending the existing 8" polyethylene water main that extends north from Mill Street and crosses Route 128 and terminates at a fire hydrant just east of the Manchester Athletic Club. The Manchester Athletic Club is served by a 2" polyethylene water service. The Town could extend the 8" water main north up Gentlees Road to Atwater Avenue, then continue northwest up Atwater Avenue to Kit Glass Drive, turn south on Kit Glass Drive and feed the site via a new access road to the proposed DPW building. This would be about a 1,200 linear foot extension.
- Natural Gas
 - There is natural gas available along School Street.
- Electric
 - NSTAR/National Grid provide three-phase and single-phase electric along School Street and Kit Glass Drive.
- Communication/Fiber
 - Existing Fiber that connects into the municipal fiber ring.
 - 12 strand fiber that runs to the emergency radio antenna on the cell tower.
 - Comcast is the Cable TV/Internet provider for the Town of Manchester-by-the-Sea.

Setbacks

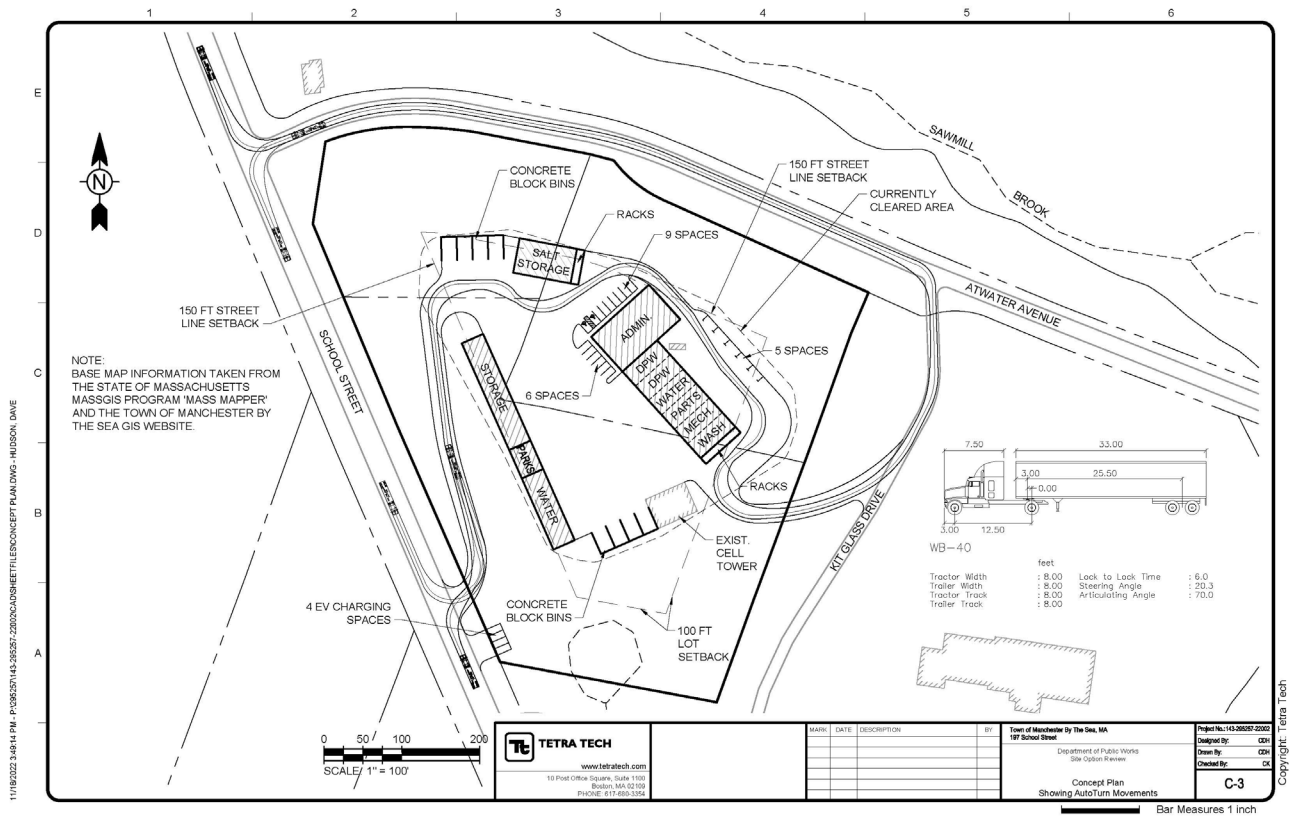
DISTRICT	MINIMUM LOT AREA (SQ. FT.)	MINIMUM FRONTAGE	MINIMUM LOT WIDTH	MINIMUM SETBACK FROM STREET	MINIMUM SETBACK FROM LOT LINE
District LCD	5-acres	N/A	Currently 500 ft. (Being Updated)	150 ft.	100 ft.

LOT COVERAGE REQUIREMENTS DISTRICT COVERAGE	MAXIMUM % LOT BY STRUCTURES	MINIMUM % LOT NATURAL OR LANDSCAPE	MAXIMUM % LOT FOR PARKING
Single Residence District LCD	25%	25%	25%

Conceptual Layout – School Street

Based on conversations with DPW staff, the following major features could be included in this layout.

- DPW Administration and Garage Building: Approximately **15,000 SF** is provided to bring the develop a DPW Facilities that meets current staff office and storage spatial needs, provides for adequate training space, provides maintenance bays large enough for modern truck sizes, and provide essential space for staff and equipment needed for a modern DPW operation.
- A drive-through wash bay is included in this facility layout (**25' x 60'**)
- The DPW Facility described above contains a **~1,500 SF (25 x 60)** garage bay for Water Department maintenance and storage.
- In addition, the Water Department is provided with **~3,000 SF (30' x 100')** of covered cold material/vehicle storage for pipe and equipment.
- DPW will have **~4,500 SF (30' x 150')** of covered cold storage to accommodate 14 full size pickups and other vehicles.
- Parks and Cemetery require **~1,200 SF (30' x 40')** of covered cold storage for their needs.
- DPW also requires **~2,400 SF ((4) 30' x 20' bins)** and a second **~1,800 SF ((3) 30' x 20' bins)** of outdoor storage for salt/sand spreaders, snowplows, pipe, precast concrete structures, cold patch, sand, gravel, and various other materials and equipment that can be subjected to the weather.
- Four (4) EV charging parking spaces at bottom of access driveway along School Street.
- At least 20 parking spots are available, including potential parking along the northeast side behind the garage.
- A **variance from the 150-foot street setback** will be required to develop the property as drawn in the Conceptual Design below.



SUSTAINABILITY INITIATIVES

Solar Energy Potential

Tetra Tech conducted a high-level estimate of the solar energy potential using the National Renewable Energy Laboratory (NREL) website. The solar energy potential of a 15,000 SF Administration and Garage building was estimated using the websites geographic information system (GIS). The roof area was estimated using drawing tools on the GIS website. The input used latitude and longitude (42.57N; 70.78W); building size (1,392 m²); angle of roof (5.7 degrees or 1/10); orientation of building (east-southeast at approximately ~125 degrees); array type (fixed); a standard module type; system losses of 14.08%; and a 1.4 DC to AC size ratio to estimate a **225.8 kW** system can be installed on the 15,000 SF roof. The results show that a PV solar array can be installed to generate an estimated **247,173 kWh/year**.

PV energy efficiency can be improved as the design progresses by considering architectural designs, shade, local topography, building orientation, and roof angles. A PV systems is a good fit for this project as it will be installed on new roof of significant size, much of the power generated can be used by the facility itself, locating PV arrays on the roof (as opposed to on the ground) decreases the connection wiring to the facility and/or to the grid, PV will require no additional land purchases or clearing as the building is already planned; and they are less visible than wind energy technologies, therefore more aesthetically acceptable.

This estimate was conducted for the School Street site, but it is assumed that the estimate will be similar to any estimate for the Pleasant Street site as the location and structures are nearly the same. Tetra Tech assumes that either positive utility interconnection options are available at each site or within a financially acceptable range.

Geothermal Energy

Tetra Tech discussed the project with Glen Fitzpatrick of Geothermal Drilling of New England (Lowell, MA). The first step is typically to drill two (2) “test holes” anywhere from 500’ - 800’ below ground surface. It should be noted that encountering bedrock is a good thing for geothermal wells. Once the hole is drilled a “pipe loop” is installed. Once the well is set up with a loop, the second step is to conduct geothermal conductivity test. During this test, glycol from the well loop is extracted and heated to a specific temperature then injected back into the loop. As the heated glycol passes through the well loop it is cooled by the groundwater. The temperature of the glycol is measured again upon returning from the well loop. This process continues, increasing the temperature of the supply (heated) glycol over time and recording the temperature of the return glycol. From the temperature data, a geothermal heat capacity curve can be generated, and the data can be used to size the well field and the heating/cooling system for the intended use.

The cost of this geothermal drilling and geothermic testing is estimated between \$50,000 and \$100,000 depending on the number and depth of the test hole(s).

In the Northeast, geothermal is typically used for cooling. However, in this application it may be best utilized as radiant floor heating to keep the temperature of the garage slab constant at about 50 degrees to prevent ice from forming in the winter and provide cooling in the summer.

Wind Energy

Wind energy was discussed as an alternative for renewable energy. However, during the zoning review it was discovered that the property boundary offsets for wind energy are equal to the height of the wind turbine itself. The initial guidance for wind turbines is that the smallest turbine should be tall enough for the bottom edge of the turbine blades to be at least 30-feet above the tallest obstacle within 500-feet. At the School Street site, the plateau area is small enough that installing a wind turbine may be an obstacle to the operation. At the Pleasant Street site, the hill to the north (water tower property) and the residential nature of the surrounding neighborhood. These factors lead us to believe that solar or geothermal a better choice for renewable energy at this site.

That said, the wind turbine industry continues to evolve and new products for building mounted vertical turbines and smaller bladed traditional turbines are coming onto the market at a rapid pace. Tetra Tech will continue to look at these innovative products as they present themselves.

Traditional Efficiencies and Net Zero Construction Considerations

In addition to the solar, geothermal and wind energy evaluations, Tetra Tech suggests a design that considers the more traditional building efficiencies including, but not limited to:

- 1) Building Envelope
 - a. R36 insulation for roof;
 - b. Cold roof;
 - c. Green roof;
 - d. Attic ventilation;
 - e. External thermal insulation composite wall system;
 - f. Ventilated façade;
- 2) Windows
 - a. Double glazing/potentially triple glazing on north windows;

- b. Natural lighting and daylighting;
 - c. Window access;
 - d. Operatable windows;
- 3) HVAC Systems
 - a. Mixed Mode HVAC Conditioning;
 - b. Optimal temperature regulation by users;
 - c. Day/night settings;
 - d. Natural ventilation;
 - e. Energy Star high-efficiency boilers and furnaces;
 - f. SEER rating > 14.5 air conditioning;
 - g. Energy Star rated appliances and electronics;
- 4) Lights
 - a. LED Light fixtures;
 - b. Manual on, Auto off switches;
 - c. Motion detection switches;
- 5) Minimum percentage of recycled building materials;
- 6) Potential solar hot water heater (radiant floor heating/freeze prevention in garage bays);
- 7) Overall management and monitoring of all critical energy systems;

OPINION OF PROBABLE CONSTRUCTION COST

Tetra Tech has provided a parametric opinion of probable construction cost using AACE International Recommended Practices for a Class 4 estimate. As is the case in Manchester-by-the-Sea, Class 4 estimates are prepared based on limited information and subsequently have wide accuracy ranges. The estimate has an expected accuracy range of -15% to -30% on the low side and +20% to +50 on the high side. This estimate should be used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval.

The estimate utilizes recent construction bids for similar facilities in New England (Rockport, MA and Johnston, RI) and uses a contingency of +30% to account for high volatility and supply chain issues surrounding material and equipment and the erratic inflation estimates in today's market. In addition to supply chain issue and inflation, steel building suppliers are currently not providing firm prices to contractors bidding buildings as prices for steel are too variable. The time of bid to the time of delivery can be as much as 12 months (3-4 months of contractor submittals followed by 8-9 months lead time). Building suppliers are not willing to take on the risk of steel price fluctuation. As such, to help reduce the risk to the contractor, many bid forms are now including an adjustment class unit bid item specifically for steel buildings. For example, the contractor will provide a lump sum price on the building along with an adjustment class unit bid item that would transfer any increase or decrease in price of the building to the owner. Therefore, the owner accepts the risk if the price of steel fluctuates during the submittal, manufacturing, and delivery phases.

Preliminary Parametric Opinion of Probable Construction Cost

Item	Item Description	Unit Estimated Cost
1	Mob & Demob (includes required bonds)	\$588,458.87
2	Civil/Site Work	\$905,002.13
3	Foundation	\$1,135,079.34
4	Admin and Garage Building	\$3,480,172.99
5	Masonry*	\$333,236.81
6	Misc. Metal*	\$237,172.96
7	Waterproofing*	\$121,218.28
8	Roofing and Flashing*	\$55,169.71
9	Painting*	\$454,951.75
10	Fire Suppression*	\$182,727.33
11	Plumbing*	\$452,139.29
12	HVAC*	\$1,095,945.00
13	Electrical*	\$904,319.67
14	IT/Communications	\$31,701.95
15	Electrical Generator Installation	\$21,769.58
16	Fuel Island Installation	\$577,880.22
17	Wash Bay	\$162,319.41
Filed Sub-Bid Subtotal		\$3,836,880.82
General Contractor Subtotal		\$6,902,384.49
CONSTRUCTION SUBTOTAL		\$10,739,265.31
Construction Contingency @30%		\$3,221,779.59
CONSTRUCTION TOTAL		\$13,961,044.90
Remaining Inflation through 2022 @ 4.5%		\$628,247.02
2023 @ 7%		\$1,021,250.43
2024 @ 5%		\$780,527.12
2025 @ 3%		\$491,732.08
CONSTRUCTION TOTAL AT MIDPOINT OF CONSTRUCTION		\$16,882,801.55
Design and Permitting at 15%		\$2,532,420.23
Construction Oversight at 15%		\$2,532,420.23
ENGINEERING SUBTOTAL		\$5,064,840.47
TOTAL PROJECT COST		\$21,947,642.02

*Filed Sub-bids Required

RECOMMENDATIONS

Tetra Tech has developed the following recommendations based upon the review of the two (2) available town-owned parcels, zoning, and overall potential for development. Should the Town elect to proceed with a new DPW facility consider the following:

- 1) Tetra Tech's opinion is the School Street site provides several benefits that the Pleasant Street site does not including being in close proximity of Rt 128, having no residential abutters, and being zoned LCD.

- 2) Should the DPW decide to proceed with the School Street Site, after Black Earth relocates, the DPW should arrange for a topographic survey of the entire site and a geotechnical investigation of the plateau area.
- 3) Consider contacting a geothermal driller to drill “test holes” and conduct a geothermic conductivity test to determine the capacity of the subsurface to support a geothermal heating and cooling system.
- 4) Meet with the Planning Board to discuss the project and hear any concerns they might have so they may be addressed early in the process.
- 5) Meet with the Conservation Commission to discuss the project and hear any concerns they might have so they may be addressed early in the process.