

Figure 2. Clark Lane, Waterford, CT.  
Site vicinity and proposed activities.  
Base map is a CTECO summer aerial

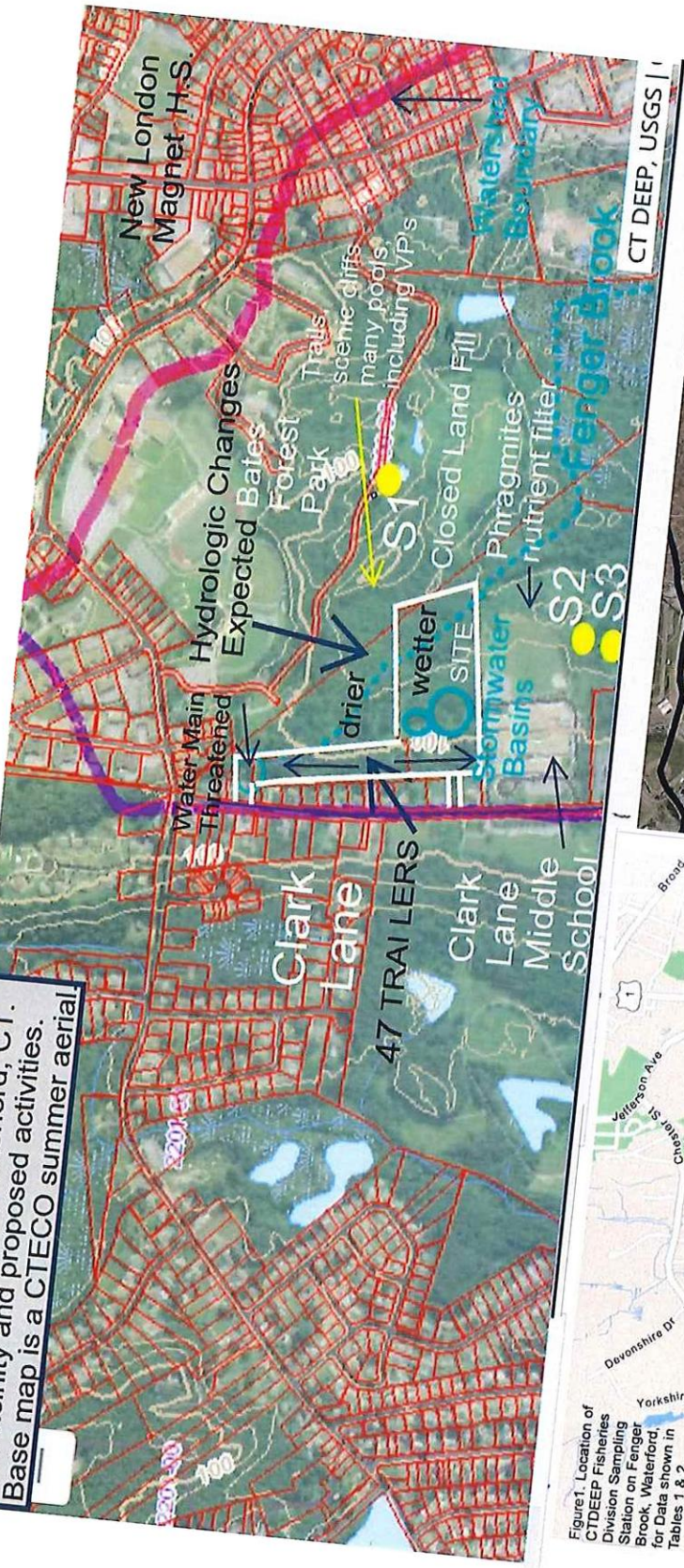
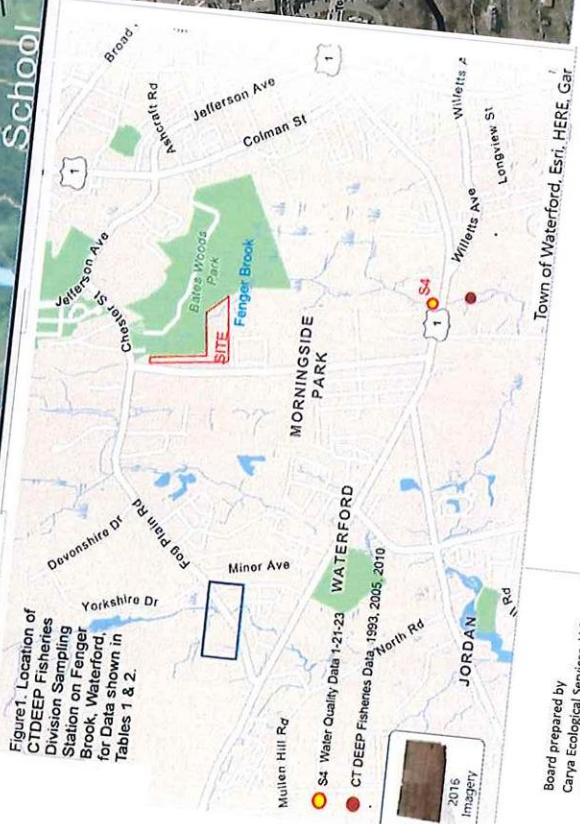


Figure 1. Location of CTDEEP Fisheries Division Sampling Station on Fenner Brook, Waterford, for Data shown in Tables 1 & 2.



Board prepared by  
Carya Ecological Services, LLC  
Cheshire, CT 1-24-23



PROPOSED WATERSHED MAP  
PREPARED FOR  
KINGSTOWN PROPERTIES LLC  
PROPOSED AFFORDABLE HOUSING DEVELOPMENT  
CLARK LANE  
WATERFORD, CONNECTICUT  
SCALE 1" = 300'  
DATE 5/27/2023  
DRAWN BY: JCH

Provost & Doyero, Inc.





183 Guinevere Ridge  
Cheshire, CT 06410  
(203) 271-1949

sigrun.gadwa@sbcglobal.net

January 26, 2023

Conservation Commission, Town of Waterford  
15 Rope Ferry Road  
Waterford, Connecticut 06385 - 2886

**ATTN:** Chairman Dimmock and Environmental Planner, Maureen Fitzgerald

**RE:** *Application Review: App. # C22-15. 47-Unit Residential Subdivision, including affordable units; 141 Clark Lane. Owners: L & M Archambault; Applicant Kingstown Properties, LLC*  
*Carya Job No.: 23- WFD 3*

Dear Commissioners:

Carya Ecological Services, LLC has conducted a preliminary review of the above-referenced application by Kingston Properties, at the request of several property owners of abutting homes on the east side of Clark Lane, including Arlene Sherman (119 Clark Lane).

## 1.0 INTRODUCTION

We have reviewed the following sources of information relevant to this application.

1. The most recent set of plans, dated 12-15-22, for this application, prepared by the firm of Provost & Rovero, Inc., offering engineering, surveying, and land planning services. The 21-sheet plan set is available for download on the Town of Waterford web site.
2. The Storm Drainage Report accompanying the plans, dated October 10, 2022
3. The wetland delineation report by soil scientist Joseph Theroux, dated 5-6-22.
4. The Wetland Functions and Values & Impact Analysis by J. Theroux, date 8-11-22.
5. Excerpts of the Technical literature on Stormceptor Pretreatment devices and on the performance of biofiltration basins.
6. Performance Testing Results and design specification for biofiltration basins published by the University of New Hampshire Stormwater Center (2009 and 2012, pp20 and 21 in both reports) pdf's may be downloaded from <https://www.unh.edu/unhsc/pubs-specs-info>.
7. Appendix A of the NY State DEC Stormwater Management Design Manual (Excerpts in Attachment B).<sup>1</sup>;

---

<sup>1</sup> Pertinent excerpts with references are in Attachment 2.

**C-22-14**  
**109R & 131 CLARK LANE**  
**PUBLIC HEARING 01-26-23**  
**EXHIBIT #17**

8. Fenger Brook Watershed Management Study, New London and Waterford, 1996. Prepared for Coastal Resources Management, Sea Grant Marine Advisory Program, New Haven, CT.
9. 2015 CTDEEP report on Fenger Brook (CT 2000-30-01) as and impaired portion of the Southeast Shoreline Drainage Area (CT 2000).
10. CTDEEP Fisheries Data from 1993, 2001, and 2010.

Our goal was to evaluate the potential for significant adverse changes to this large, currently well-buffered headwaters wetland system and to downstream regulated resources. These include Alewife Cove, the easternmost cove on the Waterford Shoreline, sensitive to increased nutrient loading.<sup>2</sup> Fenger Brook has overall impairment per the 2015 CTDEEP Report on Connecticut's water resources, but there is no breakdown as to the relative levels of impairment in different segments. Are hydrologic changes reasonably likely to result from the proposed residential project, increased water in wetlands bordering the southern portion by the stormwater discharge, and drier conditions bordering the narrow northern portion? Will the stormwater management system, in particular the bioretention basin function as intended, preventing increased nutrient loading to the Fenger Brook riparian corridor and the sensitive downstream estuary, Alewife Cove? Significance of impacts is closely tied to the sensitivity and quality of the downgradient wetland resources, under existing conditions and functional status.

To make this evaluation, we supplemented the information provided by the applicant with additional natural resource data on the headwaters portion of Fenger Brook, to the extent feasible. We have not yet found recent data on the health and nutrient status of Alewife Cove, key information that should have been provided by the applicant. On Saturday, January 21<sup>st</sup>, 2023, we conducted a field survey of the site perimeter and downgradient wetland resources, and tested specific conductivity and salinity at several locations, including a station just upstream (north) of Route 1. Local residents were also questioned. Desktop Sources of Natural Resources Data on the site vicinity and the Fenger Brook Watershed included the CTECO website, and the NRCS/USDA web soil survey. The Carya office library has assorted studies and manuals on wetland buffers, stormwater management, functions and values assessment methodology, and potential wetland stressors. The 2020 NY Stormwater Management Design Manual and the University of New Hampshire Stormwater Center Provide guidance on Bioretention Basin Design and Pollutant-loading data.

## 2.0 EXISTING CONDITIONS

Carya water quality testing results, shown in Table 1 in Attachment A, showed that upper Fenger Brook does not currently have elevated levels of nutrients or salt; specific conductivity was only 146 uS/cm and salinity was 0.1 ppt at the station is just upstream of Route 1;Upper. Readings within

<sup>2</sup> The 1996 Management Study of the Fenger Brook Watershed prepared by Seagrant may be found in Attachment 3.. It emphasizes the importance and vulnerability of Alewife Cove.



interior wetlands were also very low. One station did have elevated salinity and conductivity readings (4ppt and 549 uS/cm), in a small, west-flowing tributary to Fenger Brook, about 250 feet downgradient (west) of the three-story apartment building just south of Clark Middle School. However, without additional data on nutrient concentration, the reason for the elevated specific conductivity is not known. (Low electrical conductivity means unimpaired water, but conductivity can be elevated due to a variety of dissolved constituents.) Note that the 2015 CTDEEP report did find impairment, but did not specify locations, likely south of Route 1 in the lower watershed.

If upper Fenger Brook were significantly impacted by leachate from the closed New London landfill (west of the subject site) the conductivity reading just north of Route 1 would have been much higher. Perhaps this expected nutrient source has diminished since 2015. Otherwise good water quality is not surprising, in view of breadth of the protected forested open space in the headwaters of Fenger's Brook, about 2/3 mile wide near the subject site. Fortunately the watershed of this brook does not include the dense residential development along the Thames River and to the west of Clark Lane, as shown in Figures 1 and 2.

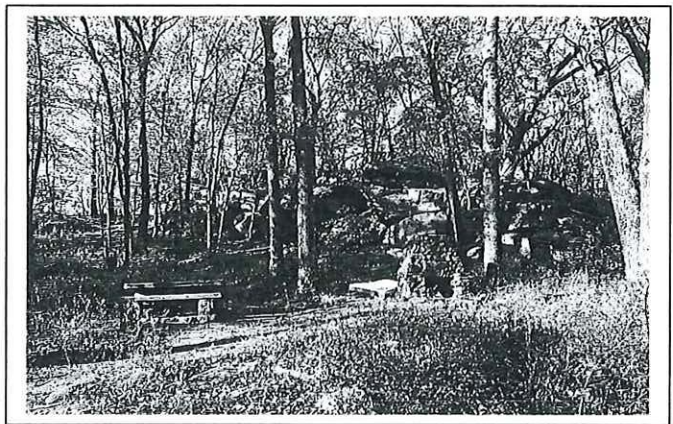
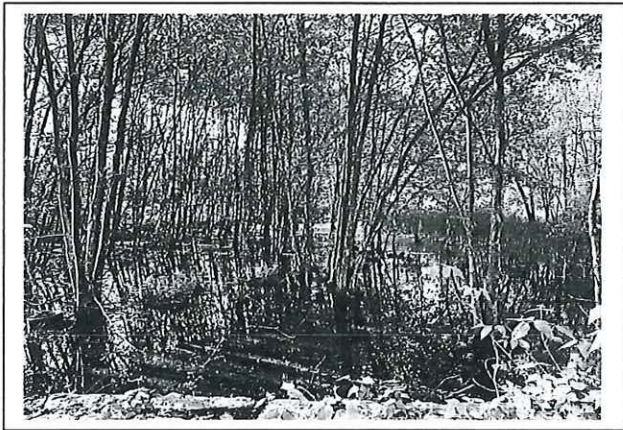
Mr. Theroux provided good information on the hydrologic characteristics and functions of the very long swath of wetlands immediately adjacent to the project (about 1/3 mile). These wetlands are primarily groundwater fed, with seasonal saturation and flooding of depressions. Multiple small drainageways flow towards Fenger Brook. He rated wildlife habitat, production export via food chain, and ground water discharge as important functions; water quality was rated very good, consistent with Carya water testing data. However Flood storage function was incorrectly rated as low, not taking into account the irregular ground topography and multiple small and large depressions, that trap and infiltrate precipitation, preventing flooding and downstream channel enlargement. Tree transpiration also prevents flooding. Roots take up and transpire large volumes of surface water, aerating the soil, and creating pore space for infiltration. Mr. Theroux did not assess the functions and values *of the wetland system as a whole* as called for by the Highway Methodology, and the other extant wetlands assessment methodologies. His assessment should have taken the New London portion into account; it has more embedded pools and high-value upland islands, including cliffs with den-caves suitable for bobcat. This top wetland predator is well-documented at this site. Amphibians and crayfish are important foods for bobcat. Wildlife habitat was rated as a principal wetland function, but the report did not mention the numerous forest pools, some of which are expected to be productive vernal pools or the significance of the wetlands' high ecological integrity. The undeveloped land at the headwaters of Fenger Brook, north of Route 1, is an almost three-square mile contiguous habitat block, a half mile to two third miles across.

We viewed the wetland from the west (Clark Lane back yards); from the South (from the entry Road to Clark Middle School) and from the West. Habitat to the west of the site includes over 100 acres



of forested ridges, scenic rock outcrops, cliffs, and wetlands, which can easily be accessed from Clark Woods Park Road and a network of hiking trails. Undeveloped municipally owned land includes the central and southern portion of New London's 95-acre Clark Woods Park, which includes portions of the subject wetland system. Accordingly it does have significant human use values: recreational, educational and aesthetic value. Trails and vernal pools straddle the unmarked town line.

We also characterized and sampled several water quality parameters in the large forested wetland south of Clark Lane Middle School, which is similar to the wetlands located downgradient of the proposed high density, linear development of manufactured rental homes.



Photos of Bates Woods Park

## CONCLUSION

It is our professional opinion that the omissions and concerns discussed orally in my presentation today, based on the sources listed above in the footnotes to the materials reviewed, should be addressed by the applicant before a permit is issued,

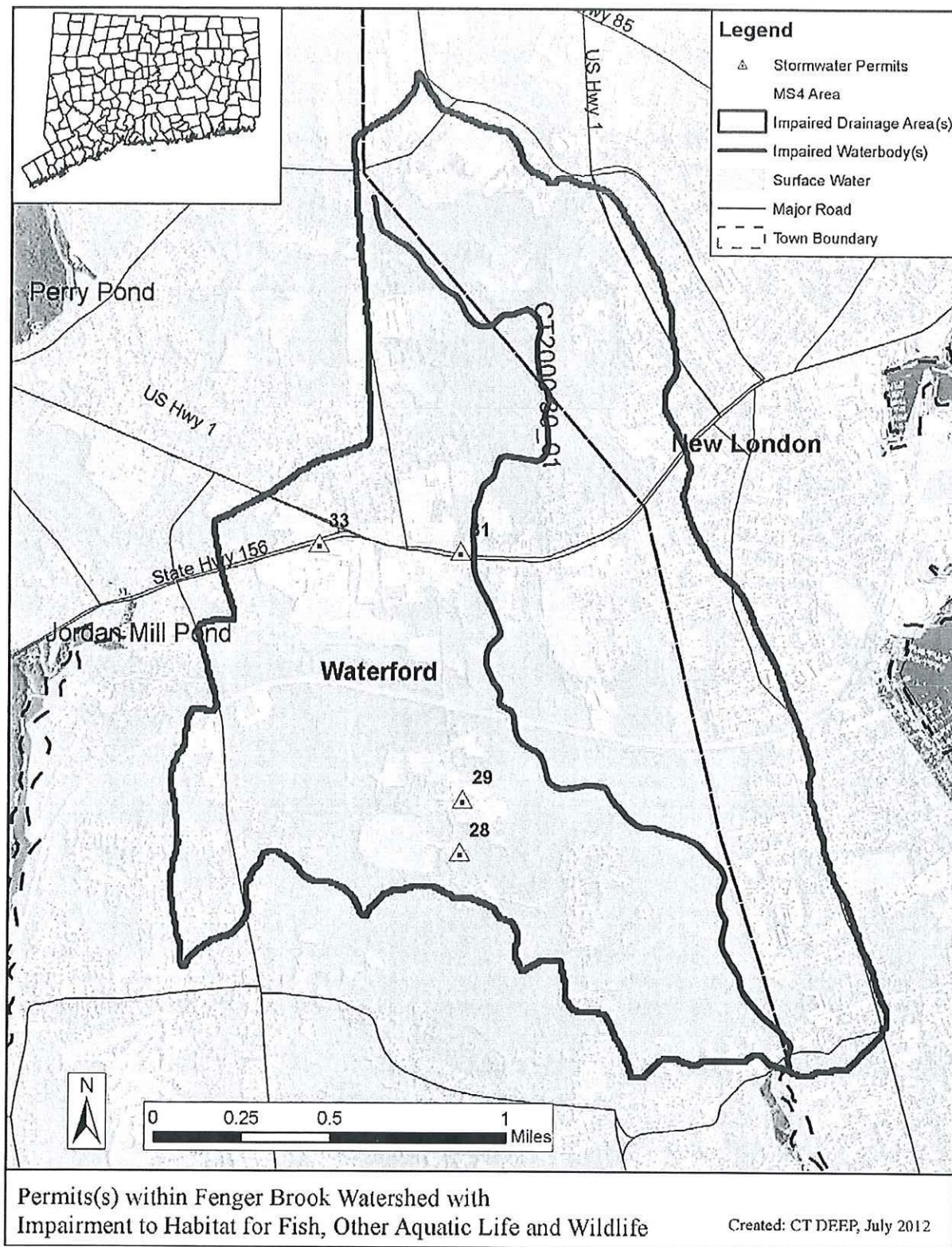
Please get in touch with us if you have any questions on the above.

Respectfully submitted,

*Suzanne N. Gadsden*



Figure 1: Permitted Stormwater Facilities in the Fenger Brook Watershed including MS4s (numbers correspond with permitted facilities listed in Table 5)



Attachment A: Tables and Figures

TABLE 1: WATER QUALITY DATA FROM FENGERS BROOK HEADWATERS, WATERFORD. FIGURE 2 SHOWS STATION LOCATIONS.

| Station ID | Watercourse                                                                                                                                                                                                      | DATE          | TIME    | Specific Conductivity<br>(uS/cm) | Salinity<br>(ppt) | Temperature<br>( °C ) |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------|----------------------------------|-------------------|-----------------------|
| S. # 1     | FENGER BROOK                                                                                                                                                                                                     | Jan. 23, 2023 | 4:15 PM | 77.6                             | 0.1               | 8                     |
| S. # 2     | FENGER BROOK                                                                                                                                                                                                     | Jan. 23, 2023 | 3:10 PM | 112.8                            | 0.1               | 6.7                   |
| S. # 3     | FENGER BROOK                                                                                                                                                                                                     | Jan. 23, 2023 | 3:30 PM | 549                              | 0.4               | 7.3                   |
| S. # 4     | FENGER BROOK                                                                                                                                                                                                     | Jan. 23, 2023 | 4:45 PM | 146                              | 0.1               | 5.5                   |
| S. # 1     | Shallow, linear, pool 20' S. of Bates Forest Park Rd, 250' N. of landfill in rocky, rugged, forested headwaters terrain                                                                                          |               |         |                                  |                   |                       |
| S. # 2     | Forested wetland drainageway, 150' south of Clark Middle School Soccer Field, similar to the groundwater-fed, forested wetlands downgradient of the northern half of the proposed Trailer Park along Clark Lane. |               |         |                                  |                   |                       |
| S. # 3     | East-flowing, 2-ft-wide Intermittent stream coming from the dense thicket behind the AHEPA, 3-story apartment building.                                                                                          |               |         |                                  |                   |                       |
| S. # 4     | Fenger Brook 50 feet upgradient (north) of brook crossing under Route 1; fast flowing with rocky substrate, incised channel                                                                                      |               |         |                                  |                   |                       |

NOTES: Testing done by Sigrun N. Gadwa, Carya Ecological Services, LLC using a YSI 30 meter. Air temperature was 3-4° C.



TABLE 2: CTDEEP FISHERIES DATA FROM FENGERS BROOK, WATERFORD, CT. SAMPLING STATION ~ 300' S. OF RTE 1.

| OBJECTID                                       | Station ID              | Sample Year | Sample ID | American Eel | Largemouth Bass | Pumpkinseed | Rock Bass | Redfin Pickerel | Tessellated Darter |
|------------------------------------------------|-------------------------|-------------|-----------|--------------|-----------------|-------------|-----------|-----------------|--------------------|
| Number of Individuals in Electrofishing Sample |                         |             |           |              |                 |             |           |                 |                    |
| 627                                            | FENGER BROOK (id:14773) | 1993        | 147731993 | 1            | 0               | 0           | 0         | 3               | 0                  |
| 628                                            | FENGER BROOK            | 2001        | 147732001 | 1            | 0               | 0           | 0         | 9               | 0                  |
| 629                                            | FENGER BROOK            | 2010        | 147732010 | 5            | 1               | 4           | 0         | 17              | 29                 |

TABLE 3: CTDEEP MACROINVERTEBRATE DATA FROM FENGERS BROOK, WATERFORD, CT. ~ 300' S. OF RTE 1

| OBJECTID | Station ID              | Sample Year | Sample ID | Ancylidae | Athericidae | Chironomidae | Elmidae | Halipilidae | Hydropsychidae | Limnephilidae | Odontoceridae | Psephenidae | Tipulidae |
|----------|-------------------------|-------------|-----------|-----------|-------------|--------------|---------|-------------|----------------|---------------|---------------|-------------|-----------|
| 884      | FENGER BROOK (id:14773) | 1993        | 147731993 | 1         | 1           | 1            | 1       | 1           | 1              | 1             | 1             | 1           | 1         |

Note: 1 means" present". Organisms in the different taxa were not counted.





NOTES: Red line delineates CT Major Basins. Basin #2, the Southeast Coastal Major Basin, includes all except the Thames River shorelines areas. Purple line delineates the Regional Basins. Fenger Brook, Alewife Cove, and East & West sides of Jordan Cove are in Basin # 20, the Southeast Shoreline Regional Basin. Jordan Brook is in Regional Basin #22, the southeast western complex. The blue-highlighted Fenger Brook CTDEEP Local Basin 2020-30 (above) flows entirely into Alewife Cove, the receiving estuary for Fenger Brook. The 8 and 10-digit Hydrologic Unit codes, with tan and gray boundary lines, also separate the Jordan Brook watershed from the Fenger Brook and Ledges Brook watersheds (combined). The CTDEEP system separates the Local Basins of Fenger Brook and Ledges Brook. Ledges Brook drains into Goshen Cove, not Alewife or Jordan Coves.