



Needham Board of Health



AGENDA

Tuesday December 10, 2019

7:00 – 9:00 p.m.

**Charles River Room
Public Services Administration Building
500 Dedham Avenue, Needham MA 02492**

- **7:00 to 7:05 – Welcome & Review of Minutes (October 11th & November 8th)**
- **7:05 to 7:30 – Continued Board Discussion about Enforceable Agreement for Sewer Connection at 57 Walker Lane Septic System**
- **7:30 to 8:00 – Staff Reports (November)**
- **8:00 to 8:05 – FY 2021 Budget Discussion and BOH Priorities**
- **8:05 to 8:10 – Update on Chairs Meeting with Select Board**
- **8:10 to 8:30 – Policy Discussion re: Residential Parcels and Distance from Points of Sale for Intoxicating Substances**
- **8:30 to 8:35 – Review of Public Information Campaign re: Youth Vaping**
- **8:35 to 8:40 – Update on Synthetic Turf Fields and Enhanced Environmental Testing**
- **8:40 to 8:45 – Mobile Food Vendors—Application & Inspections Processes**
- **Other Items**
- **Adjournment**

(Please note that all times are approximate)



NEEDHAM BOARD OF HEALTH



Needham Board of Health Minutes October 11, 2019

Board members: Edward Cosgrove, PhD, Chair
Stephen Epstein, MD, MPP, Member
Christina S. Mathews, MPH, Member
Robert A. Partridge, MD, MPH, Member

Staff present: Timothy M. McDonald, Director of Health and Human Services; Tara Gurge, Assistant Director of Public Health; Diana Acosta; Dawn Stiller; Maryanne Dinell; Tiffany Zike; Karen Shannon; Michelle Iovino; Madeline Isenberg

Convene: Public Services Administration Building, 500 Dedham Avenue, Charles River Room

Dr. Cosgrove, Chair of the Board of Health, called the meeting to order at 9:01 AM.

Minutes

There were no comments on the minutes from September. **Ms. Matthews motioned to approve the minutes. Dr. Partridge seconded. The minutes were approved by unanimous vote.**

Staff reports

Traveling Meals Program – presented by Maryanne Dinell

There was a small reduction in delivered meals during September as compared to August, largely attributable to fewer overall days and a federal holiday in September.

Environmental Health Report – presented by Diana Acosta

Ms. Diana Acosta and Ms. Tara Gurge attended the 2019 Annual Northeast FDA Food Protection Conference held on September 18-20th in Portsmouth, NH. They received a variety of up-to-date food safety information relevant to the responsibilities of the Environmental Health team and received some feedback on what to focus on for the upcoming FDA/AFDO grant application.

Ms. Acosta, Ms. Gurge and the Food Regulatory Program Analyst, Ms. Michelle Iovino, will be applying for the 2020 AFDO grant by October 15th. Funding is up to \$20,000 for food-safety projects related to the FDA Standards Project for a Category 2 grant. The team is looking to obtain funding to begin a food grading system and public educational campaign. The aim is to have all the standards set forth by the Food and Drug Administration's Voluntary National Retail Food Regulatory Programs Standards met by the end of 2020. Additionally, the team will also apply for a Category 3 training grant in the amount of \$3,000, which has been awarded in previous years. This grant allows funding for travel to educational conferences.

On September 24th, an administrative hearing was held with the owner and staff of The Rice Barn. Ms. Gurge, Ms. Acosta were present with Mr. Timothy McDonald, Ms. Tiffany Zike, and Ms. Donna

Carmichael. The purpose of this hearing was to discuss the on-going food safety issues that have been received by the Public Health Division which include an increased amount of food-borne illness complaints. The owner agreed to do the following: 1) Send additional staff members for ServSafe Food Manager and Food Allergy trainings at once which will be a condition of the issuance of the 2020 Food Establishment permit. 2) Immediately set up on-going audit/trainings with food safety trainer, Maureen Lee, with MoJin Solutions, LLC. Contract was received on September 27th. 3) Maintain routine pest control inspections with Catseye Pest Control. The progress of the project will be routinely

Additionally, on the evening of September 24th, Governor Baker declared a Public Health Emergency and announced a temporary four month ban on the sale of all vape products. As soon as the order was received and after receiving guidance from the state, Ms. Acosta and Ms. Gurge worked to draft a notice that was sent out to all ten tobacco retail establishments. Site visits to all tobacco establishments known to sell vape products were conducted by Ms. Acosta to verify compliance. Ms. Gurge contacted the Medical RMD facility and Ms. Acosta conducted a site visit to verify that all vape products were removed from sale. All permitted establishments were found to be in compliance with the ban.

Policies, Safety at Home Program, and Grant Proposals – presented by Mr. McDonald

Staff members Lynn Schoeff and Rachael Cain have continued to develop policies of the Public Health Division and the Health & Human Services Department as a whole. Ms. Cain continues her work to ensure that the Safety at Home program is sustainable and is working with Beth Israel Deaconess-Needham on the community health assessment which is a hospital requirement and will help the Public Health Division pursue its goal of accreditation.

Substance Use Prevention – Karen Shannon

Ms. Shannon provided a brief update on the Vaping Task Force which will begin its work in November and will be led by Ms. Sara Shine, the Director of Youth & Family Services. Ms. Shannon also provided an update on the 5th Quarter Program and the work of the SALSA (Students Advocating Life Without Substance Abuse) as it trains a new group of peer leaders to present on refusal skills in the 8th grade health classes.

Public Health Nursing Report – Tiffany Zike

Ms. Zike discussed the communicable diseases for the month of September. Ms. Zike had a discussion on the EEE notification process that they experienced during the month and explained where Needham stands with the EEE risk.

Ms. Zike reported that the nurses are getting prepared for the flu season. They held a Lunch and Learn, “All about the Flu” at the Center at the Heights and have begun giving flu shots to staff. The first flu clinic was on Oct 10th, 2019. She reports that they also provided 10 Tdap immunizations to school children from China, that were visiting Needham schools. Ms. Zike also reported that in September they held a CPR class for Town employees and began a Matter of Balance class at the Center at the Heights. She reports the nurses have also been working on emergency management and plan development/review including a shelter walk through, domestic violence awareness and education activities, and preparation for MRC activities and recertification process/enrollment of new members.

Regional Substance Abuse Coordinator Report – presented by Mr. McDonald

Mr. McDonald gave a brief update on the regional substance use prevention work, where Needham is a partner with Dedham, Norwood, and Westwood. The focus this fall is on providing TIPS training for

alcohol licensees to ensure responsible beverage service. This will be the first set of trainings since all four communities had staff (mainly public health and police) certified as TIPS trainers. This will provide a cost savings to the communities and allow them to offer more frequent TIPS trainings for vendors.

Substance Use Prevention in Needham – Deep Data Dive – Karen Shannon

Ms. Shannon presented an overview of the Substance Prevention Alliance of Needham (SPAN), the Needham Parent/Caregiver Survey, and the Risk Factors for Teen Substance Use in Needham.

The SPAN overview detailed its purpose as a community coalition, its structure which includes a steering committee and three action teams. Ms. Shannon explained that data informs the coalition's work and how it prioritizes the planning of prevention initiatives. Highlights of the 2018 Metro West Adolescent Health Survey (MWAHS) data touched on trends in self-reported substance use by Needham High School students.

Ms. Shannon shared that the 2019 Parent Survey, administered on line biennially since 2011 to parents and caregivers of students in grades 6 – 12, collects quantitative data for topics including: parent behaviors, attitudes, perceptions and beliefs around youth substance use. The 2019 Survey collected data from 613 parents and caregivers.

Ms. Shannon presented an abbreviated review of the Risk Factors for Teen Substance Use in Needham, created in summer 2019 by Madeleine Arthur, graduate intern from the B.U. School of Public Health. Using the 2018 MWAHS, Ms. Arthur analyzed the data for associations between substance use among Needham High School students and 16 risk factors. Highlights of this analysis include:

- 11th and 12th grade students are more likely than 9th and 10th grade students to use all substances (e.g. 4x more likely to use alcohol, 5x more likely to use marijuana, and 2.5x more likely to use electronic vaping products).
- Perception of risk is high for vaping, yet students still choose to vape
- Those who reported depression and thoughts of suicide are more likely to use all substances, especially marijuana.

Discussion of Governor's Four Month Ban on Vape Products

The Board discussed the recently announced vape ban and its impact in Needham. Ms. Acosta and Ms. Gurge stated that all of Needham's tobacco vendors complied with the order to remove vape products from their shelves. The Board and the Public Health Division staff members discussed the timing for the Governor's ban and its expiration after four months, and reviewed options to limit youth access to, and use of, vape products. The Board discussed whether it should consider its own regulation of vaping, and whether to pursue a restriction of online sales to Needham's zip codes. The Board debated asking the Governor or the Attorney General to pursue a permanent online sales restriction and discussed ways to better inform and educate the Needham community about the dangers of vaping. The Board resolved to work on a letter to the community and to continue its discussion next month.

Tobacco Compliance Check Update – Diana Acosta

Ms. Acosta provided the Board with an update on the September 26, 2019 Tobacco Compliance Check, where all vendors checked the undercover buyer's identification and passed the compliance check.

Status Update on 57 Walker Lane Septic System

Ms. Gurge and Mr. McDonald provided Board members with an update of the 57 Walker Lane Septic System. This was a continuation of the discussion at the July and September Board meetings about the failed septic system at this property and the requirement that the owner connect with Town sewer rather than replace the septic. With the support of the Engineering Division in Needham's Department of Public Works, Ms. Gurge will be able to provide the Board with an independent estimate of the costs to connect to sewer. It is hoped that this independent estimate will resolve the disagreement between the Town engineer's cost estimate for the work (\$30,000-\$40,000) and estimates the owner has received from contractors (\$150,000).

FY 2020 Budget Discussion and BOH Priorities

Mr. McDonald facilitated a Board discussion about its priorities and its resource needs. The Board members mentioned the need for Town funding to support the Substance Prevention Alliance of Needham (SPAN) and its work with the coming expiration of Needham's 10-year federal grant. The Board also highlighted the need for a full-time Director of Public Health and voiced its frustration that this position is still unfunded nearly 36 months after the creation of the Health & Human Services Department. The Board asked to continue its discussion at next month's meeting, and asked Mr. McDonald to arrange for the Town Manager to attend a future Board of Health meeting.

Upcoming Board of Health meetings:

Friday, November 8, from 9:00-11:00 a.m., Charles River Room of the PSAB

Tuesday, December 10, from 7:00-9:00 p.m., Charles River Room of the PSAB

Mr. McDonald will send Board members a survey to inform a discussion at the November Board meeting about 2020 meeting dates and times.

Dr. Epstein motioned to adjourn the meeting at 11:00 AM. Dr. Partridge seconded. Approved unanimously, the meeting adjourned at 11:00 AM.



NEEDHAM PUBLIC HEALTH DIVISION



Needham Board of Health Minutes November 8, 2019

Board members: Edward Cosgrove, PhD, Chair
Kathleen Ward Brown, ScD, Vice Chair
Stephen Epstein, MD, MPP, Member;
Christina S. Mathews, MPH, Member
Robert A. Partridge, MD, MPH, Member

Staff present: Timothy M. McDonald, Director of Health and Human Services; Tara Gurge, Assistant Public Health Director; Karen Shannon; Tiffany Zike; Maryanne Dinell; Dawn Stiller; Diana Acosta; Michelle Iovino; Lynn Schoeff

Location: Charles River Room, Public Safety Administration Building, 500 Dedham Avenue

Dr. Cosgrove, Board Chair, called the meeting to order at 8:59 AM.

Minutes: The minutes from the October meeting were not available for review.

Staff reports:

Public Health Nursing – Tiffany Zike

So far this year, the nurses have given more than 730 flu vaccinations. The high dose vaccine has been very popular and there are still about 40 doses left. The nurses provided a workshop at CATH on extreme weather preparation. It was very well-attended. The team, including Rachael Cain and Rebecca Ping, will do it again at a “lunch and learn” next Tuesday. The nurses were also involved in domestic violence awareness work during October.

There were only two communicable diseases in October, both campylobacteria. There were also two “revoked” diseases: one mumps and one botulism. The botulism was revoked because it was only in a wound rather than systemic. However, it was in a nursing home, so the nurses worked with the facility to do education and discussion around infection control.

Traveling Meals – Maryanne Dinell

Participation in Traveling Meals has been holding steady at 39 or 40 individuals. Ms. Dinell anticipates that another individual with very limited means will be joining the program. This individual’s participation will be supported by the Friends. Ms. Dinell reported that they have begun preparing for Thanksgiving in partnership with the Rotary and with Needham Community Council.

Environmental Health – Tara Gurge

Ms. Gurge reported that Environmental Health is very busy with permit renewals, many of which are being done online, although the food permits are still being handled by mail. Diana Acosta completed some spot checks of massage providers along with a state inspector from the Division of Professional Licensure.

Ms. Acosta reported that the recent alcohol compliance checks involved volunteers from Olin College and there was only one violation in this round. Ms. Acosta also reported that the new restaurant, Pancho's Taqueria, is open. A site visit found that Hungry Coyote's dumpster is insufficient to contain trash generated by the restaurant, so they have added an additional dumpster pickup. Given the number of recent complaints regarding Hungry Coyote, Public Health is requiring more staff to be ServSafe certified.

The pest problem with the dumpster in the parking lot at CVS has been resolved. There have been no complaints since they've been getting routine pest control.

Substance Use Prevention Report – Karen Shannon

Ms. Shannon reported that October was a very busy and productive month. SPAN was active at the Harvest Fair, the Drug Take-back day, the Family Dinner Project (which was sold out with 60 participants), and two SALSA 5th Quarter events. Also, the alcohol training kits have been delivered to all licensees and the Vaping Task Force is about to start.

Regional Substance Abuse – presented by Mr. McDonald

The first round of TIPS training conducted by trained regional staff (as opposed to hired vendors) occurred this past Monday. Trained staff members include public health and police, making this a much more sustainable program.

Other Projects – Mr. McDonald

Mr. McDonald reported on the climate change program managed by Ms. Rachael Cain. The program is meant to help people prepare for extreme weather (heat, cold, and flooding). The material has been translated to Mandarin and Russian so far. There will be additional translations for other languages spoken by Needham Housing Authority residents, if needed.

Synthetic turf fields and enhanced environmental testing

Discussion

The old synthetic turf was removed from town fields (Memorial and DeFazio) and is being used at an indoor baseball facility in another community. A new type of testing is being used on the new synthetic turf. The new testing, which is expensive, is being conducted by consultants who will provide Public Health with information about how to handle situations when problems are identified. The problematic chemical is Teflon which is used in the extrusion process but is not in the fiber itself. Public Health will use some funds designated for testing the crumb rubber (which has not been problematic) to pay for the more expensive fiber testing.

Action:

Ms. Gurge will confirm to see if the crumb rubber in the new turf is the same type that has not been problematic.

Governor's four-month ban on vape products, recent legal developments, Needham Board of Health policy regarding vapes, and steps to reduce youth use.

Discussion:

- Mr. McDonald presented an updated map of tobacco permit holders that shows the distance from schools. This information is relevant to the discussion about possibly retiring the tobacco sales permit from the 7-11.
- Reviewed slides from the Metro-west Adolescent Health Survey which shows the use of e-cigarettes and vaping by grade, where students get vaping products, and lifetime and recent use/
- The governor's vape ban was upheld. There were some problems with the CBD ban as it is unclear whose jurisdiction this falls in, MA Department of Public Health or Cannabis Control Commission?
- Question about whether the Board of Health would like to institute a similar vaping ban once the state-wide ban expires.
- Would this be essentially prohibition (which some Board members oppose) or would the Board choose to allow vaping products only in over-21 stores?
- Survey responses show that most teens accessed vaping products from other people. On-line access was low.
- Should the Board consider banning on-line vape sales as Belmont did? Should the Board see where the state ban and court cases play out before taking any other actions in Needham?
- Given the many open questions, the Board will invite Cheryl Sbarra and DJ Wilson to the next meeting to continue the discussion.
- Needham has a comparatively low number of tobacco sales permits. Still, since data indicates that reducing retailer density is associated with lower youth smoking rates, the Board will consider limiting permits going forward and identifying a process for retiring permits when a store closes or changes hands.
- Retiring permits might be considered if a business closes and the permit is not transferred to another owner or if there is no one on the tobacco wait list.
- If the Board develops a policy for retiring permits, the public and business owners would need fair warning.
- The Board will consider putting out a position statement that decreasing density of tobacco sales points is associated with lower tobacco use.
- The Board will consider having a public hearing to discuss retiring tobacco sales permits, lowering the density of tobacco points of sale, and considering an auction for permits.

Action:

- Dr. Partridge and Ms. Matthews will write a letter about vaping. If the Board approves the letter, it will be released to local newspapers and to the schools for distribution.
- Dr. Partridge will send articles about density of tobacco sales to Mr. McDonald for discussion at the December or January Board of Health meetings.
- Dr. Epstein will send link for data to Mr. McDonald.
- Mr. McDonald will assemble a packet of other articles about "tobacco 21" and other tobacco sales history.
- Mr. McDonald will invite Ms. Sbarra and Mr. Wilson to a future Board of Health meeting.
- The Board will discuss this topic once more before scheduling a hearing.

Continued discussion about 57 Walker Lane sewage and septic

Discussion:

As provided by the Town engineer, the total estimated cost of sewer extension to the one resident would be approximately \$54,000. However, as pointed out by Board members, this does not include many expenses, some of which might be very high.

Mr. McDonald we will seek a more inclusive definition of the cost, although there will always be some ambiguity.

The legal deadline for conforming the system to code is in December. There are many open questions, including:

- Who owns the private lane on which the house is located?
- Who is responsible for repairing the sewer pipe if it fails? Is it the Town because the sewer will be owned by the municipality, or is it the owner because the sewer will be on the private lane?
- Can the Board extend the deadline with the condition of meeting with neighbors to discuss sharing the cost?
- The Town engineer suggests a one-year extension with proof that the resident is working with his neighbors.

Action:

- Mr. McDonald will determine who would be the responsible party in the event of sewer failure.
- Mr. McDonald will get a clearer cost estimate from the Town engineer.
- Mr. McDonald will ask the resident for a progress report.
- The Board will continue the discussion at the December meeting with the goal of determining an extension with conditions.

Budget

Discussion

The budget will be submitted with the two prominent Board of Health request for personnel as top priorities, and also with two financial warrant articles (for accreditation and to hold and reserve funds in the event that there is a need to call in an expert.)

The Select Board wants to schedule a joint meeting with Board of Health in the new year. The Chairs will meet on December 5, to discuss budget, priorities, staffing for the Public Health Division, and unfunded mandates.

Dr. Cosgrove said that the budget as written addresses the Board's concerns, including funding for the Substance Prevention Alliance of Needham, 10 additional hours for a health agent for Environmental Health, and a Public Health Director.

Next meetings:

The Board of Health decided to schedule meetings 6 months at a time. The upcoming BOH meeting schedule is:

Date	Day of the Week	Time	Location
12/10/2019	Tuesday	7:00 p.m. to 9:00 p.m.	PSAB (Charles River Room)
1/23/2020	Thursday	7:00 p.m. to 9:00 p.m.	CATH (Multi-purpose Room)
2/27/2020	Thursday	9:00 a.m. to 11:00 a.m.	RRC (Multi-purpose Room)
3/13/2020	Friday	9:00 a.m. to 11:00 a.m.	PSAB (Charles River Room)

4/16/2020	Thursday	9:00 a.m. to 11:00 a.m.	CATH (Multi-purpose Room)
5/12/2020	Tuesday	9:00 a.m. to 11:00 a.m.	RRC (Multi-purpose Room)
6/16/2020	Tuesday	9:00 a.m. to 11:00 a.m.	RRC (Multi-purpose Room)

The Board will have to approve the October and November minutes at the December meeting.

Other items for the next agenda: “Until Help Arrives” course. And a combination Stop the Bleed and CPR in a one-hour training for civic groups.

Meeting adjourned at: 11:15 AM

Minutes submitted by: Lynn Schoeff

DRAFT



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/19

Agenda Item	57 Walker Lane Septic System Enforceable Agreement Extension Discussion
Presenter(s)	Timothy Muir McDonald, Director of Health & Human Services Tara Gurge, Assistant Public Health Director Tony DelGazio, Town Engineer

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
Board of Health discussion about 57 Walker Lane septic system and existing enforceable agreement (legal document) requiring connection to municipal sewer within two years after the on-site septic system failed its Title V inspection in December 2017. Follow-up – Tony, Town of Needham Engineer, met with Jones Contracting. They submitted an initial estimate to connect this home to the municipal sewer line. (See estimate enclosed.) Met with Tony to review other estimates that were not stated in the initial proposal submitted. <u>UPDATE:</u> DPW is in the process of digging a test pit at this site and will provide additional soil testing information. Tony will attend upcoming BOH meeting.	
2.	VOTE REQUIRED BY BOARD OF HEALTH
A vote is required. If not taken at this meeting, it will need to be taken before the end of December. The suggested motions are: Vice Chair: <i>I make a motion to recommend that the Board of Health affirm its commitment to the legally-binding enforceable agreement signed in December 2017 between the Town of Needham and Mr. Tal Achituv, the Homeowner, but extend the compliance date by which municipal sewer connection is required <u>by a period of one year, until December 31, 2020.</u></i>	
3.	BACK UP INFORMATION ATTACHED
Packet with information including email correspondence, state experts, Jones Contracting estimate and enforceable agreement, along with nine-page submission from Mr. Achituv.	



Walker Pond Lake Management 2017 Final Report

Needham, Massachusetts

PREPARED FOR:

Mr. Matthew Varrell, Director of Conservation
Town of Needham, Public Service Administration Building
500 Dedham Avenue
Needham, MA 02492

PREPARED BY:

ESS Group, Inc.
100 Fifth Avenue, 5th Floor
Waltham, Massachusetts 02451

ESS Project No. N514-000

December 2017



TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 AQUATIC PLANT ASSESSMENT	1
3.0 BATHYMETRIC SURVEY.....	2
4.0 FISH AND WILDLIFE ASSESSMENT	2
5.0 WATER QUALITY ASSESSMENT	4
6.0 HYDROLOGIC BUDGET AND NUTRIENT MODELING.....	6
7.0 MANAGEMENT RECOMMENDATIONS.....	8
7.1 Water Quality	8
7.1.1 Resident Education	8
7.1.2 Stormwater Infrastructure	8
7.1.3 Phosphorus Binding	9
7.1.4 Algaecides.....	9
7.1.5 Septic System	10
7.2 Aquatic Vegetation	10
7.2.1 Herbicides	10
7.2.2 Macrophyte Harvesting	13
7.2.3 Water Level Control (Drawdown).....	15
7.2.4 Dredging.....	15
8.0 SUMMARY OF MANAGEMENT RECOMMENDATIONS	17
9.0 REFERENCES.....	18

TABLES

Table 1	Aquatic Macrophytes Documented on August 31, 2017
Table 2	Aquatic Macroinvertebrates Documented on August 31, 2017
Table 3	Vertebrate Animals Documented on August 31, 2017
Table 4	Results of Water Quality and Sediment Sampling
Table 5	Summary of Walker Pond Hydrology
Table 6	Summary of Walker Pond Nutrient Loading Models
Table 7	Average Annual Nutrient Load by Land Use within the Walker Pond Watershed

FIGURES

Figure 1	Plant Cover
Figure 2	Plant Biovolume
Figure 3	Bathymetric Map
Figure 4	Land Use

APPENDICES

Appendix A	Water Quality Laboratory Reports
Appendix B	Hydrologic Budget and Nutrient Modeling Spreadsheets

1.0 INTRODUCTION

Walker Pond is a six-acre, eutrophic waterbody located in Needham, Massachusetts. The town of Needham owns approximately two-thirds of the pond and the rest is privately owned. The pond is roughly split in half by an earthen berm. Limited connectivity between the east and west sides of the pond is retained by an opening on the south side of the berm. The pond is open to recreational fishing and contains warmwater fish species (Town of Needham 2016).

The Town aims to develop a 5-year Management Plan for the pond that can be used to guide restoration and long-term management of the pond and watershed system. The following is a summary of work conducted in 2017 in support of the project:

- September 12, 2017 – Kick-off meeting
- August 31, 2017 – Aquatic plant mapping, bathymetric mapping, fish and wildlife survey, and water quality monitoring
- October 25, 2017 – Stormwater water quality monitoring

2.0 AQUATIC PLANT ASSESSMENT

On August 31, 2017, ESS scientists conducted aquatic plant mapping to assess the current condition of the pond with respect to water quality, aquatic plant, and algae growth. ESS scientists mapped the locations of all native and non-native aquatic plant species at 31 regularly spaced sampling points throughout the pond. Location data for each point was recorded using a sub-meter accurate Trimble GPS receiver.

ESS documented 12 species of aquatic macrophytes, including one invasive species, during the aquatic vegetation survey (Table 1). Plant cover (Figure 1) and biovolume (Figure 2) were categorized as dense throughout most of the pond.



Top: Walker Pond west basin, looking toward Walker-Gordon field. Bottom: East basin, looking toward outlet and Central Ave. Native duckweed and watermeal cover the surface of the pond. August 31, 2017.

Table 1. Aquatic Macrophytes Documented on August 31, 2017

Scientific Name	Common Name	Relative Abundance	Status
<i>Ceratophyllum demersum</i>	Coontail	High	Native
<i>Elodea nutallii</i>	Western Waterweed	Medium	Native
<i>Lemna</i> sp.	Duckweed	High	Native
<i>Nuphar lutea variegata</i>	Yellow Water Lily	Medium	Native
<i>Nymphaea odorata</i>	White Water Lily	Low	Native
<i>Pontederia cordata</i>	Pickeralweed	Low	Native
<i>Wolffia</i> sp.	Watermeal	High	Native
Algae sp.	Filamentous Algae	Medium	Native
<i>Lythrum salicaria</i>	Purple loosestrife	Low	Invasive
<i>Polygonum</i> sp.	Water Smartweed	Medium	Native

Scientific Name	Common Name	Relative Abundance	Status
<i>Typha</i> sp.	Cattail	Low	Native
<i>Potamogeton</i> sp.	Pondweed	Low	Native

Most of Walker Pond is covered by the small, native free-floating plants of watermeal (*Wolffia* sp.) and duckweed (*Lemna* sp.). Beneath this cover, large sections of the pond bottom are covered with native coontail (*Ceratophyllum demersum*). Native floating-leaved plants including pondweeds (*Potamogeton* sp.), white water lily (*Nymphaea odorata*), and yellow water lily (*Nuphar lutea variegata*) were also present in the east and west basins. Native emergent plants including water smartweed (*Polygonum* sp.), cattail (*Typha* sp.), and pickerelweed (*Pontederia cordata*) were observed along the shoreline. The exotic wetland plant purple loosestrife (*Lythrum salicaria*) was present in one location along the shoreline. ESS scientists did not observe any sub-aquatic invasive species during the survey.

3.0 BATHYMETRIC SURVEY

ESS scientists conducted a bathymetric survey of Walker Pond on August 31, 2017. Researchers used a handheld sonar depth finder to determine water depth and a soil probe to measure sediment depth at 31 locations within Walker Pond. Sediment composition (clay, muck, sand, etc.) was also recorded for each site.

Walker pond is a shallow waterbody, with an average depth of 2.4 feet and a maximum depth of 4 feet (Figure 3). The pond bed is composed almost entirely of mucky organic sediments. Throughout the pond, this muck layer was an average of 2.5 feet thick, though values ranged from a minimum of 0.5 feet to a maximum of 5.5 feet.

Outflow from the pond is controlled by a concrete box culvert fitted with flashboards composed of at least 6 wooden boards (approximately 2" x 9"). This structure is 6.8 feet in width and the removeable flashboards extend approximately 4 feet below the water surface. However, water depth is just 1.5 feet, and sediment depth is at least 2.5 feet, within the pond at the spillway. The pond water level was approximately 4 inches below the height of the spillway barrier on August 31, and the only outflow from the pond was the result of water leaking through gaps between the boards.

4.0 FISH AND WILDLIFE ASSESSMENT

ESS scientists conducted assessments of fish and wildlife on August 31, 2017, including macroinvertebrate and mollusk sampling. No mussels or clams were observed during sampling of shallow nearshore or deeper areas within the pond. Additionally, no bivalve shells or shellfish middens were located along the shore of the pond. The only mollusks present were small air-breathing snails (*Physa* sp.) found on submerged vegetation. All invertebrates found during the survey are listed in Table 2. The Walker Pond macroinvertebrate community includes insects (non-biting midges, dragonflies, damselflies,



Top: The pond was dominated by watermeal and duckweed (water surface), and native coontail and filamentous algae (submerged). Bottom: Detail of coontail. August 31, 2017.

caddisflies, mayflies, and water striders), crustaceans (copepods, amphipods, ostracods, and water fleas), aquatic earth worms, water mites, and flatworms. This community is typical of lentic freshwater habitats and no rare, threatened, or endangered species were encountered.

Table 2. Aquatic Macroinvertebrates Documented on August 31, 2017

Taxonomic Group	Lowest Taxonomic Level	Common Name
Crustaceans	Harpacticoida	Copepods
	Cladocera	Water fleas
	Ostracoda	Ostracods
	<i>Hyalella azteca</i>	Amphipods
Annelids (segmented worms)	Glossiphoniidae	Leeches
	Oligochaeta	Aquatic worms
Platyhelminthes (flatworms)	<i>Dugesia sp.</i>	Freshwater flatworms
Arachnids	Hydrachnidia	Water mites
Mollusks	Physinae	<i>Physa</i> snails
Insects	Libellulidae, Corduliidae	Dragonflies
	Coenagrionidae	Damselflies
	Gerridae	Water striders
	Mesoveliidae	Water treaders
	<i>Leptocerus sp.</i>	Caddisflies
	<i>Callibaetis sp.</i>	Mayflies
	Chironomidae	Non-biting midges

Vertebrates observed during the survey are listed in Table 3. A great blue heron (*Ardea Herodias*) and a green heron (*Butorides virescens*) were observed foraging for food along the shore of the east basin of the pond. Both pickerel frogs (*Lithobates palustris*) and bullfrogs (*L. catesbeianus*) were present in large numbers throughout the pond. Multiple painted turtles (*Chrysemys picta*) were also observed on partially submerged logs and branches along the shoreline. A single Canada goose (*Branta canadensis*) was present in the east basin and remained in this area for at least five hours during survey work.

Table 3. Vertebrate Animals Documented on August 31, 2017

Taxonomic Group	Scientific Name	Common Name
Birds	<i>Anas platyrhynchos</i>	Mallard
	<i>Ardea herodias</i>	Great Blue Heron
	<i>Butorides virescens</i>	Green Heron
	<i>Branta canadensis</i>	Canada goose
Reptiles	<i>Chrysemys picta</i>	Painted turtle
Amphibians	<i>Lithobates catesbeianus</i>	Bullfrog
	<i>Lithobates palustris</i>	Pickrel frog



Selection of animals observed during wildlife survey of Walker Pond on August 31, 2017. Left: green heron. Middle: great blue heron. Right: female bullfrog.

5.0 WATER QUALITY ASSESSMENT

Water and surficial sediment samples were collected from the deep hole in the west basin of Walker Pond on August 31, 2017. Water samples were collected from the outlet and inlet of Walker Pond during a wet weather sampling event on October 25, 2017. Water quality parameters including dissolved oxygen, temperature, turbidity, specific conductance, pH, color, and Secchi depth, were determined in the field. Water quality parameters including total phosphorus, dissolved phosphorus, nitrate nitrogen, total Kjeldahl nitrogen, and total suspended solids, were analyzed by Phoenix Environmental Laboratories in Manchester, CT (Appendix A). Sediment samples were collected using a Eckman sediment grab and analyzed by Phoenix Environmental Laboratories. The results of these analyses and field measurements are presented in Table 4.



Outlet of Walker Pond on August 31, 2017. The water level was approximately 4 inches below the height of the spillway boards.

In-lake dissolved oxygen levels were very low. This is likely due to excessive coverage of the water surface by small floating plants, which limits oxygen exchange between the water and atmosphere. The excessive

growth of these floating plants may indicate increased ammonia or dissolved phosphorous levels within the pond. Ammonia was not measured, but phosphorus levels within the pond were high; values above 0.02 mg/L are considered undesirable. Total Kjeldahl nitrogen was also slightly elevated, but this is likely the result of large amounts of organic material within the water column. Secchi disk depth, a measure of water clarity, was low, and water color value was high. These conditions can indicate the presence of high levels of total suspended solids or algae within the water column. However, as TSS levels were not unusually high, and most algae was observed growing attached to submerged surfaces, these values likely reflect natural staining of the water due to contact with tannic organic material.

Sediment chemical analyses indicated that the sample collected from the deep hole of Walker pond was fairly watery (total solids at only 8.34%). Total phosphorous levels within this sediment appear to be elevated, but not yet at levels that would be classified by USEPA as polluted. Therefore, pond sediments are likely a moderate source of phosphorous in the pond water. Furthermore, the available fraction of the phosphorous is unknown, as P fractionation was beyond the scope of the current study.

Wet weather water quality samples from the inlet and outlet were taken on October 25, 2017 after a rain event of approximately 1 inch. Dissolved phosphorus levels from the inlet were high, indicating that that stormwater runoff through the inlet may be a major source of phosphorus input. Water quality samples from the inlet and outlet were used to determine the nutrient budget of Walker Pond and are discussed in greater detail in section 6.0.

Table 4. Results of Water Quality and Sediment Sampling

Parameter	Units	Deep Hole ¹		Inlet ²	Outlet ²
		Water	Sediment		
Total Solids	%	—	8.34	—	—
Phosphorus, Dissolved	mg/L	0.025	—	0.056	0.038
Nitrogen, Nitrate	mg/L	< 0.02	—	< 0.02	< 0.02
Nitrogen, Total Kjeldahl	mg/L	0.89	—	0.68	0.97
Phosphorus, as P	mg/L	0.042	—	0.139	0.054
Phosphorus, Total	mg/Kg	—	545	—	—
Total Suspended Solids	mg/L	< 5.0	—	6.0	< 5.0
Dissolved Oxygen	mg/L	1.89	—	4.78	3.68
	%	20.4	—	50.9	36.2
Temperature	°C	18.4	—	17.9	18.0
Specific Conductivity	S/m	441.5	—	3.4	434.4
pH	—	7.16	—	6.73	6.78
Color	Color Units	90	—	5	10
Turbidity	NTU	1.41	—	2.32	0.94
Secchi Depth	Feet	3.38	—	—	—

¹ Sampling conducted August 31, 2017 during dry weather

² Sampling conduction October 25, 2017 during wet weather

6.0 HYDROLOGIC BUDGET AND NUTRIENT MODELING

The results of the hydrologic budget and nutrient load modeling for Walker Pond are presented in Appendix B.

The average annual precipitation for Walker Pond is estimated to be 45.45 inches. This value was used for precipitation inputs during the hydrologic modeling for Walker Pond. Estimated average water input to Walker Pond from surface water, groundwater, and direct precipitation is 0.332, 0.002, and 0.021 cfs, respectively, for a total average annual flow of approximately 0.355 cfs. This average annual value for flow will vary appreciably among seasons and weather conditions. Surface water flow contributes significantly (93.5%) to the total pond inflow, while groundwater inflow (0.5%) and direct precipitation (6%) to the pond surface contribute the remaining. The surface water flow can be further divided into dry weather flows (16%) and wet weather flows (84%). A summary of key hydrologic parameters for Walker Pond is presented in Table 5.

Table 5. Summary of Walker Pond Hydrology

Element	Value
Watershed Area	166.2 acres
Pond Area	6.0 acres
Pond Circumference	2,850 feet
Pond Volume	622,000 cubic feet
Average Groundwater Seepage Inputs	0.002 cfs
Average Direct Precipitation	0.021 cfs
Average Surface Water Inputs	0.332 cfs

Based on total pond volume (622,000 cubic feet) and the estimated flow through the system, average detention time was calculated to be roughly 20 days (0.056 years). Since detention time represents the duration of time necessary to exchange the volume of water in the pond one time this means that the water entering Walker Pond is retained for less than a day's time, on average. Flushing rate is the inverse of detention time and represents the number of times per year the pond volume is replaced; for Walker Pond the flushing rate is roughly 18 times per year.

A calculation of minimum nutrient load was made by multiplying the volume of the pond by its flushing rate and the average concentration of the nutrient observed during this study. The minimum phosphorus and nitrogen loads delivered to Walker Pond were determined to be 0.55 g/m²/yr (13 kg/yr) and 11.75 g/m²/yr (285 kg/yr), respectively, based on the in-pond nutrient concentrations observed during the study.

The actual load of phosphorus or nitrogen will exceed the estimated minimum load as a consequence of loss processes that reduce the in-pond concentration over time. A more detailed and realistic estimate of nutrient loading can be obtained by using a combination of actual field data and in-pond modeling theory (e.g., Vollenweider, 1975 and Reckhow, 1977). Nutrient loads are calculated based on nutrient values measured within the pond and hydraulic features of the system. Based on this approach, the predicted phosphorus load necessary to achieve the values found in Walker Pond ranges between 0.56 g/m²/yr (14 kg/yr) using the Vollenweider (1975) model and 1.15 g/m²/yr (28 kg/yr) using the Reckhow (1977) model. The average predicted phosphorus load for all models was 0.78 g/m²/yr (19 kg/yr). The nitrogen load

necessary to achieve the observed in-pond concentrations was estimated to be 14 g/m²/yr (340 kg/yr) (Bachmann 1980) in this manner (Table 6).

Vollenweider (1968) established criteria for calculating the phosphorus load below which no productivity problems were expected (permissible load) and above which productivity problems were almost certain to persist (critical load). These loading limits are also based on the hydraulic properties of the pond which were calculated from the hydrologic budget. The modeling results indicate that the existing conditions for phosphorus in Walker Pond exceed the permissible load and critical load. The average of phosphorus loads estimated for the pond through the in-pond models (19 kg/yr) is greater than the permissible level of 9 kg/yr and the critical level of 18 kg/yr. However, the closeness of the average estimated load to the critical load indicates that a small reduction in phosphorus could result in a large improvement in water clarity.

Similar loading limits for nitrogen have not been established, owing to the less predictable relationship between nitrogen, pond hydrology, and primary productivity. Although nitrogen data are very useful in understanding in-pond conditions and processes, phosphorus is the logical target of management actions aimed at maintaining water quality conditions in Walker Pond.

Table 6. Summary of Walker Pond Nutrient Loading Models

Nutrient	Model Output	Value
Phosphorus	Minimum Load	13 kg/yr
	Model Average Load	19 kg/yr
	Permissible Load	9 kg/yr
	Critical Load	18 kg/yr
Nitrogen	Minimum Load	285 kg/yr
	Bachmann (1980) Load	340 kg/yr

The land use based model developed for the Walker Pond watershed included the area immediately surrounding Walker Pond (Table 7, Figure 4). This modeling demonstrates that the majority of phosphorus and nitrogen entering the pond originates from developed land (largely residential).

Table 7. Average Annual Nutrient Load by Land Use within the Walker Pond Watershed*

Land Use Classification	Acres	Percentage of Phosphorus Load	Percentage of Nitrogen Load
Cropland and Pasture	—	0%	0%
Currently Developed (Residential/Commercial)	82.2	93%	64%
Forest	64.6	5%	30%
Open/Cleared Land	—	0%	0%
Transportation	0.2	0%	0%
Water	6.0	0%	0%
Wetland	13.1	1%	6%

**Export coefficients based on median value predicted by Reckhow et al. (1980), Lin (2004), and Rast and Lee (1978)*

The nutrient model results guided the management recommendations to focus on watershed-wide techniques as opposed to in-pond techniques. The modeling results demonstrate that even a small reduction in phosphorus load to Walker Pond would significantly reduce water quality issues. Therefore, the construction of stormwater best management practices (BMPs) throughout the watershed, development of vegetated buffers, or the implementation other phosphorus-load reducing techniques within the watershed are likely to be effective. This does not mean that pursuit of in-lake management actions is not advisable, but they are unlikely to translate into any significant changes to the in-pond conditions.

7.0 MANAGEMENT RECOMMENDATIONS

Walker Pond is impaired by poor water quality and nuisance aquatic plant growth, which limit recreational use such as boating and fishing. The following sections address management options that the Town can take to improve water quality and reduce nuisance plant growth.

7.1 Water Quality

Nutrient loading analysis indicates phosphorus is the limiting nutrient in Walker Pond. Phosphorus is the limiting nutrient in most Massachusetts freshwater systems; adding additional phosphorus directly contributes to algal growth, increased sedimentation and eventually to excessive aquatic weed growth as the pond becomes shallower. The current phosphorus load to Walker Pond is far beyond the critical level, suggesting that it will continue to eutrophy under current conditions. The sampling results indicate that high levels of phosphorus originating from the watershed are being delivered through stormwater runoff during rain events. Steps that the Town can take to reduce nutrient loading and improve water quality in Walker Pond are detailed in the subsections below.

7.1.1 Resident Education

Although not likely to make a significant improvement in water quality on its own, an education program can increase awareness of easy, low cost actions that residents can take to improve pond water quality by reducing nutrient runoff from their property. These actions include minimizing the impact of yard care (particularly fertilization), managing pet waste, developing rain gardens, and maintaining or planting buffers at the pond margins. A brochure to raise awareness among residents could be made available at the Needham Town Hall and/or distributed to watershed residents at minimal cost by mailing out with regular Town correspondence (e.g., water bills). The cost for the resident education program depends on the programs undertaken, but will likely cost less than \$3,000.

7.1.2 Stormwater Infrastructure

The Town can also help maintain water quality by committing to proper maintenance of stormwater infrastructure including catch basin cleaning, street vacuuming, and installation of modern BMPs. Modern BMPs include grassed swales, bio-infiltration designs, and created wetland systems for management runoff or peak runoff. The addition of stormwater detention and infiltration facilities at key runoff locations could greatly reduce phosphorus loading.

Additionally, the Town should ensure that further development and redevelopment within the watershed incorporates low impact development (LID) stormwater techniques to prevent additional deterioration. LID features include rain gardens and detention ponds. A study to identify sites that may be superior candidates for retrofitting with LID or other infiltrative stormwater management techniques would be expected to cost roughly \$15,000 to \$20,000.

7.1.3 Phosphorus Binding

Nutrient inactivation involves the addition of alum (aluminum sulfate) to surface water or sediment, with the intention of binding available phosphorus, thereby effectively “inactivating” it. Alternatives to alum, such as polyaluminum chloride, various ferric compounds, and a lanthanum-based proprietary agent called Phoslock are also available on the market. During treatment, bound phosphorus precipitates out of solution and settles into sediments, where it remains unavailable for biological activity. Inactivation agent that does not immediately bind with available phosphorus settles into the sediments, helping to capture additional phosphorus that may be released from sediments over time.

An in-pond low-dose alum treatment could be applied as needed to prevent or control an incipient algae bloom. This approach is the most appropriate for addressing occasional algae blooms and, due to the low dosage applied, can be implemented with minimal risk of undesired impact. Although low-dose alum treatments carry a higher cost than algaecide treatments, they provide an added benefit of removing phosphorus from the water column and may provide control over a longer period than algaecides. Algaecides target the algae, while alum targets the cause of the excessive algae. Low-dose alum treatments should be preceded, accompanied and followed by sampling of the water body targeted for treatment. Sampling should minimally include analysis of dissolved phosphorus, aluminum, pH, and alkalinity and the locations sampled should be representative of all areas to be treated.

Costs for treatment vary significantly depending on the type of inactivation agent used, the necessary dosage of the selected agent, and commodity prices at the time. Tributary dosing stations must be resupplied with the treatment agent as supplies are exhausted and may also require additional engineering design and permitting prior to implementation.

Phosphorus binding compounds can effectively reduce plant and algal growth. However, phosphorus binding compounds will only be effective for a short period of time if watershed sources of phosphorus continue to enter the lake. Treatment is relatively expensive if the effects are only expected to last a few years. In contrast, if watershed sources of phosphorus are greatly reduced, phosphorus binding could effectively reduce algal growth for one to two decades. Phosphorus binding treatment is more cost effective if the effects are expected to last over a longer timescale.

Nutrient inactivation requires an Order of Conditions issued under the Wetlands Protection Act. Therefore, a Notice of Intent (NOI) must be filed with the Needham Conservation Commission. In addition, the applicator must possess a Commercial Applicator License.

7.1.4 Algaecides

To our knowledge, algal blooms have not been problematic at Walker Pond, although this pond provides ideal conditions to support a bloom. Algal blooms can be associated with aquatic vegetation control due to the reduced competition for light in managed areas. Registered algaecides are primarily copper-based and result in almost immediate control of a broad spectrum of planktonic and filamentous algae. Algaecide treatments can be expected to cost on the order of \$250 to \$500/acre for most formulations, although some specialty formulations may exceed this cost.

Algaecides would only be recommended if algal growth were to reach nuisance levels. Algaecide application requires an Order of Conditions issued under the Wetlands Protection Act. Therefore, a NOI must be filed with the Needham Conservation Commission. In addition, the applicator must possess a

Commercial Applicator License and obtain a water body-specific “license to apply herbicides” prior to treatment.

7.1.5 Septic System

The town of Needham has sanitary sewer lines installed within much of the watershed of Walker Pond; however, these lines do not service many of the homes along Walker Lane. The Walker Lane homes are on septic systems, many of which are located within 100 feet of the shoreline of Walker Pond. If these were well maintained and functioning systems, this would not necessarily be problematic as much of the phosphorus generated from a wastewater system is adsorbed to soil as the water moves through the ground.

ESS has learned that most of these systems were installed over 50 years ago using piping known as Orangeburg pipe. Orangeburg was lightweight soft pipe made of bitumenized fiber layers of wood pulp and pitch pressed together. Orangeburg was a low cost alternative to metal for sewer lines and was later replaced by PVC or other economical plastic materials. Lack of strength causes pipes made of Orangeburg to fail more frequently than pipes made with other materials. The useful life for an Orangeburg pipe is about 50 years under ideal conditions, but has been known to fail in as little as 10 years. Orangeburg pipe is not a currently acceptable material for construction of drainage lines in Needham.



Failed piece of 4-inch Orangeburg pipe removed from septic system on Walker Lane. (Photo: T. Achituv)

Failing septic systems and drainage lines provide a significant conduit for nutrients and other pollutants to move from the septic system through the ground and into the pond. Obviously, repairing a failing system with breakouts is critical, but the underlying problem of the use of Orangeburg pipe for most of the homes along Walker Lane and the lack of a municipal sanitary sewer line along this road is likely to result in future failures and impacts to Walker Pond. Extending the sewer line beyond 67 Walker Lane to the other homes along Walker Lane would be beneficial to the water quality in Walker Pond given the anticipated future failures of Orangeburg pipe. At a cost of approximately \$100 per foot to extend this sewer line, the anticipated costs would be on the order of \$100,000.

7.2 Aquatic Vegetation

The surface of Walker Pond is covered with nuisance levels of native watermeal and duckweed. The bottom of Walker Pond is covered with nuisance levels of native coontail. Dense growths of coontail can outcompete native underwater vegetation, leading to loss of biodiversity. Exotic purple loosestrife was also observed along the shoreline of the pond. Options to control plant growth include the use of herbicides, macrophyte harvesting, water level control (drawdown), and dredging.

7.2.1 Herbicides

Herbicide treatment is usually the most cost-effective means by which to rapidly achieve the goal of reducing aquatic biomass over a large area. Herbicides may also be used over the long-term as part of a comprehensive management plan to treat areas of recurring infestations that are not readily controllable through other means. Over time, as control of the target species is achieved, management may be re-focused on other non-chemical methods, if desired.

The five herbicide options with potential to be useful for aquatic plant control at Walker Pond are fluridone, 2,4-D, imazamox, diquat dibromide, and flumioxazin. Each herbicide is detailed in the sections below.

Fluridone – Systemic Herbicide

Fluridone (tradename Sonar) is a systemic herbicide that reduces photosynthesis in affected plants, leading to the eventual starvation of the entire plant. Fluridone is a systemic herbicide that effective on coontail. Fluridone may be applied as a liquid formulation or as a slow-release pellet formulation.

The primary advantages of fluridone include the following:

- As a systemic herbicide that kills the plants and roots, fluridone may result in multiple seasons of control for some species of plants.
- Due to the slow action of this herbicide, plant dieback is gradual and dissolved oxygen sags and subsequent algal blooms are rarely problematic.
- Label restrictions are minimal.

The primary limitations of fluridone include the following:

- Concentrations must be maintained at treatment levels for as long as 90 days to achieve effective treatment. This can be difficult in water bodies with rapid flushing rates, although use of granular formulations or advanced liquid formulations (e.g., Sonar Genesis) may significantly improve treatment success.
- Coontail does not rely on roots and therefore there may not be a multi-year benefit to its use

Fluridone is one of the more expensive herbicides on the market and treatments typically cost \$800 to more than \$1,000/acre, depending on the formulation used and the need for “booster” treatments to maintain the concentration of the herbicide at an effective level over the treatment period. ESS does not recommend the use of fluridone for Walker Pond as there are other herbicide options that are superior.

2,4-D – Systemic Herbicide

2,4-D is a systemic herbicide that prevents affected plants from being able generate new tissue, resulting in eventual death of the plant. This herbicide is effective on coontail, and to a lesser degree watermeal and duckweed. Various formulations of 2,4-D are approved for aquatic use under multiple tradenames (e.g., Navigate) in Massachusetts.

The primary advantages of 2,4-D include the following:

- As a systemic herbicide, 2,4-D may result in multiple seasons of control.
- 2,4-D is selective for dicots, which means that it is effective on coontail while having less impact or no impact on desirable plant species such as native pondweeds.
- The required contact time for 2,4-D is significantly less than fluridone. Therefore, it may be easier to achieve effective control of target species in waterbodies with high flushing rates.

The primary limitations of 2,4-D include the following:

- The potential for migration through soils means 2,4-D cannot be used in Interim or Zone II Wellhead Protection Areas without significant additional hydrologic or hydrogeologic assessments. Additionally, setbacks from private wells are required to minimize the potential for 2,4-D treated water to be drawn into these wells. Setbacks vary from 25 to 200 feet, depending on geology.
- The coontail, watermeal and duckweed would not be impacted for multi-year control as these are not rooted plants.

2,4-D may be potentially useful for control of coontail and the duckweed and watermeal. 2,4-D has been on the market for decades and is one of the most cost-effective systemic herbicides available. It typically costs \$450 to \$500/acre to apply, not inclusive of any required monitoring. Given the potential for this herbicide to impact groundwater and the expected single-season effect of a treatment, ESS does not recommend 2,4-D over other herbicide options.

Flumioxazin – Contact Herbicide

Flumioxazin (trade name Clipper) works by inhibiting protoporphyrinogen oxidase (PPO), an enzyme necessary for photosynthesis. Inhibition of PPO causes destruction of plant cell plasma membranes in the presence of sunlight, resulting in rapid dieback of plant tissues.

The primary advantages of flumioxazin include the following:

- Flumioxazin a contact herbicide that provides rapid control coontail and will also inhibit growth of duckweed and watermeal.
- Minimal contact time is required for flumioxazin to be effective.

The primary limitations of flumioxazin include the following:

- As a contact herbicide, flumioxazin only kills the exposed parts of the plant (leaves and stem). Long-term control requires consistent reapplication to the same beds over several years.
- Because flumioxazin requires sunlight to work, it is less effective once a significant vegetative canopy has developed in the water column, due to the shading that develops. This may be an issue with the dense coontail growth in Walker Pond which underlies the duckweed and watermeal which also have a shading effect.
- Flumioxazin degrades rapidly in water, so it may result in poor control if not precisely applied to the targeted beds.
- Application is limited to no more than one-quarter of the total lake area for waterbodies in Massachusetts. Additionally, the treatment cannot be reapplied to the same area for at least three consecutive years. This is required to protect non-target species populations and prevent the development of resistant plant populations.

The cost of flumioxazin is significantly higher than most other contact herbicides, ranging up to \$1,000/acre for treatment. Treatment costs can sometimes be reduced if flumioxazin is used in combination with diquat. Given the limitations placed on this herbicide for partial pond treatments and

the need to control coontail throughout the entire pond, this herbicide is not ideal for Walker Pond at this time.

Diquat Dibromide – Contact Herbicide

Diquat dibromide, also known as diquat or by its tradename Reward, works quickly by interrupting the photosynthetic process, resulting in the dieback of leaf and stem cells. It offers immediate control of coontail and has shown to be somewhat effective at controlling duckweed and watermeal at higher doses.

The primary advantages of diquat include the following:

- Provides rapid control of targeted plant.
- Minimal contact time is required for diquat to be effective.

The primary limitations of diquat include the following:

- Diquat is not effective against all species.
- As a contact herbicide, diquat only kills the exposed parts of the plant (leaves and stem). The roots and crowns typically survive and put out another flush of growth in the following year (or even later in the same season). Long-term control requires consistent reapplication over several years.
- Application should be limited to no more than one-half of total pond area per label restrictions. This is required to prevent impacts to aquatic life due to rapid dieback of treated plants, which could result in temporary reductions in dissolved oxygen levels.

Diquat may be useful for control of coontail and to a lesser degree the watermeal and duckweed. Diquat is one of the least expensive herbicides on the market on a per-treatment basis. Treatments typically cost between \$200 and \$250/acre, therefore an annual cost of \$2,000 to \$2,500 (including mobilization costs) for Walker Pond should be anticipated. ESS does recommend the use of diquat as an herbicide alternative for managing excess weed growth in Walker Pond.

Permitting

Herbicide application requires an Order of Conditions issued under the Wetlands Protection Act. Therefore, a Notice of Intent (NOI) must be filed with the Needham Conservation Commission.

The applicator must possess a Commercial Applicator License and obtain a water body-specific License to Apply Herbicides prior to treatment.

7.2.2 Macrophyte Harvesting

Macrophyte harvesting covers a wide range of techniques, including mechanical harvesting, hand harvesting (often conducted by divers), and diver assisted suction harvesting (DASH). Of these, ESS recommends hand harvesting and DASH as precision techniques that can provide effective control over small areas. Mechanical harvesting is not recommended given the shallow depths of the pond. The two recommended techniques are discussed further below.

Mechanical Harvesting

Hydroraking uses a backhoe-like machine mounted on a barge to remove plants directly from pond sediments. Depending on the attachment used, plants are scooped, scraped, or raked from the bottom and deposited on shore for disposal. Rotovation is essentially underwater rototilling of pond sediments. Rotating blades cut through roots, shoots, and tubers, dislodging and expelling them from their growing locations. Some operations are also outfitted to collect some or most of the rotovated plant materials. Both hydroraking and rotovation are most useful for local control of water lilies and other plants with large rhizomes or tubers, as these methods can physically remove or destroy the bulky portions of the plant.

Hydroraking is not recommended for control of vegetatively reproducing species such as coontail. Costs to perform hydroraking vary from \$6,000 to more than \$12,000 per acre, if performed by a contractor. Given the presence of coontail, lack of nuisance lilies, and high cost of implementation, ESS does not recommend hydroraking as a management technique at Walker Pond.

Hand Harvesting

The simplest form of harvesting is hand pulling of selected plants. Depending on the depth of the water at the targeted site, hand harvesting may involve wading, snorkeling, or SCUBA diving. Pulled plants and fragments are placed in a mesh bag or container that allows for transport and disposal of the vegetation. Hand harvesting of submerged vegetation aims to remove entire plants, including the roots, thereby preventing re-growth in subsequent seasons. In practice, it is difficult to achieve 100 percent removal, except where beds are isolated or represent pioneer infestations. Where hand harvesting is used to control established weed beds, some re-growth should be expected in subsequent seasons. With diligence, control may be achieved after a few consecutive seasons of hand harvesting.

At Walker Pond, hand harvesting could be used to provide precision control of coontail around key access points, fishing areas, and the outlet. Hand harvesting of submerged aquatic plants can be conducted on smaller scales (up to a few hundred square feet) by trained homeowners and volunteers. Larger scale work is a major effort that may span weeks and is usually conducted by professionals. Costs for hand harvesting vary with bed density and expertise of the staff conducting the operation, but typically range from \$2,500 per acre for lighter infestations to more than \$4,000 per acre for very dense beds.

Due to the dense aquatic plant growths present throughout the entirety of Walker Pond, ESS would not recommend moving forward with an aquatic vegetation hand harvesting program at this time. However, hand harvesting is recommended to control purple loosestrife along the shoreline of Walker Pond because it is currently isolated to a small area. Hand harvesting may be useful in the future if aquatic plant densities can be reduced by other means (including chemical treatment and/or DASH harvesting) to the point where hand harvesting can be efficiently employed.

DASH

DASH is similar to hand harvesting but more efficient because entire plants are fed into a suction hose and lifted to a collection vessel at the surface, thereby significantly reducing the time it takes for the diver to handle and return plants to the surface. DASH can also reduce the potential for release of plant fragments.

At Walker Pond, DASH could be used to provide precision control of coontail as a non-herbicide alternative to clear target management areas up to a few acres in size. As with hand harvesting, DASH is unlikely to result in full control after a single harvesting event.

DASH costs approximately \$3,000 to \$6,000 per acre. The approximate cost for implementing this technique throughout the entire pond would be approximately \$18,000 to \$36,000. However, DASH costs within a targeted area would be expected to decline over time, as control is achieved.

Due to the higher annual costs of DASH harvesting over chemical treatment, ESS would not recommend this technique unless the Town would prefer a non-chemical approach to aquatic plant management.

7.2.3 Water Level Control (Drawdown)

Drawdown involves lowering the water level of a pond to expose shallow bottom sediments and associated plants (both native and non-native) to drying and/or freezing. It is most effective against species that reproduce by vegetative means, including coontail.

Ponds with rapid drop-offs to great depths tend to benefit most from drawdown. Due to the shallow bathymetry of Walker Pond, drawdown is only likely to provide limited control of aquatic invasive plant growth. Although drawdown can be conducted at any time, the interaction of drying and freezing that occurs with winter drawdown is usually most effective. Environmental restrictions and recreational use also limit the appropriate window for drawdown to the winter period. In Massachusetts, winters are often variable in their intensity and the ideal winter condition of very cold weather with limited snow cover is not likely to be achieved more frequently than every other year.

Drawdown could be achieved by removing boards at the outlet to the pond. However, due to the shallow nature of the pond (maximum depth 4 feet), aquatic animals, including fish and benthic invertebrates, may not be able to successfully overwinter in the reduced water depth. Furthermore, care would have to be taken to ensure that large amounts of sediment are not released into the outlet while the water level is being lowered.

Drawdown requires an Order of Conditions issued under the Wetlands Protection Act. Therefore, a NOI must be filed with the Needham Conservation Commission. ESS does not recommend drawdown as a management technique for improving Walker Pond as the approach would be detrimental to fish and wildlife while only being minimally beneficial towards controlling nuisance weed growth.

7.2.4 Dredging

Dredging works as a plant control technique when either a light limitation is imposed through increased water depth or when enough soft sediment is removed to reveal a less hospitable substrate for plant growth (e.g. hard bottom or other nutrient-poor substrate). Light limitation through increased depth is possible in Walker Pond, particularly since water clarity is already relatively poor.

Dredging in Walker Pond could be an effective long-term control technique for some nuisance aquatic plants within the targeted management area, but will be costly. Dredging would not be entirely effective at controlling coontail, watermeal, or duckweed as these plants are not rooted. Dredging would remove the accumulated sediment and nutrients that contribute to the nuisance weed growth in the pond.

The key factor influencing the approach and costs for moving forward with a dredge program at Walker Pond will be the ability to draw down the pond to allow for dredging within the drained basin to occur using conventional excavation equipment. This is most likely an environmentally sound and feasible approach if conducted during the winter months when wetland areas associated with the pond would be dormant. This approach would allow for sediment to be dewatered within the basin itself by pulling the sediment up to the margins of the pond to allow water to drain back into the main portion of the basin.

If conventional “dry” dredging is not determined to be feasible for Walker Pond due to equipment access issues or water management concerns, hydraulic dredging would be a viable alternative. Hydraulic dredging is generally more expensive than conventional dredging for limited projects and it would require a larger and more sophisticated containment area to dewater the sediment as it is removed from the pond.

Alternatively, advanced dewatering techniques such as the use of Geotubes (geotextile fabric for dewatering) or a belt-filter press machine could be used instead but these would add additional costs over traditional dewatering containment. All of these external sediment dewatering options will require land adjacent to the pond to be made available for the dewatering process. The Town’s public access lot may be adequate space for the use of a belt-filter press machine, but a larger area (such as the ball field) would be required for either the use of the Geotubes (>1.0 acres) or a standard dewatering basin (> 2 acre).

The amount of material to be removed and the type of disposal or reuse will also have a significant impact on the cost of dredging. Environmental permitting for dredging projects is moderately complex and will require up to a year before the project could receive all required approvals. Federal (U.S. Army Corps of Engineers 404), state (Massachusetts Environmental Protection Act Certificate and 401 Water Quality Certificate), and local permits (Notice of Intent filed for Order of Conditions from the Department of Natural Resources) are all required, and would necessitate considerable advance information and review time.

With an estimated soft sediment volume of approximately 25,000 cubic yards in Walker Pond, the cost of a dry or hydraulic dredging project for the entire pond would likely run between \$600,000 and \$1,000,000 (including permitting and design) for removal of all of the soft sediments, although not all sediments would necessarily need to be removed to achieve light limitation throughout the pond. Costs could increase if sediment cannot be reused or disposed of in the immediate vicinity of the pond.

Chemical content of the material to be dredged is an important consideration in determining the feasibility of reuse or disposal. Disposal costs could vary greatly depending on whether the material can be beneficially reused. If the material removed from the pond is clean, it is useful as a soil amendment. It is possible that the material may potentially be sold to local garden suppliers or landscape businesses which would make the project more economically feasible. However, material that is not suitable for beneficial use would need to either be amended with clean material (potentially from within the basin) to dilute the concentrations to suitable levels or trucked to a site for disposal. Either of these options would increase the cost of the project and, depending upon the level of implementation, could potentially make dredging a less cost-effective option.

If dredging is considered to be a viable long-term option, the next steps would be:

1. Assessment of specific scope and extent of dredge program including possible funding options.
2. Additional chemical and physical analysis of the sediments in areas targeted for dredging. One core will need to be collected specifically from the target dredge area for each 1,000 cubic yards of sediment proposed to be dredged.
3. Development of an engineering design for submission to permitting authorities.
4. Initiation of the permitting process including an Environmental Notification Form filing for MEPA (Massachusetts Environmental Policy Act) review, filing a local Notice of Intent under the Wetlands Protection Act, filing for a Section 401 Water Quality Certificate from MassDEP, and seeking a U.S. Army Corps of Engineers Section 404 Permit for dredging.

These four activities might be expected to cost up to \$50,000 for Walker Pond, but are essential if dredging is to be pursued as a management option. Additional design costs would include final engineering design following the permitting process (incorporating any accepted changes resulting from these reviews) along with the development of a bid specification package for the project.

Assuming the estimated sediment accumulation rate of 10 to 20 cy/year and a dredge volume of 25,000 cubic yards in the targeted management area, refill could be expected to take several hundred years. Using a conservative estimate of a 100-year project lifespan, the annualized dredging cost of a conventional dredging project would be \$6,000 to \$10,000 per year. This estimate is based entirely on measured TSS load and could be higher or lower depending on pond circulation patterns, in-pond algae and macrophyte production, and the occurrence of catastrophic weather events.

8.0 SUMMARY OF MANAGEMENT RECOMMENDATIONS

Although Walker Pond is not a large recreational waterbody within the Town of Needham, it has the potential to support boating and fishing as well as skating in the winter months. These recreational endeavors were historically afforded by the pond, but due to nutrient and sediment loading from the pond's watershed, the waterbody has significantly deteriorated in recent years.

There are a range of options available for improving the pond. The simplest, most economical and quickest option would be to control excessive weed growth with herbicides. ESS does recommend the application of the contact herbicide diquat as one approach to alleviate the weed problems in the pond. Costs for this would be on the order of \$2,500 per year and would need to occur indefinitely.

ESS also recommends improving the incoming water quality by making improvements to the stormwater management system within the watershed. Next steps in this regard would be to conduct a study of the watershed (\$20,000) to identify suitable locations for infiltrating runoff efficiently. Additionally, educating watershed residents on proper land stewardship with a targeted brochure would be beneficial, to a limited degree, at a cost of about \$3,000.

ESS recommends that the Town consider extending the sewer line along Walker Lane to capture sewage effluent from systems that are currently or will inevitably fail over the coming years due to failure of construction materials such as Orangeburg pipe. Costs for this are estimated to be on the order of \$100,000, exclusive of design and permitting.

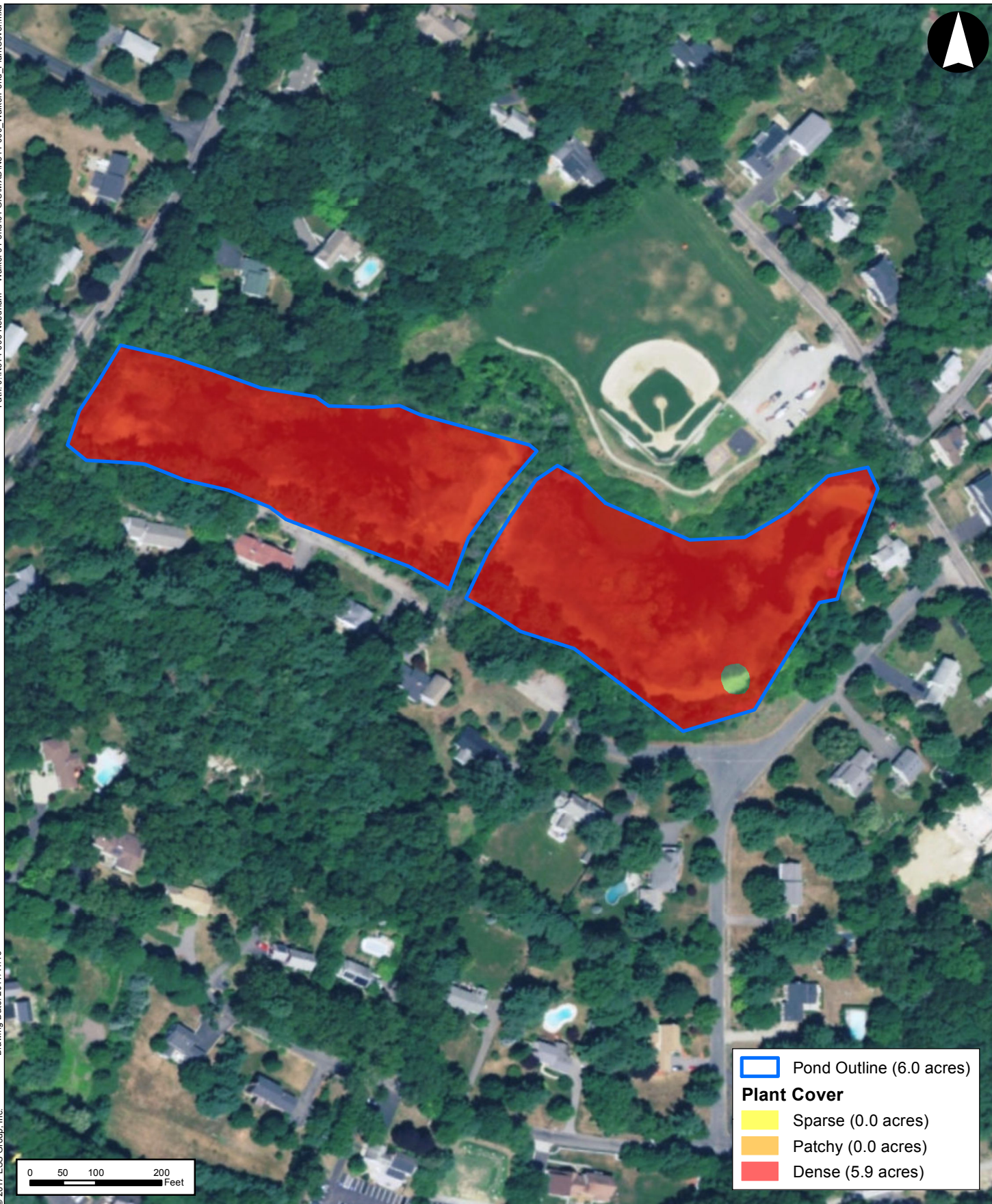
Finally, ESS does recommend that the Town consider dredging as a longer-term solution that can rectify the weed growth and reset the pond. Dredging alone will not improve the quality of the water entering the pond, but it will deepen the pond, remove accumulated organic sediment and nutrients, and if dredged to sufficient depth, would preclude the growth of rooted plants. Although the costs to dredge Walker Pond could approach \$1 million, the project would be expected to benefit the pond for more than 100 years. Next steps in this regard would be to determine the potential for funding a project of this magnitude within Town and to undertake the necessary design and permitting for the project.

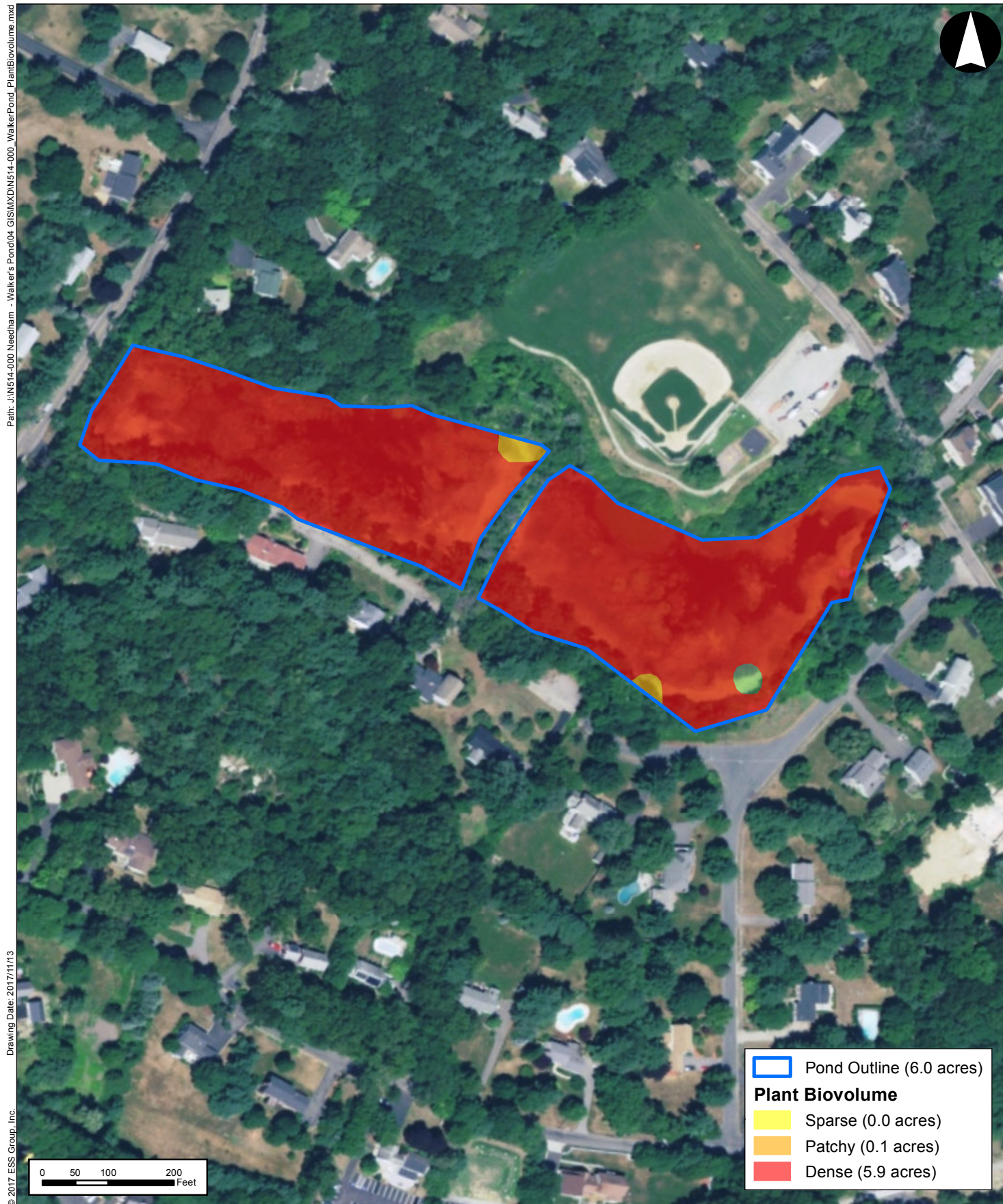
9.0 REFERENCES

- Bachmann, R.W. 1980. The role of agricultural sediments and chemicals in eutrophication. *Journal of Water Pollution Control Federation* 52:2425–2431.
- Lin, J.P. 2004. Review of Published Export Coefficient and Event Mean Concentration (EMC) Data. ERDC TN-WRAP-04-3. U.S. Army Corps of Engineers. Engineer Research and Development Center, Vicksburg, Mississippi.
- Rast, W. and G. F. Lee. 1978. Summary analysis of the North American (US Portion) OECD eutrophication project: nutrient loading - lake response relationships and trophic state indices., EPA-600/3-78-008, US EPA Corvallis, Oregon.
- Reckhow, K. 1977. Phosphorus models for lake management. Ph.D. dissertation, Harvard University, Cambridge, Massachusetts.
- Reckhow, K.H., M. Beaulac, and J. Simpson, 1980. Modeling Phosphorus Loading and Lake Response Under Uncertainty: A Manual and Compilation of Export Coefficients. U.S. Environmental Protection Agency, EPA 440/5-80-011, 214 pg.
- Town of Needham. 2016. Director's Report, Parks and Recreation Commission. <http://www.needhamma.gov/ArchiveCenter/ViewFile/Item/5356>
- Vollenweider, R.A. 1968. Scientific Fundamentals of the Eutrophication of Lakes and Flowing Waters, with Particular Reference to Nitrogen and Phosphorus as Factors in Eutrophication. Technical Report to OECD, Paris, France.
- Vollenweider, R.A. 1975. Input-output models with special references to the phosphorus loading concept in limnology. *Schweizerische Zeitschrift für Hydrologie* 37:53-62.

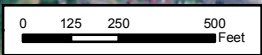
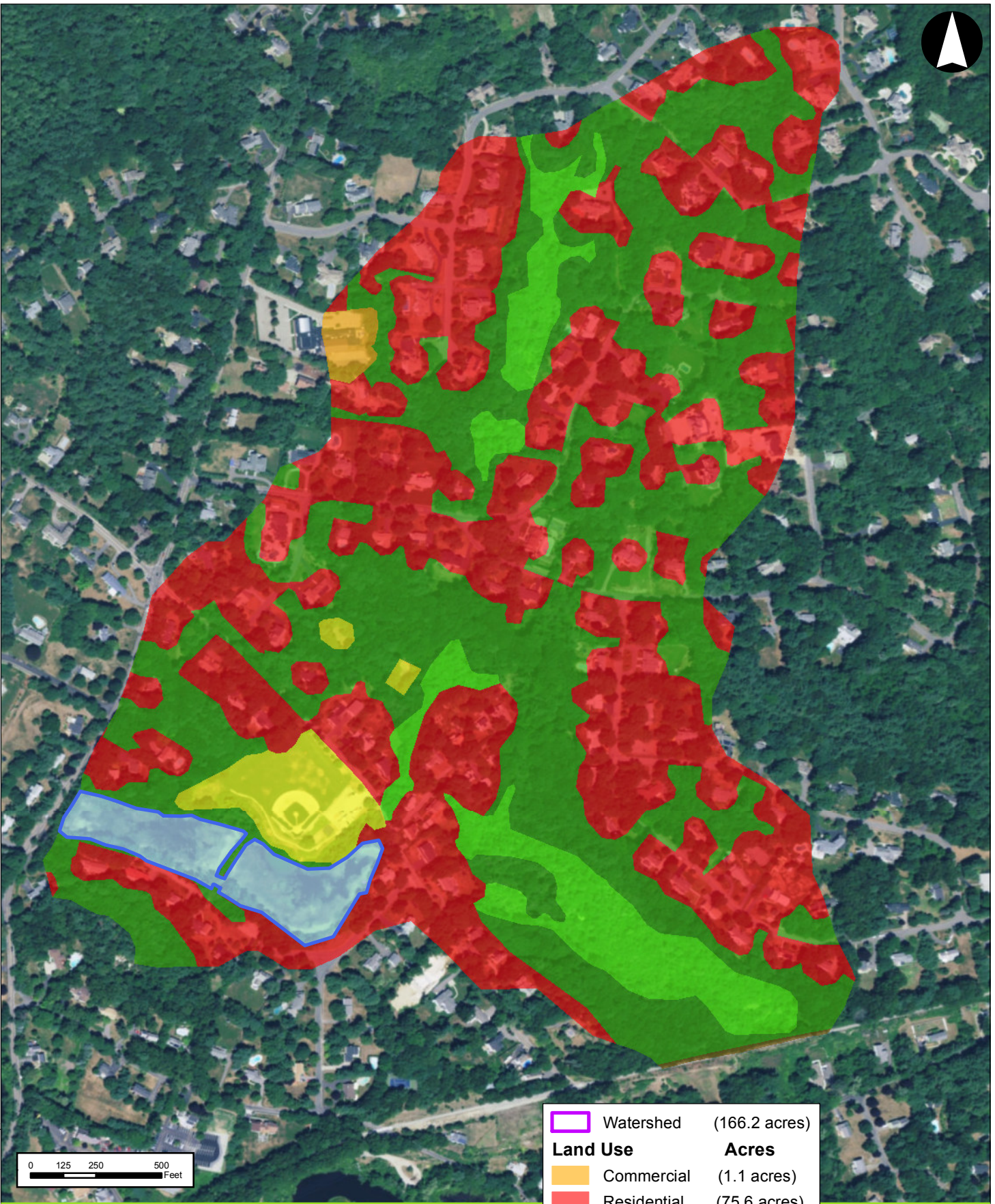
Figures











	Watershed	(166.2 acres)
Land Use		Acres
	Commercial	(1.1 acres)
	Residential	(75.6 acres)
	Recreation	(5.5 acres)
	Transportation	(0.2 acres)
	Forest	(64.6 acres)
	Wetland	(13.1 acres)
	Water	(6.0 acres)

Land Use

Figure 4

Appendix A

Water Quality Laboratory Reports



Monday, September 11, 2017

Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: WALKERS POND
Sample ID#s: BY94224 - BY94225

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

September 11, 2017

FOR: Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: SW
Analyzed by: see "By" below

Date

08/31/17
09/01/17

Time

13:05
15:20

Laboratory Data

SDG ID: GBY94224
Phoenix ID: BY94224

Project ID: WALKERS POND
Client ID: DEEP HOLE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, Dissolved as P Low Level	0.025	0.003	mg/L	0.5	09/07/17	JR	SM4500PE-99
Nitrate-N	< 0.02	0.02	mg/L	1	09/01/17 18:58	MI	E353.2
Nitrogen Tot Kjeldahl	0.89	0.10	mg/L	1	09/07/17	WHM	E351.1
Phosphorus, as P	0.042	0.003	mg/L	0.5	09/07/17	JR	SM4500PE-99
Total Suspended Solids	< 5.0	5.0	mg/L	1	09/06/17	KH	SM2540D-97,-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Dissolved-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services.

This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

September 11, 2017

Reviewed and Released by: Bobbi Aloisa, Vice President



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

September 11, 2017

FOR: Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SEDIMENT
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: SW
Analyzed by: see "By" below

Date Time

08/31/17 14:30
09/01/17 15:20

Laboratory Data

SDG ID: GBY94224
Phoenix ID: BY94225

Project ID: WALKERS POND
Client ID: DEEP HOLE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Total Solids @ 104C	8.34	0.1	%	1	09/06/17	KH	SM2540B-97
Phosphorus, Total	545	6.0	mg/Kg	1	09/07/17	JR	SM4500PE-99

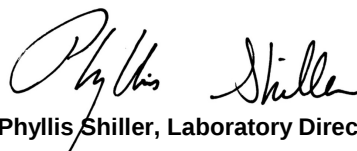
RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services.

This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

September 11, 2017

Reviewed and Released by: Bobbi Aloisa, Vice President



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

September 11, 2017

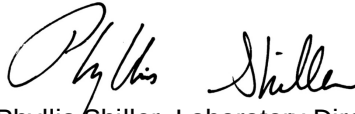
QA/QC Data

SDG I.D.: GBY94224

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 400373 (mg/L), QC Sample No: BY93735 (BY94224)													
Total Suspended Solids	BRL	5.0	<5.0	<14	NC	95.0						85 - 115	
QA/QC Batch 400510 (mg/L), QC Sample No: BY93906 (BY94224)													
Phosphorus, as P	BRL	0.01	<0.010	<0.01	NC	103			112			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 400122 (mg/L), QC Sample No: BY94001 (BY94224)													
Nitrate-N	BRL	0.02	<0.02	<0.02	NC	99.6			101			90 - 110	20
QA/QC Batch 400542 (mg/Kg), QC Sample No: BY94225 (BY94225)													
Phosphorus, Total as P	BRL	0.50	545	545	0	112						75 - 125	30
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 400216 (), QC Sample No: BY94225 (BY94225)													
Total Solids	BRL	0.1	8.34	8.51	2.00	100						75 - 125	30
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 400486 (mg/L), QC Sample No: BY94306 (BY94224)													
Nitrogen Tot Kjeldahl	BRL	0.10	25.8	26.4	2.30	106			108			85 - 115	20

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference


Phyllis Shiller, Laboratory Director
September 11, 2017

Monday, September 11, 2017

Criteria: None

State: MA

Sample Criteria Exceedances Report

GBY94224 - ESSGRPRI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----------------	-------------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

September 11, 2017

SDG I.D.: GBY94224

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

CHAIN OF CUSTODY RECORD



587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Cooler: Yes ☒ No ☐
 Coolant: IPK ☒ ICE ☐ No ☐

Temp: °C Pg of

Data Delivery:

☐ Fax #:
☒ Email: phoenix@phoenixlabs.com

Project: Walker Pond, Hallowell, ME
 Report to: Matt Lebowitz
 Invoice to: Bachman Cabal
 Phone #: (401) 330-1244
 Fax #:

Customer: ESS Corp
 Address: 16 Hemingway Drive, 2nd Floor
East Providence, RI 02915

This section MUST
 be completed with
 Bottle Quantities.

Client Sample - Information - Identification
 Sampler's Signature: [Signature] Date: 8/31/17
Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WM=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe
 OIL=Oil B=Bulk L=Liquid

Analysis Request	GL VOA Vials (Methanol)	GL VOA Vials (As Is)	GL Amber 1000ml (As Is)	PL H2SO4 250ml (As Is)	PL HNO3 250ml (As Is)	PL H2SO4 250ml (As Is)	PL HNO3 250ml (As Is)	Bacteria (as Is)	Bacteria (w/10)
<u>Phosphorus</u>									
<u>As</u>									
<u>Se</u>									
<u>Oil</u>									
<u>Lead</u>									
<u>Copper</u>									
<u>Cadmium</u>									
<u>Chromium</u>									
<u>Vanadium</u>									
<u>Barium</u>									
<u>Manganese</u>									
<u>Nickel</u>									
<u>Silver</u>									
<u>Gold</u>									
<u>Mercury</u>									
<u>Antimony</u>									
<u>Bismuth</u>									
<u>Chlorine</u>									
<u>Fluorine</u>									
<u>Bromine</u>									
<u>Iodine</u>									
<u>Sulfur</u>									
<u>Phosphorus</u>									
<u>As</u>									
<u>Se</u>									
<u>Oil</u>									
<u>Lead</u>									
<u>Copper</u>									
<u>Cadmium</u>									
<u>Chromium</u>									
<u>Vanadium</u>									
<u>Barium</u>									
<u>Manganese</u>									
<u>Nickel</u>									
<u>Silver</u>									
<u>Gold</u>									
<u>Mercury</u>									
<u>Antimony</u>									
<u>Bismuth</u>									
<u>Chlorine</u>									
<u>Fluorine</u>									
<u>Bromine</u>									
<u>Iodine</u>									
<u>Sulfur</u>									

Relinquished by: <u>[Signature]</u>	Accepted by: <u>[Signature]</u>	Date: <u>9/17</u>	Time: <u>9:35</u>	RI: ☐ Direct Exposure (Residential) ☐ GW ☐ Other	CT: ☐ RCP Cert ☐ GW Protection ☐ SW Protection ☐ GA Mobility ☐ GB Mobility ☐ Residential DEC ☐ I/C DEC ☐ Other	MA: ☐ MCP Certification ☐ GW-1 ☐ GW-2 ☐ GW-3 ☐ S-1 ☐ S-2 ☐ S-3 ☐ MWRA eSMART ☐ Other	Data Format: ☒ Excel ☐ PDF ☐ GIS/Key ☐ EQUIS ☐ Other
Comments, Special Requirements or Regulations: <u>Note low detect on phosphorus - 0.01 mg/L or better.</u> <u>(sample water)</u>				Turnaround: ☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ Standard ☐ Other		State where samples were collected: <u>MA</u>	
* SURCHARGE APPLIES							



Monday, November 06, 2017

Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: NS14-000.01
Sample ID#s: BZ27251 - BZ27252

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

November 06, 2017

FOR: Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by: ML
Received by: B
Analyzed by: see "By" below

Date

10/25/17
10/25/17

Time

9:45
17:00

Laboratory Data

SDG ID: GBZ27251
Phoenix ID: BZ27251

Project ID: NS14-000.01
Client ID: INLET

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, Dissolved as P Low Level	0.056	0.003	mg/L	0.5	11/01/17	JR	SM4500PE-99
Nitrate-N	< 0.02	0.02	mg/L	1	10/25/17 22:28	MI	E353.2
Nitrogen Tot Kjeldahl	0.68	0.10	mg/L	1	11/02/17	WHM	E351.1
Phosphorus, as P	0.139	0.003	mg/L	0.5	11/01/17	JR	SM4500PE-99
Total Suspended Solids	6.0	5.0	mg/L	1	10/27/17	KH	SM2540D-97,-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Dissolved-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services.

This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

November 06, 2017

Reviewed and Released by: Bobbi Aloisa, Vice President



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

November 06, 2017

FOR: Attn: Mr Matt Ladewig
ESS Group Inc.
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by: ML
Received by: B
Analyzed by: see "By" below

Date

10/25/17
10/25/17

Time

9:00
17:00

Laboratory Data

SDG ID: GBZ27251
Phoenix ID: BZ27252

Project ID: NS14-000.01
Client ID: OUTLET

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, Dissolved as P Low Level	0.038	0.003	mg/L	0.5	11/02/17	JR	SM4500PE-99
Nitrate-N	< 0.02	0.02	mg/L	1	10/25/17 22:29	MI	E353.2
Nitrogen Tot Kjeldahl	0.97	0.10	mg/L	1	11/03/17	WHM	E351.1
Phosphorus, as P	0.054	0.003	mg/L	0.5	11/02/17	JR	SM4500PE-99
Total Suspended Solids	< 5.0	5.0	mg/L	1	10/27/17	KH	SM2540D-97,-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Dissolved-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services.

This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

November 06, 2017

Reviewed and Released by: Bobbi Aloisa, Vice President



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

November 06, 2017

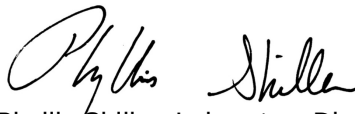
QA/QC Data

SDG I.D.: GBZ27251

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 407352 (mg/L), QC Sample No: BZ26815 (BZ27251)													
Total Suspended Solids	BRL	5.0	62	63	1.60	98.0						85 - 115	
QA/QC Batch 407080 (mg/L), QC Sample No: BZ26824 (BZ27251, BZ27252)													
Nitrate-N	BRL	0.02	<0.02	<0.02	NC	102			97.5			90 - 110	20
QA/QC Batch 407995 (mg/L), QC Sample No: BZ27037 (BZ27251)													
Nitrogen Tot Kjeldahl	BRL	0.10	0.77	0.74	4.00	99.8			101			85 - 115	20
QA/QC Batch 407353 (mg/L), QC Sample No: BZ27037 (BZ27252)													
Total Suspended Solids	BRL	5.0	8.0	8.0	NC	94.0						85 - 115	
QA/QC Batch 407897 (mg/L), QC Sample No: BZ27038 (BZ27251)													
Phosphorus, as P	BRL	0.01	0.218	0.22	0.90	104			109			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 408030 (mg/L), QC Sample No: BZ27257 (BZ27252)													
Phosphorus, as P	BRL	0.01	2.50	2.48	0.80	98.3			96.6			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 408196 (mg/L), QC Sample No: BZ27287 (BZ27252)													
Nitrogen Tot Kjeldahl	BRL	0.10	0.63	0.63	0	109			104			85 - 115	20

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference


Phyllis Shiller, Laboratory Director
November 06, 2017

Monday, November 06, 2017

Criteria: None
State: MA

Sample Criteria Exceedances Report
GBZ27251 - ESSGRPRI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----------------	-------------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

November 06, 2017

SDG I.D.: GBZ27251

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Appendix B

Hydrologic Budget and Nutrient Modeling Spreadsheets

Walker Pond - HYDROLOGIC ASSESSMENT

Watershed for Walker Pond =	166.2 acres	7,239,672 SF	0.260 mi2	Source:
Pond Area	6.0 acres	261,360 SF	24,281 meters2	ESS delineation based on MassGIS USGS topos
Area of Watershed - Pond Area	160.2 acres	6,978,312 SF		ESS, 2011, calculation in GIS
Lake Circumference	2,850.0 feet			ESS, 2011, calculation in GIS
Lake Volume	622,036.8 cubic feet		17,614.1 meters3	ESS, 2011, calculation based on GIS and field data
Area influenced by seepage	14,250.0 ft2	= 1,324 m2		ESS estimate derived from pond circumference
Groundwater (data)	4 l/m2/day	= 0.141 cf/m2/day		ESS estimate based on unpublished data
		= 186.9 cf/day		Calculation
		= 0.002 cfs		Calculation
Annual PPT/yr	45.45 inches			Natick Weather station, 7.08 miles from Needham, from www.idcide.com
Annual PPT - ET	30.45	2.54 ft/yr	0.02 cfs	Precip on pond minus regional ET
Runoff (watershed)	15.00	1.25 ft/yr	0.28 cfs	Calculation
Base Flow (Streams) as measured during dry weather - Average =		0.06 cfs		No flow during dry weather, field data

	Ground	PPT	Surfacewater	Total	
Dry	0.002	0.000	0.055	0.057	Estimated range of total annual input into lake:
Wet	0.000	0.021	0.277	0.298	(1.5 to 2 cfs/sq mi of watershed) =
Total	0.002	0.021	0.332	0.355 cfs	0.39 to 0.52 cfs

Walker Pond, Needham, Massachusetts - Existing Conditions

IN-LAKE MODELS FOR PREDICTING PHOSPHORUS LOADS AND CONCENTRATIONS

THE TERMS			THE MODELS				LOAD ANALYSIS			PREDICTED WATER CLARITY				
SYMBOL	PARAMETER	UNITS	DERIVATION	VALUE			NAME	FORMULA	PREDICTION CONC. (ppb)	LOAD (g/m2/yr)	MODEL	ESTIMATED LOAD (kg/yr)	ESTIMATED LOAD (mg/L)	PREDICTED CHL AND WATER CLARITY
TP	Lake Total Phosphorus Conc.	ppb	From data or model	42	Enter Value		Mass Balance	TP=L/(Z(F))*1000	42		Phosphorus			
L	Phosphorus Load to Lake	g P/m2/yr	From hydro & sub-watershed model	0.55	Enter Value	Assumes 100%	(minimum load)	L=TP(Z)(F)/1000		0.55	Mass Balance (no loss)	13		
TPin	Influent (Inflow) Total Phosphorus	ppb	From data	139	Enter Value		Kirchner-Dillon 1975	TP=L(1-Rp)/(Z(F))*1000	28					MODEL
TPout	Effluent (Outlet) Total Phosphorus	ppb	From data	54	Enter Value		(K-D)	L=TP(Z)(F)/(1-Rp)/1000		0.83	Kirchner-Dillon 1975	20		Value
I	Inflow	m3/yr	From data	317,089	Enter Value		Vollenweider 1975	TP=L/(Z(S+F))*1000	41					Mean Chlorophyll (ug/L)
A	Lake Area	m2	From data	24281	Enter Value		(V)	L=TP(Z)(S+F)/1000		0.56	Vollenweider 1975	14		Dillon and Rigler 1974
V	Lake Volume	m3	From data	17614	Enter Value		Reckhow 1977 (General)	TP=L/(11.6+1.2(Z(F)))*1000	16					Jones and Bachmann 1976
Z	Mean Depth	m	Volume/area	0.725423			(Rg)	L=TP(11.6+1.2(Z(F)))/1000		1.15	Reckhow 1977 (General)	28		Oglesby and Schaffner 1978
F	Flushing Rate	flushings/yr	Inflow/volume	18.0021			Larsen-Mercier 1976	TP=L(1-Rlm)/(Z(F))*1000	34					Modified Vollenweider 1982
S	Suspended Fraction	no units	Effluent TP/Influent TP	0.388489			(L-M)	L=TP(Z)(F)/(1-Rlm)/1000		0.68	Larsen-Mercier 1976	16		"Maximum" Chlorophyll (ug/L)
Qs	Areal Water Load	m/yr	Z(F)	13.05914			Jones-Bachmann 1976	TP=0.84(L)/(Z(0.65+F))*1000	34					Modified Vollenweider (TP) 1982
Vs	Settling Velocity	m	Z(S)	0.281819			(J-B)	L=TP(Z)(0.65+F)/0.84/1000		0.68	Jones-Bachmann 1976	16		Vollenweider (CHL) 1982
R	Retention Coefficient (from TP)	no units	(TPin-TPout)/TPin	0.611511										Mod. Jones, Rast and Lee 1979
Rp	Retention Coefficient (settling rate)	no units	((Vs+13.2)/2)/(((Vs+13.2)/2)+Qs)	0.340449			Average of Model Values		31		Model Average			Secchi Transparency (M)
Rlm	Retention Coefficient (flushing rate)	no units	1/(1+F^0.5)	0.190735			(without mass balance)			0.78	(without mass balance)	19	0.0596	Oglesby and Schaffner 1978 (Avg)
							Reckhow 1977 (Anoxic)	TP=L/(0.17(Z)+1.13(Z(F)))*1000	37					Modified Vollenweider 1982 (Max)
							(Ra)	L=TP(0.17(Z)+1.13(Z(F)))/1000		0.62	Reckhow 1977 (Anoxic)	15		
							From Vollenweider 1968							
							Permissible Load	Lp=10^(0.501503(log(Z(F)))-1.0018)		0.36	Permissible Load	9	0.0277	Permissible Conc.
							Critical Load	Lc=2(Lp)		0.72	Critical Load	18	0.0553	Critical Conc.
ADDENDUM FOR NITROGEN														
TN	Lake Total Nitrogen Conc.	ppb	From data or model	900	Enter Value		Mass Balance	TN=L/(Z(F))*1000	900		Nitrogen			
L	Nitrogen Load to Lake	g N/m2/yr	From data or model	11.75	Enter Value	Assumes 100%	(minimum load)	L=TN(Z)(F)/1000		11.75	Mass Balance (no loss)	285		
C	Coefficient of Attenuation	fraction/yr	2.7183^(0.5541(ln(F))-0.367)	3.437099			Bachmann 1980	TN=L/(Z(C+F))*1000	756					
								L=TN(Z)(C+F)/1000		14.00	Bachmann 1980	340	1.07	(check - av in pond nitrogen concentration - mg/L)

Average Annual Nutrient Load by Land Use within the Walker Pond Watershed

Land Use Classification	Acres	P load rate (kg/ha/yr)	P Load rate (kg/acre/yr)	Phosphorus Load (kg/yr)	Percentage of Phosphorus Load	N load rate (kg/ha/yr)	N Load rate (kg/acre/yr)	Nitrogen Load (kg/yr)	Percentage of Nitrogen Load
Cropland and Pasture	0.0	0.50	1.24	0.0	0%	5.0	12.35	0.0	0%
Currently Developed (Residential/Commercial)	82.2	1.00	2.47	203.1	93%	5.0	12.35	1015.6	64%
Forest	64.6	0.08	0.19	12.0	5%	3.0	7.41	478.9	30%
Open/Cleared Land	0.0	0.10	0.25	0.0	0%	3.0	7.41	0.0	0%
Transportation	0.2	1.00	2.47	0.5	0%	5.0	12.35	2.5	0%
Water	6.0	0.00	0.00	0.0	0%	0.0	0.00	0.0	0%
Wetland	13.1	0.10	0.25	3.2	1%	3.0	7.41	97.1	6%
Preliminary Total Annual Nutrient Load				218.8				1594.0	
Attenuation Coefficient (% of load reaching lake)				9%				22%	
Adjusted Total Annual Nutrient Load				19.7				350.7	

Notes: Phosphorus export coefficients based on median value predicted by Reckhow et al. (1980), Lin (2004), and Rast and Lee (1978)

From: Tara Gurge
Sent: Monday, November 18, 2019 3:22 PM
To: Timothy McDonald <tmcdonald@needhamma.gov>
Subject: FW: 57 Walker Lane follow-up on updated estimate
Importance: High

Tim –

As discussed, I met with the Town Engineer, Tony DelGaizo, last Friday and here is the total cost estimate, which also includes those 'gray area' costs, that the BOH wanted more clarification on. See below:

- In reference to the [REDACTED] estimate, specifically the items that were listed as 'not included', Tony went down and reviewed all these items with me and mentioned that these items would only add up to another approximate \$1,000.
- Tony also explained that if the homeowner was able to have his direct neighboring abutter go in with him on the cost with also having them add a municipal sewer connection be brought up to his property, specifically the property located at #67 Walker Lane, that would be an additional high estimate of approximately \$15,000.
- Tony will be conducting a perc test this week at the Walker Lane site to determine if there would be any additional costs associated due to the finding of ledge on site. (TBD)

SO Tony mentioned that the total cost of connecting BOTH properties to municipal sewer, would be around \$70,044. (\$54,044 -orig. estimate from Jones) + \$1,000 + \$15,000).

And Tony also stressed that a new alternative FAST nitrogen eliminating septic system (which would need to be installed in this location given the proximity to Walker Pond, etc.--See Conservations report that I forwarded to you), would potentially cost this homeowner around \$50,000 PLUS the annual inspection maintenance costs that would be associated with the maintenance of this alternative system. So splitting this municipal sewer cost with his neighbor would only potentially cost him \$35,000. (Which is a lot less than the cost of the alternative septic system installation.)

Tony is having his guys out to conduct the perc testing this week to determine if there is any potential ledge on site. He will let us know once that has been assessed, and whether any additional costs would need to be added due to the findings of any ledge.

Just a reminder that the homeowner stated at one of our meetings that the \$30-35K cost estimate for a municipal sewer connection would be something that he'd be willing to cover in order to meet this BOH Enforceable Agreement order requirement.

I will forward any additional info. I receive from Tony to you once he conducts his follow-up site visit this week.

Let me know if you need any additional information or if you have any follow-up questions on that. And I will reach out to Tony again on whether he'll be available to join us at our next BOH meeting, in case the board as any other specific engineering questions for him. (OR if he's not available, maybe we can get Tom Ryder to attend.)

Thanks,
Tara





Tara Gurge

From: Tara Gurge
Sent: Friday, May 17, 2019 11:07 AM
To: 'Tal Achituv'
Subject: RE: FW:URGENT- 57 walker lane HEARING WILL
Importance: High

Tal-

Thanks for the follow-up email. It is very helpful to know that these meetings and these sewer connection discussions are taking place. I was not made aware of that. When is your next meeting? The Health Division would like to attend. Let me know. I will also follow-up with the Town Engineer with this latest information that you provided.

Also – Just a reminder. Here are the email excerpts noted below that were discussed and agreed to when we allowed your pipe repair to be conducted, along with my follow-up email correspondence from my contact a MassDEP. This Enforceable Agreement Order was given by the Town of Needham Engineering AND Health Depts. back in November 2017, as you may recall. (See highlighted area.) See below:

On Thu, Nov 30, 2017 at 4:37 PM Tara Gurge <TGurge@needhamma.gov> wrote:

Tal -

Great – So I'm taking this as the most updated version. I just got off the phone with Tom Ryder from our Town Engineering Dept. **He is in agreement, that we can allow this pipe repair between the home and the septic tank, as long as you agree to sign an 'Enforceable Agreement' with the Health Department** which states that you will be connecting to the town municipal sewer system in the near future (next couple of years.)

Email from MassDEP – After we received your follow-up info. that you provided to me from your contacts at MassDEP, we again reached back out to our contact below and asked her if indeed **the septic system pipes, along with the septic system components, are all part of the complete septic system, and that if a pipe fails due to its age, then that is also considered part of the complete septic system,** thus a new compliant Title Five septic system needs to be installed and/or the property must be connected to the municipal sewer system? And here was her direct response. SEE BELOW:

Email excerpt from Claire Golden @ Mass DEP – (see attached - sent 3/13/19)
There is an existing Enforceable Agreement for the upgrade which was consented to. The Enforceable Agreement is, to the best of my knowledge, in full force and effect.

The upgrade needs to happen either by enforcing the Agreement and/or pursuing other enforcement options. With orangeburg pipe you're likely looking at a 60 year old system that has outlasted standard systems and needs an upgrade.

I hope this helps.

Claire



Goal need a proposal to be submitted (as stated in recent email) - To extend order. Got to approve (show evidence that working to connect)

Claire A. Golden, EEIV
MassDEP Wastewater Management and Surface Water Permitting Programs
205B Lowell St
Wilmington, MA 01887
978-694-3244
978-694-3499 (fax)
claire.golden@mass.gov

Follow MassDEP on Twitter at <http://twitter.com/MassDEP>
Visit our website at www.mass.gov/eea/agencies/massdep

PLEASE NOTE: If you cannot meet this Enforceable Agreement deadline, we must know this ASAP. We may be able to work with you on giving you a one-time extension, but you must submit a detailed sewer connection proposal to all Town Depts. involved in giving us all details on this project, which must also include strict timeframes for this sewer connection. This proposal will need to be submitted to the Board of Health for their final approval in a timely manner. (The BOH meets on a monthly basis.)

Please get back to me and let me know if you have any follow-up questions on that requirement. I will also need to hear back from you on when your next meeting is scheduled for, and where this meeting is taking place, etc.

Thanks for your continued cooperation in this urgent public health matter.

Thanks,



TARA E. GURGE, R.S., C.E.H.T., M.S.
ASSISTANT PUBLIC HEALTH DIRECTOR
Needham Public Health Division
Health and Human Services Department
178 Rosemary Street
Needham, MA 02494
Ph- (781) 455-7940; Ext. 211/Fax- (781) 455-7922
Mobile- (781) 883-0127
Email - tgurge@needhamma.gov
Web- www.needhamma.gov/health



 please consider the environment before printing this email

STATEMENT OF CONFIDENTIALITY

This e-mail, including any attached files, may contain confidential and privileged information for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by others is strictly prohibited. If you are not the intended recipient (or authorized to receive information for the recipient), please contact the sender by reply e-mail and delete all copies of this message. Thank you.

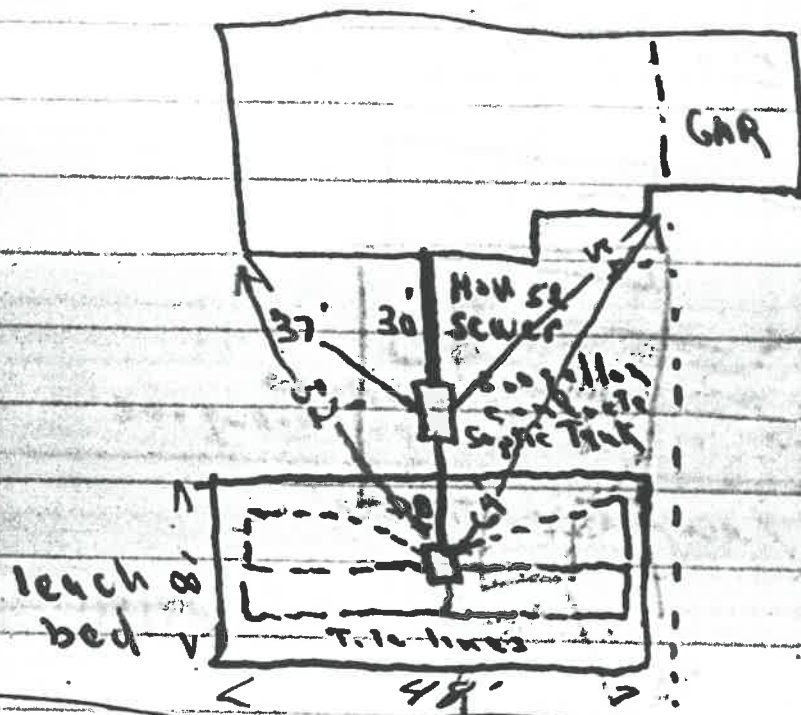


[Follow Needham Public Health on Twitter!](#)

42 ✓

B 224 c 0

Jensen-Bielski - 57 WALKER LANE



Walker Lane

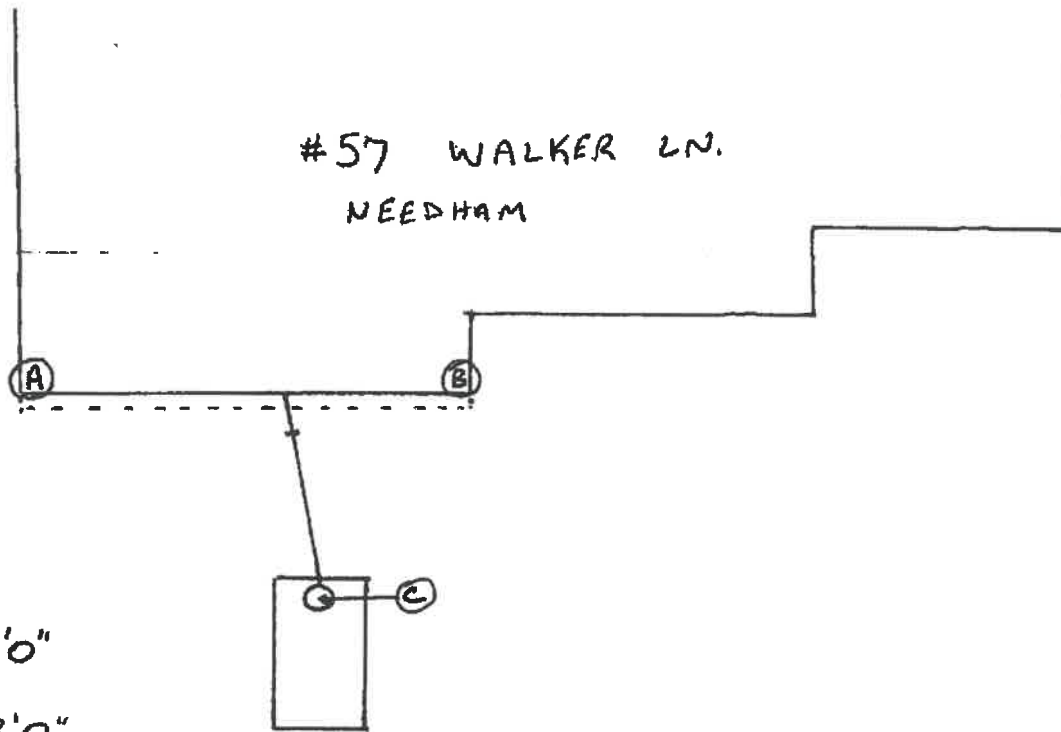
9/26/56

Leach system in properly but
 inlet line from Septic tank to
 Distrib. box seems lower than
 leach tile lines - nec. to raise.
 10/15/56 INLET LINE TO DISTRIBUTION

Box RAISED

FINAL APPR - 10/15/56

#57 WALKER LN.
NEEDHAM



A TO C = 34'0"

B TO C = 28'0"

Pipe Replaced from
Existing CAST IRON COMING
OUT OF HOUSE INTO Existing
SEPTIC TANK. New inlet tee
installed.

12/1/2017

Kenny Jones Corp.

P.O. Box 72

WALPOLE, MA 02081

508-850-5151

Tara Gurge

From: Tal Achituv <tal@achituv.com>
Sent: Thursday, November 30, 2017 5:07 PM
To: Tara Gurge
Cc: Rachel Achituv
Subject: Re: Repair to sewer main at 57 Walker Lane

Thanks Tara.

Kenny says he will be ready for inspection at 1.

On Thu, Nov 30, 2017 at 4:37 PM Tara Gurge <TGurge@needhamma.gov> wrote:

Tal -

Great – So I'm taking this as the most updated version. I just got off the phone with Tom Ryder from our Town Engineering Dept. He is in agreement, that we can allow this pipe repair between the home and the septic tank, as long as you agree to sign an 'Enforceable Agreement' with the Health Department which states that you will be connecting to the town municipal sewer system in the near future (next couple of years.)

We understand, due to your recent email, that you will not be finishing off your second floor addition space (as stated in the attached document that was in your septic file – done by previous owner), until you connect your property to the municipal sewer, once it gets brought down the street in front of your house.

The Enforceable agreement will be following in a separate email shortly. In the meantime, you may set up an appointment with Kenny Jones for the repair. I know you mentioned that you wanted to conduct this repair tomorrow, so right now we have some slots available at 9 AM, and also any time between 12-2 PM in the afternoon. We will have to meet with the septic installer on site to confirm that this pipe was replaced and that it's at the correct invert and that it's Schedule 40 PVC piping, etc.

Please let me know what time works best for the installer, so we can put that in our schedule.

Thanks,

Tara

From: Tal Achituv [mailto:tal@achituv.com]
Sent: Thursday, November 30, 2017 4:04 PM

To: Tara Gurge
Cc: Rachel Achituv
Subject: Repair to sewer main at 57 Walker Lane

Dear Tara,

To follow up on our conversation, I would like to summarize the conditions and plans regarding the sewage emergency at our house at 57 Walker Lane.

The situation is that there is a blockage in the pipe going from the house to the septic tank caused by deterioration of the orangeburg (cardboard+tar) pipe which connects the cast-iron main line to the septic tank.

This deterioration causes cracking/perforation, narrowing, and root-penetration into the pipe, which in turn also allows sewage to seep into the ground - since it is sitting in the blocked pipe which is no longer structurally sound, as well as backing up of sewage into the basement.

The house has an extension, built in 1996 by the previous owners, and we are aware that it cannot be turned into a bedroom without first making the necessary improvements to make such a remodel compliant with Title V (either through expanding/replacing the septic, or connecting to sewer).

Also, our intention is to connect to sewer, and we have been working as a group as part of an ongoing effort together with the town, primarily through Conservation (Matt Varrell), to understand the best way to deal with road reconstruction, utilities burial, gas service and sewer service. The main idea is to wait before taking any action until the residents and the town could design together a solution that incorporates all the environmental needs and requirements, and not only minimize cost and maximize effectiveness, but also minimize any risk to the environment by only opening up the road once and then replacing it with a proper modern road. The current state is that in this year's town meeting a budget has been approved to run a study to understand what is causing the deterioration of the pond. Pending the study's finding, our hope is that together with the town we can deal with floodwater infiltration, roof runoff, and replacement of septic systems to help address the level of nutrients flowing into the pond causing it to become unusable to the public.

Given that these bureaucratic processes take years, it is hard to predict by when we would be able to finalize all of these plans. I am encouraged that the study that we worked hard to get is due in the next few weeks, and that the new director of conservation seems to be as eager as Matt Varrell to work with the neighborhood towards finding a solution for the pond. This has been 2+ years of meetings, and I hope that we could arrive at a solution for walker lane in as little time as possible. It greatly depends on the rate in which the town will be moving forward with planning and recommendations for remediation of the nutrient overflow into the pond.

Had it been easier (or even feasible) to connect to sewer we would have chosen to do that over fixing the orangeburg pipe. But since the sewer main is two houses away, and more than 10 feet deep (well below the water table) it is a complicated and expensive process that cannot be feasibly done before the ground freezes anyway. I have been assured of this by several contractors. The ones that have the necessary equipment to pump out the water while they work are either overbooked, not licensed in the town, or unreachable at this time.

I had hoped to avoid having to deal with replacement of the orangeburg pipe through alternative means of opening up the clogged pipe but since Chris Seariac, the superintendent of water/sewer strongly advised against it, I am left with no other option but replacing the portion of the pipe that is deteriorated, for which we require a permit from the board of health.

Given this situation, the background, and the future plans, I hope that you can approve the permit for this work.

Best regards,

Tal Achituv.



Needham Public Health Department

1471 Highland Avenue, Needham, MA 02492
www.needhamma.gov/health

781-455-7500 ext. 511
781-455-0892 (fax)



December 1, 2017

Mr. Tal Achituv
57 Walker Lane
Needham, MA 02492

Re: Septic System Enforceable Agreement for #57 Walker Lane in Needham

Dear Mr. Achituv;

As you recall, we recently issued a Septic Construction permit to allow you to replace the Orangeburg pipe leading from your home to your septic tank, at the property address noted above, which according to our records is only an 800 gallon septic tank, which does not meet today's Title Five Septic System standards. The Town Engineering and Water and Sewer Departments, along with the Public Health Division, allowed this repair under the agreed to condition that an **Enforceable Agreement** would be signed and dated by you, which states that you will be connecting to the municipal sewer system in the next couple of years. (NOTE: We allowed you to conduct this repair in lieu of submitting a failed Title Five Septic System report, where if your system was found to be in failure, due to this compromised pipe (which you reported that raw sewage was actively backing up into your home), PER MASS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MA DEP) REQUIREMENTS, YOU MUST CONNECT THIS SEPTIC SYSTEM WITHIN TWO YEARS FROM THE DATE OF THE FAILED TITLE FIVE INSPECTION REPORT, which obligates you to connect on or before the date that your emergency repair was made, which was on December 1, 2017.

Since at this time, it is not possible to connect to the municipal system (which is located two houses down), we are requiring that this **Enforceable Agreement** be set up and adhered to in order to meet our septic system abandonment/connecting to sewer requirements. This is an agreement between the Public Health Division and the property owner.

See Enforceable Agreement noted below:

I, Tal Achituv, who owns the property located at #57 Walker Lane in Needham, MA, agrees that the property will be fully connected to the municipal sewer line on the street on or before December 1, 2019. I agree that once the property is connected to the municipal sewer system, that a Septic Abandonment Form (see attached) is filled out and signed/dated, and submitted back to the Public Health Department for review/approval. (NOTE: I agree that this property is currently being evaluated and a decision will be made on the timing of this connection in the near future. I will continue to keep the Public Health Dept. in the loop on that.)

Property owner – Print: Tal Achituv / Sign: [Signature]

Date: 12/15/17

Please call me if you have any questions at (781) 455-7500; Ext. 262.

Sincerely,

[Signature]

Tara E. Gurge, R.S., C.E.H.T., M.S.
Assistant Public Health Director

WalkerLane-#57EnforceableAgreementConnToSewer-17

Tara Gurge

From: Golden, Claire (DEP) <claire.golden@state.ma.us>
Sent: Wednesday, March 13, 2019 11:35 AM
To: Tara Gurge
Cc: Brander, Kevin (DEP)
Subject: RE: Enforceable Agreement question

Tara,

There is an existing Enforceable Agreement for the upgrade which was consented to. The Enforceable Agreement is, to the best of my knowledge, in full force and effect.

The upgrade needs to happen either by enforcing the Agreement and/or pursuing other enforcement options. With orangeburg pipe you're likely looking at a 60 year old system that has outlasted standard systems and needs an upgrade.

I hope this helps.
Claire



Claire A. Golden, EEIV
MassDEP Wastewater Management and Surface Water Permitting Programs
205B Lowell St
Wilmington, MA 01887
978-694-3244
978-694-3499 (fax)
claire.golden@mass.gov

Follow MassDEP on Twitter at <http://twitter.com/MassDEP>
Visit our website at www.mass.gov/eea/agencies/massdep

From: Tara Gurge [<mailto:TGurge@needhamma.gov>]
Sent: Tuesday, March 12, 2019 9:23 AM
To: Brander, Kevin (DEP)
Subject: Enforceable Agreement question
Importance: High

Kevin —

Hello — Hope you are doing well. I have a question - Is it true that the septic system pipes, along with the septic system components, are all part of the complete septic system, and that if a pipe fails due to its age, then that is also considered part of the complete septic system, thus a new compliant Title Five septic system needs to be installed and/or the property must be connected to the municipal sewer system?

We had a septic system fail in town near a pond that had 'Orangeburg' piping that had collapsed that needed immediate Emergency replacement, and we allowed the emergency repair ONLY under the condition that the system would be

properly decommissioned and then tied into the municipal sewer system within a 2-year time frame. So we issued an Enforceable Agreement as a result. (We are approaching the 2-year deadline, and we are now getting push-back from the owner that is now stating that this was a simple 'plumbing issue' and not a septic issue, and the Enforceable Agreement does not apply in his case??? Is that accurate?

Please let me know.

Thanks,



TARA E. GURGE, R.S., C.E.H.T., M.S.
ASSISTANT PUBLIC HEALTH DIRECTOR
Needham Public Health Division
Health and Human Services Department
178 Rosemary Street
Needham, MA 02494
Ph- (781) 455-7940; Ext. 211/Fax- (781) 455-7922
Mobile- (781) 883-0127
Email - tgurge@needhamma.gov
Web- www.needhamma.gov/health



Prevent. Promote. Protect.



please consider the environment before printing this email

STATEMENT OF CONFIDENTIALITY

This e-mail, including any attached files, may contain confidential and privileged information for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by others is strictly prohibited. If you are not the intended recipient (or authorized to receive information for the recipient), please contact the sender by reply e-mail and delete all copies of this message. Thank you.



[Follow Needham Public Health on Twitter!](#)

July 12, 2019

Tara E. Gurge
Assistant Public Health Director
Needham Public Health Dept.
1471 Highland Ave.
Needham, MA 02492

Dear Ms. Gurge,

At your request I am writing to describe the efforts that I have made since the signing of the “Enforceable Agreement” on December 1, 2017, approximately 18 months ago. At that time I had contacted the Town because I believed my septic system may have failed. As we now know, the septic system did not fail, but the “Orangeburg pipe” which connected my septic system to the house did fail. In the process of my investigations, I learned that this kind of pipe which is much like cardboard, was used during the war and post war era instead of cast iron. The septic related problem I experienced has now been resolved by replacing that piping with regulation PVC piping suitable for a 21st century system.

I understand that the Agreement requires that “per Mass Dept. of Environmental Protection (MA DEP) requirements, I must connect this septic system within two years from the date of the failed title five inspection report”. I will provide below details on the efforts I’ve made to comply with this agreement. There are two additional conditions that relate to this compliance.

1. My septic system has been tested and confirmed that it is indeed in good working condition, and in fact did not fail.
2. My conversations subsequent to my original contact with the Town have reinforced an understanding that I would be required to take “reasonable means” to comply with the agreement and connect to Town sewer.

While I considered asking you to waive this Agreement now that we know the septic system has not failed, I do want to make clear that I am still very committed to connecting to the Town sewer system. However, as you will see in the information below, the steps required to connect by December 1 do not, in my belief, meet the standards of “reasonable means”.

When this first happened and I began the process to cost out and undertake a remedy to the situation, I was given an estimate by the both town engineering staff, as well as contractors, that I should expect to pay between \$20K-\$30K to connect my home to the Town sewer. I assume that \$40K would be the upper range of what the Town would expect to be a “reasonable” cost to comply with the Agreement. Had the estimates I received come anywhere close to this estimate, I would have proceeded. But the estimates I received (and I’m summarizing here, more details are below) led to a likely price of closer to \$95K-\$120K range and possibly higher when the terrain of the land and proximity to the pond is considered. More important, a decision to act unilaterally to solve my own problem would involve interfering with or even blocking the longer range plans of my Walker Pond neighbors.

Initially, since the agreement was signed just as the ground was starting to freeze, we had to wait till spring before any contractor would seriously engage. Early in the spring of 2018 I started reaching out to contractors, and once some started coming on-site it became clear that this kind of job cannot be done by most contractors due to the complex conditions including length, depth, proximity to wetlands, need to work under the water table, etc. It has been extremely difficult to get contractors due to these reasons.

Of the ~50 contractors I contacted, the vast majority was incapable of doing this. The contractors who can, of which there are only a few in this area, are very busy. Additionally, the complexity-to-size ratio makes this job of no interest to some (such as Lynch Development). Bigger contractors who aren't scared away by the complexity-size ratio are booking into 2021 (such as Fed Corp). The initial efforts through the spring and summer of '18 have come up with two willing and able contractors (Malone & Murphy), only one of which would actually communicate and come for a site visit (Murphy).

Cost estimates from Bob Murphy were in the 80-100k range, exclusive of engineering/permits/fees. The town engineer pushed back on these costs, but the town engineer's estimates were not taking into account some of the complexities that are apparent in the field and were plans that did not take into account the need to not block the neighbors from being able to connect as well, like the need for the sewer to stay deep enough, and the need for a manhole, etc.

After several iterations between Bob and Tony, either way you look at it the project comes out at 90-130k with the engineering costs of \$10K-\$30K excluded. The high engineering costs make even looking into getting a more serious quote from Bob than the one you'll find attached infeasible. Moreover, the engineering process is only likely to cause further increases in the costs rather than savings due to extra findings that may come up.

In our meeting with the town, which you attended back in May, Tony the town engineer had mentioned the option for the town engineering department to develop such a plan for the neighborhood, if we exhaust all options for finding a feasible solution for connecting my house to the town sewer. He had pointed out that he knows at least one more contractor who is currently doing similar work, and which was not on my lists of contractors -- Jones Contracting.

After finally getting Jones Contracting on site, you'll find the estimate attached below, which is in-line with Bob Murphy's estimates, if not a little 'worse' (more expensive). Jones also pointed out that in the work done elsewhere in Needham, at similar depth and also near water, additional costs of tens of thousands of dollars kept being added due to findings on the ground (unsuitable material, digging depth required wider trenches and more road reconstruction, etc.) and suggests that this would likely cost more.

I have also been in touch with MA DEP, in efforts to understand the requirements and limitations that may be in effect, as well as the rest of the neighbors in order to attempt to bring (average) cost and complexity down, and I am glad to report that the neighbors on the road who are on septic systems are generally looking forward to being able to connect to sewer, if costs are reasonable.

At the DEP I reached out to Marybeth Chubb, and Claire Golden; The advice I received from both the Boston office as well as the North East Regional Office supports my assessment that while it is important that we seriously look into connecting to sewer, that the failure of the pipe leading from my house to the septic system is not a cause for failing of the septic system itself. They also mentioned that the two year requirement is not a MA DEP requirement, but rather that timing on these cases are entirely within the control of the LAA (in our case, the Needham BoH).

We are also very optimistic, through the neighborhood efforts, that through an integral approach to the all the issues at the town involving the road, walker lane, and walker pond, we will be able to come to the best outcome - of everyone connecting to sewer.

While most of my efforts have been invested towards finding a way to connect to sewer, I have also looked into replacing the septic system, and you'll find a quote for a system that is suitable both for my house, and to the proximity to the pond (a presby EnviroSeptic) which comes in at \$30K.

I hope that we can all agree that it is worth putting time and effort on all sides to figure out how we might be able to connect to sewer, rather than end up installing a septic system. I think that this process has taught both you and me a lot about the situation that we did not realize at the beginning, and I hope that you would agree that the complexity uncovered merits reconsideration.

In summary, I signed the agreement with the understanding that this was, at most, a \$30K-\$40K problem, that it was required by MA DEP and that our septic system has failed. I submit below evidence of my good faith efforts to comply with the Agreement. Because none of these understandings are correct I respectfully request that the Agreement be set aside or voided. I further suggest that because the Town and the Walker Pond neighborhood have a long range interest in permanently resolving the potential of septic failures, and have a long range interest in preserving and protecting Walker Pond that the Dept of Public Health replace that Agreement with an Agreement to engage with the Walker Pond neighbors to explore the problems and potential solutions, involving a range of public and private experts, to develop a consensus plan of action.

Please find attached below:

- Timeline of my efforts to comply with the agreement
- Partial list(s) of contractors I have contacted
- Sewer Cost estimates from Bob Murphy
- Sewer Cost estimates from Jones Contracting
- Report from Kenny Jones after inspecting the septic system recently
- Septic (EnviroSeptic) estimate from Kenny Jones
- Map showing the other locations of sewer in the vicinity, showing that there are not better options for sewer than the one explored (initially we were hoping that the sewer on Central Ave is closer)

From Russell Jones - Jones Contracting

28

Septic Evaluation



2092 Main St.
Walpole, MA 02081

Office: (508)-850-5151

Cell: (774)-259-4062

www.kennyjonescorp.com

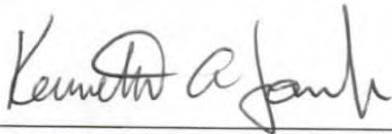
kenny@kennyjonescorp.com

Septic System Examination:

RE: 57 Walker Ln. Needham, MA

On Friday 6/28/19 I examined the existing septic system at 57 Walker Ln. Needham, MA. I opened the septic tank covers and found that the inlet and outlet tees were in place and that the level in the tank was good.

I located the distribution box and found that the level was at the bottom of the outlet lines and that all outlet lines were taking effluent when water was added to the box with a garden hose.

A handwritten signature in black ink, appearing to read "Kenneth A. Jones, Jr.", is written over a horizontal line.

Kenneth A. Jones, Jr. – President Kenny Jones Corp.

Septic Estimate

Kenny Jones Corporation
P.O. BOX 72
Walpole, MA 02081
Phone 508 850-5151
kenny@kennyjonescorp.com
www.kennyjonescorp.com



ADDRESS

Tal Achituv
57 Walker Ln.
Needham, MA 02492

PROPOSAL 1781

DATE 06/30/2019

ACTIVITY	QTY	RATE	AMOUNT
Engineering Proposal submitted for work at 404 N. Main St. Sharon, MA. Price includes the following: SEPTIC SYSTEM DESIGN WORK: \$4,775 - Provide backhoe services to dig for perk test = \$400 - Provide permit fees to Town of Needham = \$1,375 - Provide services of Glossa Engineering, Inc. to provide the following: = \$3,000 - Perform soil analysis and perk test - Create septic system design plan - Once system is installed create "as-built" plan Note: Additional costs may be incurred if Notice of intent / Order of conditions are required by Needham Conservation Commission	1	4,775.00	4,775.00
Septic System Conceptual Estimate submitted for work at 57 Walker Ln. Needham, MA. Based on site visit on 6/28/19 and other work performed in the area. A firm proposal will be created once design plans have been completed and approved. Price includes the following: - Furnish & install 125' of filter mitt erosion control barrier - Pump, crush, and remove existing septic tank and leaching area as necessary to get new system in - Furnish & install new, 1,500 gallon, H-10 loading, 2-compartment septic tank with risers & covers - Furnish & install new H-10 distribution box with riser & cover as necessary - Furnish & install septic sand / ASTM C-33 concrete sand as necessary (approx. 200 yards) - Furnish & install 240' of Presby Enviro-septic leaching pipes - Furnish & install observation ports in leaching area - Furnish & install vent pipe including granite post style vent concealer - Furnish & install magnetic locator tape over system components - Backfill and grade site per plan, blend in yard to try to smooth out remove excess fill (approx. 100 yards) - Loam & hydro-seed areas disturbed by system installation	1	26,000.00	26,000.00

Payment to be made as follows: 1/2 payment at start of job, and balance upon completion. Any deviations or alterations from above specifications, involving extra costs will be executed only upon written order, and will become an extra charge over an above original proposal. *Ledge is an extra charge.

Requests for additional Hydro seeding after initial application (if included in proposal) is an additional charge.

Contractor assumes no responsibility for any damage to underground sprinkler systems or driveways.
All agreements are contingent upon strikes, accidents or delays beyond our control. Acceptance of the Proposal constitutes a contract.
Proposal will be honored for thirty (30) days from date of issue.

TOTAL \$30,775.00

Accepted By

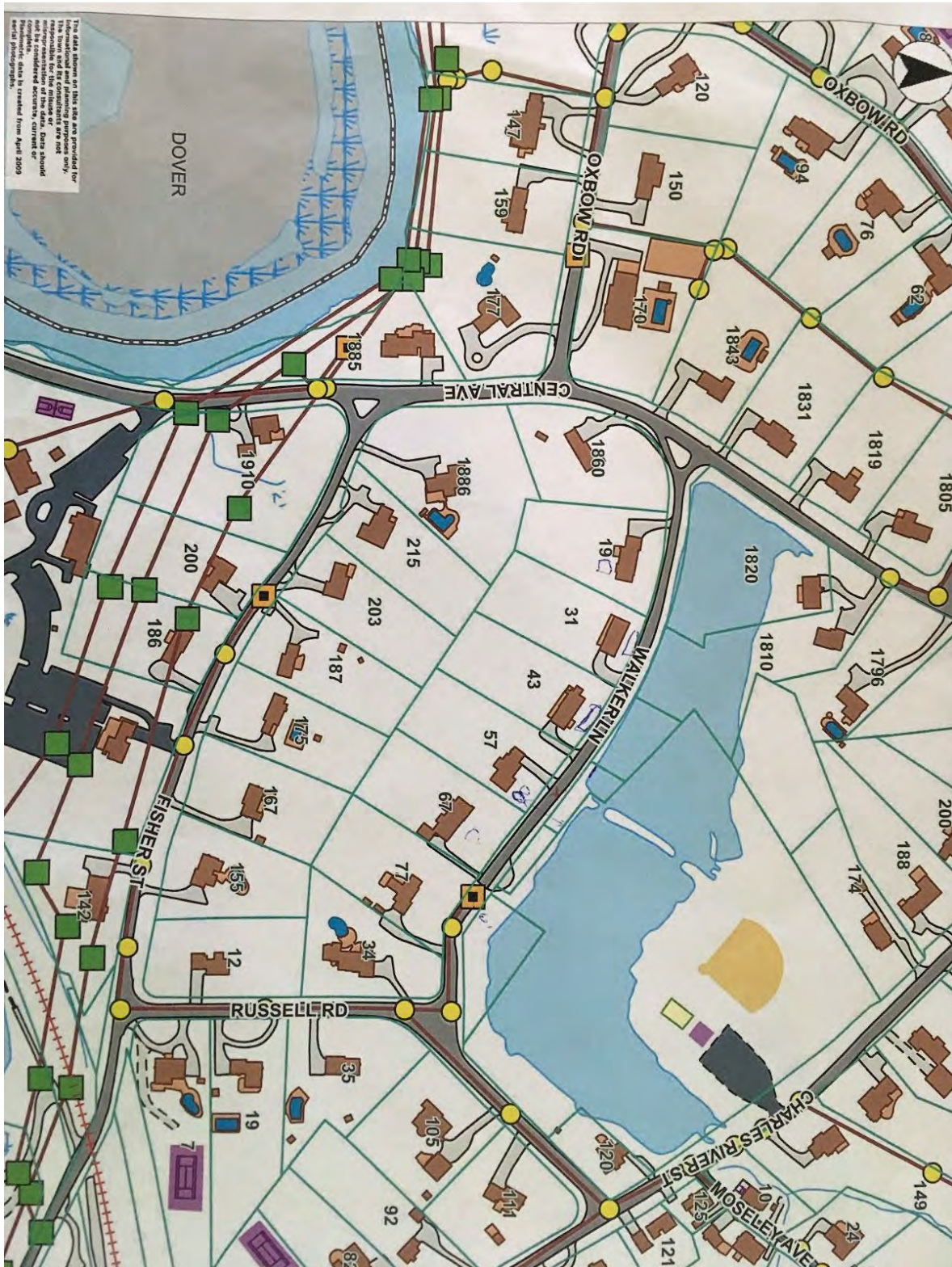
Accepted Date

Partial list of contractors contacted

Updated 3/14/2019				CONTRACTOR LICENSE LIST			PAID FEE	
Contractor	Expiration Date	Phone Number	Address					
Alden Building Company	12/1/21	978.750.9660	212 Centre St. Danvers, MA 01923					
Arelio, R.B. Company	12/1/21	508.633.0793	157 Southbridge Rd. N. Oxford, MA 01537					
B-P & Sons Inc.	12/1/21	508.376.5720	840 Main St. Mills, MA 02054					
Early Contractors Inc.	12/1/21	978.374.8033	66 Emerson St. Haverhill, MA 01830					
Ernest Guigli & Sons	12/1/21	781.999.0194	10 Tech Cir. Natick, MA 01760					
Fed Corp.	12/1/21	781.329.1044	1039 East St. Dedham, MA 02026					
Fronton, S & T Inc.	12/1/21	978.265.7231	70 Donohoe Rd. Dracut, MA 01826					
Gunite, Andrews Co. Inc.	12/1/21	978.663.0724	6 Republic Rd. N. Billerica, MA 01862					
Larier, H.C. Company	12/1/21	508.434.4328	2 Mechanic St. Woodville, MA 01784					
Lussier Corp.	12/1/21	508.651.2333	193 Oak St. Natick, MA 01760					
Lynch Development Corp	12/1/21	617.839.6024	97 Chapel St. Needham, MA 02492					
Malone, Jack Company	12/1/21	781.444.7860	20 Chestnut St. Needham, MA 02492					
McCarthy, G.D.	12/1/21	781.589.3650	721 Central Ave. Needham, MA 02494					
Middlesex, the Corp	12/1/21	978.875.0999	1 Speciale Pond Rd. Littleton, MA 01460					
Modern Habitat LLC	12/1/21	617.803.8629	Box 582, Lincoln, MA 01773					
Mofford, Vinny Excavation	12/1/21	508.654.7917	5 Bryant Circle, Middleboro, MA 02346					
Negoshian, John M. Co	12/1/21	617.775.8180	1101 South St. Needham, MA 02492					
New England Boring Contractors	12/1/21	603.437.1610	Box 165, Derry, NH 03053					
Oakcrest Builders	12/1/21	508.958.6070	4 Hopedale St. Mendon, MA 01756					
O'Donoghue Construction	12/1/21	781.724.9423	644 West St. Braintree, MA 02184					
Parkside Utility Construction LLC	12/1/21	617.952.7395	37 Ayer Rd. Littleton, MA 01460					
PBZ Construction Inc	12/1/21	781.828.6471	28 Tosca Dr. Stoughton, MA 02072					
Perdoni Construction	12/1/21	781.492.0330	10 Shattuck St. Natick, MA 01760					
Shea, Michael Company	12/1/21	617.719.1794	Box 858, Walpole, MA 02081					
Slicklen Builders	12/1/21	781.444.8956	21 Upland Rd. Needham, MA 02492					
V & A Construction Corp.	12/1/21	781.328.2353	84 Gaffney Rd. Dedham, MA 02026					
Western Professional Builders	12/1/21	781.762.4606	136 Highview St. Westwood, MA 02090					
Sole Murphy 30								
Sones Contracting (Walpole)								
gerald@pumpengrains.com								
1400 H. Spencer								
710 Westwood								
50m								

T: public works/copy of License List

Sewer location in the area



Timeline

Date	Event
November 1, 2017	Sewage in basement - Talk to Water/Sewer (Chris) - showing video - recommended against pipe-in-pipe,
November 29, 2017	Spoke to Kenny Jones
November 29, 2017	Sent plans to Karen Fruci
November 30, 2017	Acknowledged plans - said Kerry Malone will be in touch
November 30, 2017	Showed plans to Tom @ DPW/Engineering
December 1st 2018	Got permit + Work done -- E-mail understands connecting to sewer once it is in front of my house
December 15, 2017	Signed Enforceable Agreement given to Tara
March - April	Called contractors (see list attached)
May 4, 2018	Touch base w/Tara
May 8, 2018	Tara response
May 18, 2018	Tara check-in
June 27, 2018	Neighborhood meeting
July 16, 2018	Emailing with CRWA and MA River Alliance
July 23, 2018	Call with MA River Alliance
August 14, 2018	Neighborhood meeting - Pond + Road + CRWA + MARA + Garlick [Tal, Dan, Peter and Mark]
September 6, 2018	Sent plans to Bob Murphy [Asked that he try to come by before the 16th]
September 11, 2018	Town meeting about stormwater by-laws
September 25, 2018	Bob Murphy too busy
September 26, 2018	Spoke to Malone on the phone, emailed plans AGAIN
September 28, 2018	Bob Murphy follow up
October 4, 2018	Meeting on-site with MA Rep. Garlick re: pond, sewer

October 10, 2018	Reach out to MA Rep. Garlick in effort to help understand State requirements
November 2, 2018	Tara Check-in, Kerry Malone claims to not have documents (sent months ago, and then again)
November 2, 2018	Response to Tara - Malone not replying
November 5, 2018	Tara check-in
November 5, 2018	response to tara
November 5, 2018	Tal <> Tara
December 19, 2018	Tara check-in
Feb-Mar 2019	Back and forth with Bob Murphy, looking for NEW engineering plan
March 7, 2019	DEP - Sanh.Tran [310 CMR 15.305 - LAA can set own deadline for completion of upgrade]
March 12, 2019	Bob Murphy + Buckley Engineer @ Bay Colony Group
March 20, 2019	Tara check in- follow up on engineering, Tony suggest a <60k solution (which won't work)
March 25, 2019	Quote from Bill Buckley at Bay Colony Group - \$12k + 3 months turnaround
March 27, 2019	Neighborhood meeting - Quotes on road, further discussion on septic and sewer
March 29, 2019	DEP - Phone Marybeth Chubb / Claire Golden / Kevin Brander
April 1st 2019	DEP - Olusegun Onatunde -Forwarding to NERO
April 15, 2019	(date approx) Phone conversation with Claire Golden
April 24, 2019	Neighborhood meeting - Road re-pave delayed while we wait for sewer answers; Agreed to patch soon as we wait
April 26, 2019	Tara Checks in
May 14, 2019	Tara Check-in
May 16, 2019	General overview update to Tara
May 30, 2019	Tara checking in with town Chris/Tony 'have not heard from me in a while'
May 31, 2019	Meeting @ DPW with Tara, Tony+Tom(Engineering), Sean (Water/Sewer), and Deb (Conservation)
June 2019	Contacting Jones contracting working on Winding River Rd
	Quote from Jones Contracting comes in at > \$100k per house, even after aggregation
June 27, 2019	Discussion with Conservation Commission
June 30, 2019	Kenny inspects Septic, find it to be functioning properly, provides quote for EnviroSeptic

Budget pricing for sewer connection to #57 Walker Ln. 190lf sewer from depth of 10.5' to 8.7'

Permanent trench patching

Service to front of house

TOTAL \$

Please keep in mind that we have the following exclusions/conditions that would all apply to this potential project:

1. Schedule to be determined.
2. Labor is to be open shop.
3. The following items are not included:
 - a. Engineering and control.
 - b. Engineer produced as-builts
 - c. Permits & Fees
 - d. Rock removal, excavation, and replacement for rock sized 1 cubic yard or greater
 - e. Hazardous material excavation, removal, or replacement.
 - f. Unsuitable material excavation, removal or replacement.
 - g. Milling and/or Reconstruction of Existing Roadways
 - h. Maintenance of Erosion Controls
 - h1. Preparation and repair of site for 10 year storm or greater.
 - h2. Dust Control
 - h3. Winter condition and related work.
 - i. Concrete encasement of Utilities
 - j. Controlled Density Fill and/or Flowable Fill
 - k. Infrared Asphalt Treatment
 - l. Repair to miss or unmarked utilities including but not limited to Sprinkler systems, ETC
Conduit and/or Wire, Gas, Water, Sewer, Septic or Drain, Fire Alarm
 - m. Relocation of interfering utilities
 - n. Repair of water and sewer mains and appurtenances should they be deemed insufficient for tapping and/or connection
 - n1. Third Party Chlorination, Pressure Testing, Vacuum Testing, Air Testing and/or Material Testing.
 - o. Asbestos Abatement, Oil Tank Cleaning and Removal
 - p. Fencing
 - q. Prevailing Wage Rates, Standby Time, Overtime Wage Rates
 - r. Landscaping Beyond Loam & Seed, Maintenance of Grass Seed
 - r1. Tree Protection
 - r2. Hardscape Work, Landscape Construction
 - s. Additional Conditions/Requirements by Street Opening Permits and/or Town Engineer
 - t. Signage
 - u. Police Detail and Traffic Control
 - v. Lighting
 - w. Excavation Dewatering Beyond that which would be handled using a single 3" "mud sucker" pump with zero treatment of discharge for siltation
 - x. Existing Utility and/or Grade Verification, Locating, and Protection
 - y. Shoring beyond vendor's four varying trench boxes.
 - z. Disposal Costs

4. Price based on [REDACTED], Inc. performing all utility work most efficient manner. This means all
5. trenches/excavations will be backfilled as the installation process moves along, This must be coordinated with all inspecting authorities. If an inspecting authority requires visual inspection of all components, then the inspector will need to be on site at all times.
6. This agreement is contingent upon the absence of strikes, accidents or delays beyond our control.
7. Price is based on the execution of the complete project without delay. Should the owner choose to postpone any portion of the project that portion not yet completed will be subject to renegotiation prior to remobilization. A list of material cost shall be provided upon contract execution. Escalation of material, fuel or labor cost resulting from owner delay will require an equitable increase in the contract.
8. There shall be no change to the provisions of this proposal without written confirmation of same by vendor.
9. Payment terms to be discussed.
10. [REDACTED], Inc. reserves the right to cease work if payment at these terms is not received in a timely manner.
11. Severance of this contract will require a payment equal to ten percent of the remaining work to cover efforts made by [REDACTED], Inc to perform the entire project in the most efficient scenario.
12. Any alteration or deviation from project specifications and or these terms involving extra costs will be executed only upon written orders and will become an extra over and above this contract. A Jones extra work memorandum slip or an approved change order shall constitute a written order.
13. Prices herein provided by [REDACTED] will remain firm until the completion of this project with the exception of asphalt material for pavement and fuel. Asphalt material pricing will be adjusted to comply with "Massachusetts Highway Department Monthly Price Adjustment for Hot Mix Asphalt (HMA) mixtures. Fuel pricing will be adjusted based on the Energy Information Administration Crude Oil per Barrel Spot Prices.
14. A finance charge of 1.5% per month will be applied to any overdue invoice. Legal fees incurred by Jones Contracting, Inc. for contract enforcement and payment collection shall be paid for in full by the project owner and general contractor.
15. The terms and conditions of this Agreement are absolutely confidential between the parties and shall not be disclosed to anyone else, except as shall be necessary to effectuate its terms. Any disclosure in violation of this section shall be deemed a material breach of this Agreement.





DHAM PUBLIC HEALTH DIVISION



Unit: Public Health Nursing

Month: November 2019

Staff member: Tiffany Zike & Donna Carmichael

Activities and Accomplishments

Activity	Notes
Flu Clinics	Held a Saturday clinic at RRC. Vaccinated about 150 people. Had a mini clinic at North hill.
Northeastern Epidemiology Conference	Discussion of disease tracking and local surveillance processes.
Extreme Weather Workshop	Winter Weather workshop with MAPC grant in coordination with Brookline

Summary overview for the month:

The Public Health Nurses have been conducting flu clinics and holding office hours through the month of November. They have been working with community partners and town agencies to help residents. Began working with the MVP grant and emergency management. Continue to push MRC recruitment.



DHAM PUBLIC HEALTH DIVISION



COMMUNICABLE DISEASES:	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	Apr	MAY	JUN	T20	T19
Amebiasis	0	1											1	0
Chickungunya	1												1	0
BABESIOSIS	1	1											2	4
Borrelia Miyamota													0	0
CAMPYLOBACTER	2	2	2	2	1								9	6
CRYPTOSPORIDIUM													0	0
Cyclosporiasis	4	1											5	0
EHRlichiosis/ HGA	2												2	4
Enterovirus		1											1	0
GIARDIASIS	1	1	1										3	2
Haemophilus Influenza													0	0
HEPATITIS B					1								1	9
HEPATITIS C		1	2										3	11
Influenza													0	98
Invasive Bacterial Infection		1											1	0
Legionellosis	1												1	0
Listeriosis													0	0
LYME	7	13	2	3	4								29	46
MEASLES													0	0
MENINGITIS													0	0
Meningitis(Aseptic)													0	0
Mumps	1												1	1
Noro Virus													0	5
PERTUSSIS	1	1											2	3
RMSF(Rocky Mt Spotted Fever)					1								1	0
SALMONELLA													0	3
SHIGA TOXIN													0	1
SHIGELLOSIS													0	3
STREP Group B		1											1	0
STREP (GAS)													0	2
STREP PNEUMONIAE													0	3
TUBERCULOSIS													0	0
TULAREMIA													0	0
Latent TB													0	1
Varicella	1	1			1								3	6
Vibrio													0	1
West Nile virus													0	0
Zika													0	0
TOTAL DISEASES	22	25	7	5	8	0	0	0	0	0	0	0	67	209
Revoked/Suspect Diseases Investigated		2		2									4	5
Contact Investigation													0	5



DHAM PUBLIC HEALTH DIVISION



ANIMAL TO HUMAN BITES	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	Apr	MAY	JUN	T20	T19
DOG	1	1	1	0	0								3	23
CAT		1											1	0
BAT		1											1	0
SKUNK													0	1
RACCOON													0	0
other													0	0
TOTAL BITES	1	3	1	0	0	0	0	0	0	0	0	0	5	24
IMMUNIZATIONS	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY20	FY19
B12	2	2	2	2	2								10	24
Flu (Seasonal)				525	185								710	712
Hep B													0	2
Polio													0	4
TDap			10										10	6
Varicella													0	0
Consult													0	702
Fire/Police	4	8	5	10	21								48	157
Schools	2	7	11	7	11								38	172
Town Agencies	2	2	3	8	4								19	267
Community Agencies	1	2	8	5	3								19	103
ASSISTANCE PROGRAMS	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY20	FY19
Food Pantry	2	2	0	2	3								9	14
Food Stamps		0	0	0	0								0	1
Friends		0	0	0	0								9	0
Gift of Warmth		2	0	1	6								1 (\$627)	20(\$5817)
Good Neighbor		0	0	0	0								0	2
Park & Rec	1	0	0	1	0								2	2
Salvation Army		0	0	0	0								0	1
Self Help	1	1	1	5	4								12	26
Gift Cards Distributed 0 Donations to GOW: \$600.00														



NEEDHAM PUBLIC HEALTH DIVISION



Unit: Traveling Meals Program

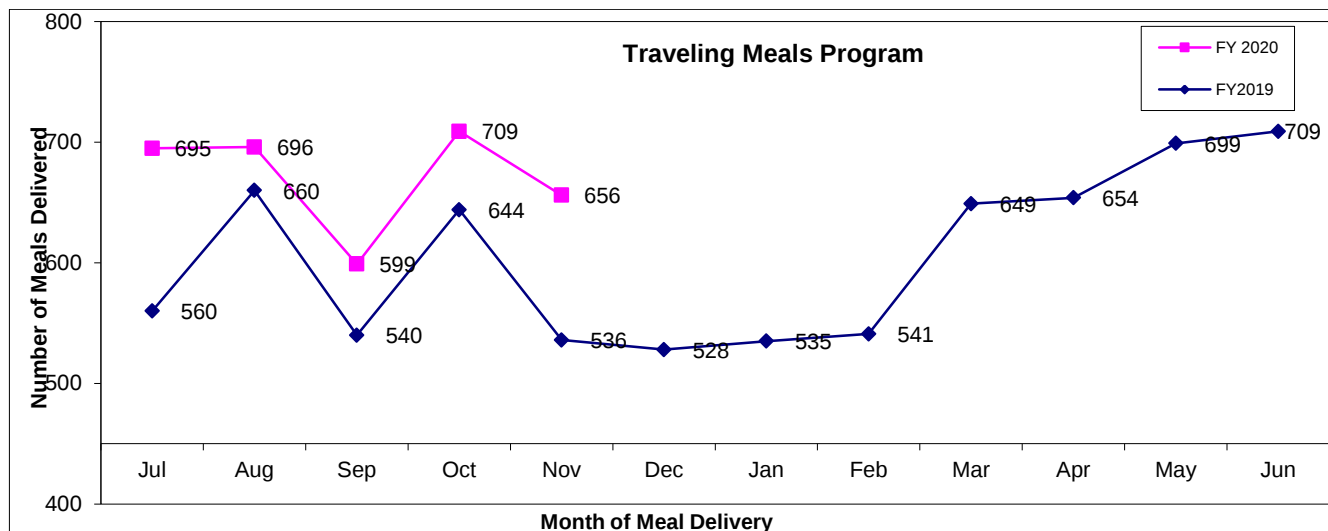
Monthly Report for November, 2019

Staff member: **Maryanne Dinell, Program Coordinator**

Activities and Accomplishments

Activity	Notes
14 volunteers packed meals and 26 volunteers delivered 656 meals to homebound Needham residents in need of food for the month of November.	There were no incidents that required 911. Several times during the month, there was difficulty delivery meals for the clients with cognitive issues do not answer their door.
6 clients enrolled and 3 clients no longer need the Program Needham Community Council, Masons, and Rotary Club provided meals on Thanksgiving Day to clients on the Program that were not able to be with their families.	3 New clients are private pay, 2 clients will have their meals cost provided by the FRIENDS. Dementia, Anxiety, depression and declining health justified their need for the Program. 1 Client re-enrolled. 2 clients able to provide on their own. 1 client passed away-enrolled in Program since August, 2015

Summary overview for the month: **November, 2019**





NEEDHAM PUBLIC HEALTH DIVISION



Unit: Substance Use Prevention

Date: November 2019

Staff: Karen Shannon, Karen Mullen, and Monica DeWinter

Activities and Accomplishments

Activity	Notes
Family Dinner Project planning	The community dinner event, held November 7, sold out with 60 residents registered. Professional development workshop held with 8 in attendance. 18 volunteers assisted in delivering both events, including 4 NHS students. Co-hosted with BIDNeedham. Publicity channels included school newsletters, emails from after-school programs, Needham Youth & Family, and social media. Event survey sent to participants; awaiting responses.
Vaping Task Force	First meeting held 11/14/19. Groundwork set for developing task force goals.
Action Team Meetings	Parent, Community, Youth and Steering Committee meetings all held during the week of 11/18/19
Presentation to School Committee	Karen S. conducted presentation on SPAN in conjunction with SALSA student presentation. School Committee offered to assist with providing representation on a SPAN Action Team.
Alcohol Training Toolkits Distribution	Distributed final toolkit to newly opened Pancho's Taqueria on 11/15/19.
New Medication Disposal	CVS on Great Plain Avenue installed a medication disposal kiosk in response to request made by Maureen Doherty, NDPH staff and Needham resident in 2018.
SAPC Leadership Meeting	Karen S. attended monthly meeting, 11/18/19, Dedham.
Planned and Executed two NHS 5 th Quarter Events	- o 5th Quarter events are substance-free teen events held after home football games - o Held on 10/18 and 10/25/19 - o 300+ NHS students attended each event. - o Donations from community funded free pizza, snacks, basketball, ping pong, and dj/music.
Planned & Facilitated 4 SALSA Vaping Awareness Action Team Meetings (11/1, 11/8, 11/15, 11/22)	NHS SALSA Students working with NHS administration to educate parents, peers & community about the risks of vaping. Dr. Alan Stern attended 11/1 student team meeting to review materials and provide input/insights regarding youth vaping.



NEEDHAM PUBLIC HEALTH DIVISION



Planned & Executed 2 SALSA Field Trips to Pollard grade 8 Health Classes	- o Continuation of refusal skills training presented by NHS SALSA students - o 3 classes held over 11/21 and 11/22 - o Approximately 12 SALSA students presented to 75 Pollard students.
SPAN website	Update site by adding Vaping resources for students and parents



NEEDHAM PUBLIC HEALTH DIVISION



Unit: Accreditation

Date: November 26, 2019

Staff member: Lynn Schoeff

Activities and Accomplishments

Activity	Notes
Policies and procedures	Finalized the After-Action Report policy
Community Health Assessment	With the completion of the BID-N Community Health Needs Assessment, the Division has a good start on the accreditation requirement for a community health assessment. When reviewed with the additional perspective of the Housing Authority, Adolescent Health, and the Senior surveys, it becomes much easier to determine what is needed to complete this requirement.

Other activities:

- Lynn has developed guidance and a timeline to help Health and Human Services staff members write the Annual Report.

Summary overview for the month:

Continued work on policies and procedures; building on the BID-N Community Health Needs Assessment to meet the accreditation requirement; and beginning work on the Annual Report.



NEEDHAM PUBLIC HEALTH DIVISION



Date: November 2019

Staff: Rachael Cain

Activities and Accomplishments

Safety at Home Program

Activity	Notes
Program Completion and Sustainability	• Work specified under the MetroWest Health Foundation grant is complete as of June 30, 2019, with all funds spent and deliverables met • Home visits and education will continue on a slightly more limited basis while they are integrated into the services offered by Aging Services' Social Workers and the Public Health Nurses • Referrals continue to be received, including one from the Needham Fire Department

Housing Authority Assessment

Activity	Notes
Report Writing and Dissemination	• Final report is in the final round of edits • Graphic designer began work on final product • Began planning launch event, multiple town presentations, and new programming at the Housing Authority, including a potential smoking cessation course to begin shortly after report is released

Accreditation Support

Activity	Notes
Community Health Assessment	• Beth Israel Deaconess Hospital-Needham completed the community health needs assessment and community health improvement plan and shared it with the Public Health Division. The document will be used to inform the Division's accreditation efforts.



NEEDHAM PUBLIC HEALTH DIVISION



Climate Change Project

Awarded \$26,089 grant from the Metropolitan Area Planning Council (MAPC) to implement a one-year climate resiliency project for older adults. Activities will include creating and holding three workshops for older adults about extreme weather and how to prepare for it, as well as a related communications campaign.

Activity	Notes
Conduct Workshops	• Held first workshop focused on extreme heat on June 26th • Held second workshop, focused on storms and flooding on October 17th at the Housing Authority • Final workshop held November 12th at CATH ○ 45 attendees ○ Brookline Health Department presented on how to stay safe during extreme cold ○ Emergency kits were distributed to 25 participants (the number of kits remaining that were purchased under the grant) ○ Mandarin interpreter was available but not utilized (provided by a Brookline volunteer) ○ Evaluations collected
Communications	• Needham Cable segment, social media, flyer distribution, and emails to partners promoted the November event • Distributed Mandarin and Russian brochures to Housing Authority
Reporting	• Successful site visit from funders on August 15th • Beginning work on final report

Other Public Health Division activities this month:

- Began Foundations of Public Health 15-week course
- Began serving on Needham's Youth Vaping Task Force
- Attended the American Public Health Association Annual Meeting

Summary overview for the month:

- Held third and final MAPC climate change grant workshop with 45 attendees
- Attended the American Public Health Association Annual Meeting
- Edited Needham Housing Authority Report
- Began Foundations of Public Health 15-week course
- Began serving on Needham's Youth Vaping Task Force



Needham Public Health Division November 2019



Assist. Health Dir. - Tara Gurge
Health Agents - Diana Acosta and Monica Pancare
Food Regulatory Program Analyst/Intern - Michelle Iovino

Unit: Environmental Health

Date: 12/10/19

Staff members: Tara Gurge, Diana Acosta, Michelle Iovino and Monica Pancare

Activities and Accomplishments

Activity	Notes
FDA Grants awarded for 2020	- Category 2 – Moderate Projects – Focusing on researching a grading system and other food-related projects. - \$18,212.25 - Category 3 – Travel - Funding to attend FDA conferences and trainings. - \$3,000.00
Food Advisory Board meeting held on Nov. 14 th –	Food Advisory Board developed to enhance communication and input on Needham's food safety program. This advisory board currently includes food establishment owners, school food service nutritionist, hotel managers, and town residents/consumer representatives. We hope to meet in person at least once per year and will send on-going email updates as needed. Topics discussed at our first meeting included: - Food establishment grading or public scoring - Electronic permitting and online payment systems - Food Allergy Awareness - Sustainability ideas - Pest and Trash control/hauler pick-up times - Healthy eating and nutrition programs i.e. Nourishing Needham and how to improve the program
Administrative Hearing held with Mandarin Cuisine	We held a hearing on Nov. 19th with the owner to discuss the on-going food safety issues and pest concerns that we have observed as part of our routine food inspections. The owner agreed to do the following: - Send an additional staff member for ServSafe Food Manager and Food Allergy training at once. (Will be a condition of the issuance of her 2020 food permit.) - Immediately setting up on-going audit/trainings with bi-lingual food safety trainer, Maureen Lee, with MoJin Solutions, LLC. (Contract received on 11/20.) - Increase routine pest control inspections with Catseye Pest Control. (Will send copies of reports to Health Division.)
Artificial Turf PFAS Testing	Had a conference call with Fuss & O'Neill to discuss what will be required in order to conduct additional

	turf testing for PFAS. (Kathleen to lead discussion – on BOH Meeting Agenda.)
Town Pest Control	Met with Assist. Director of DPW, Director of Building Maintenance Dept., along with RTS Director to determine a stricter pest control protocol for future pest control needs for all Town Buildings, RTS, and Town Parking lots, since current contract is up the end of December. UPDATE – Town is in process of putting together a stronger scope of work pest control protocol, which contains minimum <u>monthly</u> pest control services (instead of quarterly), more proactive actions on pest control side with having them come back to re-treat if pest evidence is found, to require the pest company to point out to Maintenance Dept. any holes or gaps that are present during inspections so that they can be sealed/repaired in a timely manner. Will also include rodent exclusion techniques in the towns updated scope of work.

Other Public Health Division activities this month: (See attached report.)

Activities

Activity	Notes
Applications Received	- 1/1 - Animal - 4/5 – Acupuncture / Disposal of Sharps - 6/8 - Bodywork Establishments - 18/25 - Bodywork Practitioners - 1/1 - Biotech - 109/138 –Food Establishments (annual) - 3/3 – Hotels - 9/9 – Indoor Pools - 2/2 – Medical Waste Haulers - 4/10 – Septic Installers - 16/25 – Septage / Grease Haulers - 9/10 - Tobacco
Bodyworks (New)	1 – Annual Bodywork Establishment Inspection completed (for permit renewal.) - Season Day Spa 1 – Bodywork Establishment Permits issued - Baan Thai Spa 2 – Bodywork Practitioner Permits issued - Baan Thai Spa (2x) 1 - Bodywork Establishment Permit pending - Popular Nails – inspection completed, awaiting CORI/SORI results for practitioner 1 -Bodywork Practitioner Permit pending - Popular Nails
Demo Reviews/ Approvals	6 - Demolition sign-offs: - 1386 Great Plain Ave - 42 Rosalie Road - 38 Donna Road - 63 Pinewood - 341 Warren Street - 260 Rosemary Street

Food – Temporary Food Event Permits	1 – Temporary Food Permits issued
Food – Food Permit Plan Reviews (Updates)/Permits Issued	1 – Food Establishment looking to start their Pre-operation inspection process: - <u>Thai Story Restaurant (formerly known as Eat Well)</u> – (Still in process.) 1 – Food establishment seasonal/annual permits issued: - Tobin Beaudet School – Great Plain Ave - Tobin Beaudet School – School Street 1 – Food Establishment pending plan review submittal: - Home Kitchen Inc. – (Still no application submitted)
Food – 6-Month Check-ins	6 – 6-month check in with Level 1 Food Establishments - Only required to be physically inspected once a year. Check in requires an update on food operations and new manager name(s).
Food Pre-operation Inspections conducted	2 – Pre-operation inspections conducted for: - Tobin Beaudet School – Great Plain Ave - Tobin Beaudet School – School Street
Food - Mobile	0– Mobile Truck Inspections conducted.
Food Complaints	3/2 – Food Complaints/Follow-ups: - <u>Café Fresh Bagel (2/1)</u> - 1) Resident became “violently ill” after eating an egg and cheese bagel. Reported staff were not using gloves. Did not follow up with a doctor so foodborne illness was not confirmed. Diana called the owner of the establishment and asked to remind staff on proper glove use and hand washing procedures. 2) Anonymous customer called to report “filth” seen on ceilings and vents. Broken tables were upside down and claimed bags of bagels were left on the ground. A recent inspection was conducted prior to complaint and these reported conditions were not observed. - <u>Dunkin Donut Chestnut St. (1/1)</u> – Customer reported staff was not wearing “protective clothing or anything on their hands”. They also were sweeping and mopping behind the counter “in view of the customers.” It was not clear if there was a spill at the time the customer went into the store which might have been a reason for the mopping or sweeping behind the counter. Diana contacted the owner and it was reported that aprons are a component of the uniform, but not a requirement.
Housing Complaints /Follow-ups -	3/9 – Housing Complaints/Follow-ups - - <u>Gould Street (1/3)</u> – Resident who has complained of “nuclear material” on his property returned and stopped in the office. Diana, Tim, and Donna met with him. Went over the responsibilities and abilities of the Public Health Division and clarified that the resources to test for material like this are not available in the Division. During the meeting, Jack Priest of Radiological Control at the State Department was called. He reported if there was an emergency to call 911. Diana coordinated with the Fire Department to use a Geiger meter on the property. The Fire Department attempted to take a reading at the beginning of the month, but the resident did not respond to them. Fire completed a reading at the end of the month and did find no readings on the monitor. - <u>Stephen Palmer Apartments (1/2)</u> – Resident reported an ongoing issue with the heating system. Heat and hot water were on and off for several days. Diana contacted the maintenance manager of the buildings. He reported a plumber was already on their way to replace the boiler system. One of the staff members was tasked with periodically checking in on the current boiler until it was replaced. The resident later called to report heat and hot water were working properly. Maintenance manager reported that the burner tubes came in and were replaced and boilers were “running at 100%) - <u>Central Ave (0/1)</u> – Oven has been repaired. Heat is working and now the occupant has some ability to control the heat. The occupant has reported issues with rodents in the unit. The landlord was provided with a list of licensed pest control servicers that may bait the whole building. - <u>Murphy Rd. (1/3)</u> – Social worker called on behalf of occupant to report that her client had no heat in her home, and that her gas boiler was in disrepair for many weeks. Worked with

	landlord in expediting this boiler repair and ended up ordering the replacement of the gas boiler. Landlord was also responsible for relocating occupant to a local hotel while the boiler replacement was conducted. Site visit was conducted where Tara and Diana met with the resident. - <u>Linden St. (1/3)</u> – Report received from DFS social worker that home is in severe disrepair and on-going water damage was present due to missing attic window and reported concerns of on-going structural damage due to water damage. Inspection conducted by Tara, Diana, and Donna with Building Commissioner. Order letter sent restricting the owner to occupy the residence until the home was repaired and re-inspected and permission granted by Building and Health, to reoccupy the home. (Owner has moved in with her son while she comes up with a plan.)
Nuisance – Complaints/ Follow-ups	3/4 – Nuisance Complaints/Follow-ups conducted for: - <u>Needham Center Laundromat (1/2)</u> – A resident reported that the facility was not clean, various machines are out of order, chairs and windows were cracked, and water damaged magazines were stuffed between machines to prevent them from knocking each other. Diana walked in to check on conditions the same day. There were 7 washing machines and 4 dryers out of service. There was a build up of dust in between machines. Awaiting response from owner of establishment. Attempted calling location and phone number is no longer in service. - <u>St. Mary Street (0/1)</u>: At a recent check, it seems that resident is removing less items that he was previously. Diana has alerted the fire department of the lack of progress and concern as it is a potential fire hazard. UPDATE: Building Commissioner sent an updated letter to owner. - <u>Needham Children’s Center (2/1)</u>: Two representatives from the Children’s Center called to report that the classrooms smelled like “sewage.” It was determined that The Farmhouse restaurant was having its grease traps cleaned out that morning. The Children’s Center’s air system circulated in the “foul smelling air” into the building. Diana contacted the restaurant’s management who reported the grease company usually cleans out the trap in the morning before the restaurants were open. It was recommended to have the cleanings done at night to not cause a public health nuisance. This is the first time this has been reported. Timing on the grease company may have changed due to the Thanksgiving holiday.
Septic – Addition to a Home on a Septic	1 – Addition to a Home on a Septic plan review conducted: - <u>#320 Charles River St.</u> – Plan review in process. Have call in to engineer for clarifications on rooms to be added as part of the proposed addition/renovation.
Septic Final As-built plan reviews –	3 – Septic final as-built plan reviews in process for: - <u>#1407 Central Ave. (New Storage Bldg. at DPW)</u> - Tank installed. Follow-up tank alarm check inspection conducted. Final as-built plan submission pending for our review/approval. UPDATE – Reached out to project manager again on status of tight tank as-built plan submittal. (Plan is still pending.) - <u>#260 Cartwright Rd.</u> – Received final, revised septic as-built plans. In process of having engineer and installer sign off on the Certificate of Compliance. (In process.) - <u>#745 Central Ave.</u> – Received final, revised septic as-built plans. In process of having engineer and installer sign off on the Certificate of Compliance. (In process.)
Septic – Enforceable Agreement Discussion (Cont.)	1 - Enforceable Agreement Discussion held for #57 Walker Lane. (Continue discussion from last BOH meeting.) Spoke with Town Engineer to review other items that were not included in the overall estimate that was received. → Town Engineer will be present at next BOH meeting to answer any additional questions and to clarify any remaining costs for this sewer connection project. Will also need to determine whether an extension of the Enforceable Agreement should be approved and for how long. Also reached out to owner and his representative to attend the next meeting.

Planning Board Plan reviews	1– Subdivision Plan Review for Planning Board - - #1001 and #1015 Central Ave. - Amendment to the Definitive Subdivision Plan for Sunrise Terrace. Waiver request for removal of sidewalk. Comments sent.
Zoning Board Plan reviews	5 – Plan Reviews for Zoning Board conducted for: - #350 Cedar St. - #642 Webster St. - #1201 Highland Ave. and #397-399 Great Plain Ave. (Dunkin Donuts stores – New owner.) - #1180 Great Plain Avenue - Revised requirements sent on addition of pest control services to take place at the start of and throughout the duration of construction.

Yearly

Category	Jul	Aug	S	O	N	D	J	F	M	A	Ma	Ju	FY '20	FY' 19	FY' 18	FY' 17	Notes/Follow-Up
Biotech	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	Biotech registrations
Bodywork	0	0	0	1	2	0	0	0	0	0	0	0	3	14	11	6	Bodywork Estab. Insp.
Bodywork	0	0	0	0	1	0	0	0	0	0	0	0	1	9	6	4	Bodywork Estab. Permits
Bodywork	0	0	0	0	2	0	0	0	0	0	0	0	2	21	22	13	Bodywork Pract. Permits
Demo	11	10	8	12	6	0	0	0	0	0	0	0	47	104	105	112	Demo reviews
Domestic Animal Permits/Insp.	0	0	0	0	0	0	0	0	0	0	0	0	0	21	19	17	Animal permits/
	1	0	0	0	0	0	0	0	0	0	0	0	1	22	3	16	Inspections
Food Service	14	11	22	18	23	0	0	0	0	0	0	0	88	200	225	198	Routine insp.
Food Service	7	13	3	2	2	0	0	0	0	0	0	0	27	12	32	37	Pre-oper. Insp.
Retail	1	5	6	7	6	0	0	0	0	0	0	0	25	46	60	69	Routine insp. Or 6 month check in
Resid. kitchen	1	0	0	0	0	0	0	0	0	0	0	0	1	6	8	7	Routine insp.
Mobile	2	0	1	0	0	0	0	0	0	0	0	0	3	17	13	15	Routine insp.
Food Service	3	2	2	3	1	0	0	0	0	0	0	0	11	28	53	51	Re-insp.
Food Service/retail	1	3	1	1	0	0	0	0	0	0	0	0	6	140	171	177	Annual/Seasonal Permits
Food Service	11	8	25	8	1	0	0	0	0	0	0	0	53	134	163	158	Temp. food permits/Insp
	9	0	1	0	0	0	0	0	0	0	0	0	10	37	29	62	
Food Service	1	1	0	0	0	0	0	0	0	0	0	0	2	14	14	7	Farmers Market permits
	28	41	40	37	0	0	0	0	0	0	0	0	146	229	127	33	Farmers Market insp.

Category	Jul	Au	S	O	N	D	J	F	M	A	Ma	Ju	FY '20	FY' 19	FY' 18	FY' 17	Notes/Follow-Up
Food Service	3	2	5	4	3	0	0	0	0	0	0	0	17	18	20	13	New Compl./
	3	3	4	5	2	0	0	0	0	0	0	0	17	21	21	17	Follow-ups
Food Service	5	1	1	1	0	0	0	0	0	0	0	0	8	20	42	33	Plan Reviews
Food Service	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	Admin. Hearings
Grease/ Septage Haulers	0	0	0	0	0	0	0	0	0	0	0	0	0	21	24	24	Grease/ Septage Hauler Permits
Housing (Chap II Housing)	7	0	0	0	0	0	0	0	0	0	0	0	7	0	14	14	Annual routine insp./
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	Follow-up insp.
Housing	4	2	6	2	3	0	0	0	0	0	0	0	17	22	22	7	New Compl./
	4	2	6	7	9	0	0	0	0	0	0	0	28	28	24	11	Follow-ups
Hotel	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	Annual insp./
	0	1	14	0	0	0	0	0	0	0	0	0	15	0	0	0	Follow-ups
Nuisance	3	0	5	3	3	0	0	0	0	0	0	0	14	55	42	30	New Compl./
	12	4	8	5	4	0	0	0	0	0	0	0	33	69	42	45	Follow-ups
Pools	0	0	0	0	1	0	0	0	0	0	0	0	1	20	12	13	Pool insp./
	0	0	0	0	0	0	0	0	0	0	0	0	0	12	7	8	Follow up
Pools	0	0	0	0	0	0	0	0	0	0	0	0	0	19	12	9	Pool permits
Pools	0	0	0	0	0	0	0	0	0	0	0	0	0	3	44	19	Pool plan reviews
Pools	0	0	0	0	1	0	0	0	0	0	0	0	1	5	7	6	Pool variances
Septic	1	1	0	8	0	0	0	0	0	0	0	0	10	9	5	18	Septic Abandon
Septic	0	1	0	0	1	0	0	0	0	0	0	0	2	2	2	5	Addition to a home on a septic plan rev/approval
Septic	5	0	1	2	0	0	0	0	0	0	0	0	8	21	28	43	Install. Insp.
Septic	0	1	0	0	0	0	0	0	0	0	0	0	1	3	1	0	COC for repairs

Category	Jul	Aug	S	O	N	D	J	F	M	A	Ma	Ju	FY '20	FY' 19	FY' 18	FY' 17	Notes/Follow-Up
Septic	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	3	COC for complete septic system
Septic	7	5	6	5	4	0	0	0	0	0	0	0	27	62	51	62	Info. requests
Septic	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	6	Soil/Perc Test.
Septic	2	1	0	0	0	0	0	0	0	0	0	0	3	6	5	8	Const. permits
Septic	0	1	0	0	0	0	0	0	0	0	0	0	1	8	9	11	Installer permits
Septic	0	1	0	0	0	0	0	0	0	0	0	0	1	5	3	6	Installer Tests
Septic	1	0	0	0	0	0	0	0	0	0	0	0	1	1	3	7	Deed Restrict.
Septic	3	1	0	0	3	0	0	0	0	0	0	0	7	9	23	14	Plan reviews
Sharps permits/Insp.	0	0	0	0	0	0	0	0	0	0	0	0	0	7	9	9	Disposal of Sharps permits/
	0	0	0	0	1	0	0	0	0	0	0	0	1	7	7		Inspections
Subdivision	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	Plan review-Insp. of lots /
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	Bond Releases
Special Permit Planning/ Zoning Board memos	0	0	3	0	5	0	0	0	0	0	0	0	8	34	15	12	Special Permit/Zoning
Tobacco	0	0	0	0	0	0	0	0	0	0	0	0	0	10	11	12	Tobacco permits
Tobacco	1	0	2	0	1	0	0	0	0	0	0	0	4	14	18	25	Routine insp./
	0	2	6	0	0	0	0	0	0	0	0	0	8	3	3	6	Follow-up
Tobacco	10	0	10	0	0	0	0	0	0	0	0	0	20	30	41	34	Compliance checks
Tobacco	0	0	0	1	0	0	0	0	0	0	0	0	1	3	4	2	New compl./
	0	0	0	1	0	0	0	0	0	0	0	0	1	3	4	2	Compl. follow-ups
Trash Haulers	0	0	0	0	0	0	0	0	0	0	0	0	0	17	14	26	Trash Hauler permits
Medical Waste Haulers	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	Medical Waste Hauler permits
Wells	1	0	0	0	0	0	0	0	0	0	0	0	1	6	2	7	Permission to drill letters/
	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	3	Well Permits

FY 20 Priority FBI Risk Violations Chart (By Date)

Restaurant	Insp. Date	Priority Violation	Description
Hearth Pizzeria	7/13/2019	3-302.11 (A)(2) Raw Animal Foods Separated from each other - Except when combined as ingredients, separating types of raw animal foods from each other such as beef, fish, lamb, pork and poultry during storage, preparation, holding, and display by: (a) Using separate equipment for each type, or (b) Arranging each type of food in equipment so that cross contamination of one type with another is prevented and (c) preparing each type of food at different times or in separate areas.	A cooked turkey breast was stored in Same container as raw chub beef. PIC removed and stored properly
Briarwood Healthcare Center	7/13/2019	4-501.114 (A)-(E) Chem.San. Temp./pH/Concentr./Hard.- A chemical sanitizer used in a sanitizing solution shall be used in accordance with the EPA-registered label use instructions. A chlorine solution shall have a temperature of 55°F-120°F, depending on water hardness, and concentration range of 25ppm to 100ppm. An iodine solution shall have a minimum temperature of 68°F with a concentration range of 12.5ppm to 25ppm. A quaternary ammonium compound solution shall have a minimum temperature of 75°F and be used according to the manufacturer's use directions.	Sanitizer in the 3 compartment sink was not at 200 ppm. Test Frequently and at least once every four hours
Gari Japanese Fusion	7/27/2019	3-501.19 (B)(1)(3)(4) Time as a Public Health Control - 4 Hours - If time rather than temperature is used as the public health control up to a maximum of 4 hours: the food shall have an initial temperature of 41°F or less when removed from cold holding temperature control, or 135°F or greater when removed from hot holding temperature control; the food shall be cooked and served, served at any temperature if RTE, or discarded, within 4 hours from the point in time when the food is removed from temperature control; and the food in unmarked containers or packages, or marked to exceed a 4-hour limit shall be discarded.	Time as a public health control as required no charts were available as required. Cooked product did not have time stamp and other information as required. The most recent date was July 14 2019 it was observed that shrimp and other TCS foods were held at room temperature products were discarded
The Farmhouse	7/27/2019	3-501.14 (A) Cooling Cooked Foods - Cooling cooked TCS foods shall be done within 2 hours from 135°F to 70°F and then within 4 hours from 70°F to 41°F.	Corrected on site - Stockpot of beef stock cooling improperly 2 large containers of chicken stock cooling improperly. Repeat offense. Train staff on proper cooling techniques to get product to 70f within 2 hours and below 41f within the next 4 hours.
Fuji Steakhouse	8/9/2019	3-304.11 Food Contact with Soiled Items - Food shall only contact surfaces of: equipment and utensils that are cleaned and sanitized; single-service and single-use articles; or linens, such as cloth napkins that are used to line a container for the service of foods AND are replaced each time the container is refilled for a new consumer.	Side towel used to store cut vegetables in rolltop on service line. Paper towel used layering products.

Fuji Steakhouse (cont.)	8/9/2019	3-302.11 (A)(2) Raw Animal Foods Separated from each other - Except when combined as ingredients, separating types of raw animal foods from each other such as beef, fish, lamb, pork and poultry during storage, preparation, holding, and display by: (a) Using separate equipment for each type, or (b) Arranging each type of food in equipment so that cross contamination of one type with another is prevented and (c) preparing each type of food at different times or in separate areas.. 3-501.14 (D) Cooling When Receiving Raw Eggs - Raw eggs shall be received as specified under 3-202.11(C) and immediately placed in refrigerated equipment that maintains an ambient air temperature of 41°F or less.	Raw cut beef was stored on top shelves in walk-in above RTE Raw shell eggs 84F stored at room temp in kitchen. Discarded.
Beth Israel Deaconess Hospital Kitchen	8/10/2019	2-301.14 When to Wash - Employees shall clean their hands and exposed portions of their arms immediately before engaging in food preparation including handling utensils and equipment and: after touching bare human body parts other than clean hands and clean, exposed portions of arms; after using the toilet; after handling animals; after coughing, sneezing, using a tissue, using tobacco, eating, or drinking; after handling soiled equipment or utensils; after any type of contamination; when switching between working with raw food and working with RTE food; and before donning gloves to initiate a task that involves working with food.	During inspection two cooks present did not wash hands. Frequent handwashing is critical in between change of tasks. This inspector directed the chef to provide paper towels in the empty dispenser.
Brother's Pizza	8/15/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. - All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable <i>Salmonellae</i> shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.	Deli prep unit was on the warmer side. Tuna salad in top well was at 46°F. To be discarded at end of service. Will keep top lid shut as often as possible. Adjust all front of house cooling units to be cooler.
Hungry Coyote	8/22/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. - All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable <i>Salmonellae</i> shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.	Front of House - Front holding burrito units need to be cooler. Both units were in the mid 40's. Kitchen - Pork was cooked last night. Did not cool down properly. Temperature at 76°F. Discarded by PIC.
Founder's Café / Shark Ninja	8/22/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. - All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable <i>Salmonellae</i> shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.	Deli prep unit and the salad bar in the front was running warm. Tuna salad observed at 45°F. See other temps in log. Manager to get facilities to adjust temperature of units. Staff instructed to set up deli area later the day right before start of service.
Dragon Chef	8/22/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. -All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable <i>Salmonellae</i> shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.	Cooked chicken in cold holding unit had a prep date of 8/15. Checked temperature of center of bowl and was at 60°F. Manager instructed to dispose of food. Disposed of compromised item. Directed PIC to lower temperature of walk-in.

New Garden	8/24/2019	2-301.14 When to Wash - <i>Employees shall clean their hands and exposed portions of their arms immediately before engaging in food preparation including handling utensils and equipment and: after touching bare human body parts other than clean hands and clean, exposed portions of arms; after using the toilet; after handling animals; after coughing, sneezing, using a tissue, using tobacco, eating, or drinking; after handling soiled equipment or utensils; after any type of contamination; when switching between working with raw food and working with RTE food; and before donning gloves to initiate a task that involves working with food.</i> 3-304.11 Food Contact with Soiled Items - <i>Food shall only contact surfaces of: equipment and utensils that are cleaned and sanitized; single-service and single-use articles; or linens, such as cloth napkins that are used to line a container for the service of foods AND are replaced each time the container is refilled for a new consumer.</i> 3-302.11 (A)(2) Raw Animal Foods Separated from each other - <i>Except when combined as ingredients, separating types of raw animal foods from each other such as beef, fish, lamb, pork and poultry during storage, preparation, holding, and display by: (a) Using separate equipment for each type, or (b) Arranging each type of food in equipment so that cross contamination of one type with another is prevented and (c) preparing each type of food at different times or in separate areas.</i> 4-702.11 Frequency-Before Use After Cleaning - <i>Code: Utensils and food contact surfaces of equipment shall be sanitized before use and after cleaning.</i>	During the inspection many of the staff members went outside in parking lot to take a break. Some were observed eating/drinking, touching arms and face. Upon entering the kitchen from taking their break several staff members did not wash hands as required. This inspector required and observed each staff member to wash their hands again, as required. Ice machine underside has slime on rim. PIC directed to clean ASAP. Knives stored improperly on prep line. Do not store directly on soiled equipment prep top area. Improper storage of raw TCS foods in walk-in. Food uncovered. It was observed that a cook was "washing" a pail and beverage container in the middle of the 3-comp. sink without proper washing or sanitizing. The sinks were not set up yet or ready for ware washing tasks.
Residences at Wingate	9/7/2019	3-801.11 (C) Special Requirements (Raw/Partially Cooked RTE) - <i>Code: The following foods may not be served or offered for sale in a RTE form: raw animal foods such as raw fish, raw marinated fish, raw molluscan shellfish, and steak tartare, a partially cooked animal food such as lightly cooked fish, rare meat, soft-cooked eggs that are made from raw eggs, and meringue; and raw seed sprouts.</i>	Poached eggs and fried eggs were prepared from raw shell eggs unpasteurized. Poached egg was 135f Fried egg 145f HSP raw and partially under cooked foods may not be offered in this HSP environment. Use pasteurized shell eggs for this offering
Three Squares	9/14/2019	3-301.11 (B) Preventing Contamination from Hands - <i>Code: Except when washing fruits and vegetables, food employees may not contact exposed, ready-to-eat food with their bare hands and shall use suitable utensils such as deli tissue, spatulas, tongs, single-use gloves or dispensing equipment.</i>	Cook prepared toasted cheese bacon sandwich and removed it to cutting board. Touched product without wearing gloves. Product discarded. Cook stated that he never heard of the regulation that requires you to wear gloves when touching ready to eat foods.

Three Squares	9/14/2019	3-304.11 Food Contact with Soiled Items - <i>Code: Food shall only contact surfaces of: equipment and utensils that are cleaned and sanitized; single-service and single-use articles; or linens, such as cloth napkins that are used to line a container for the service of foods AND are replaced each time the container is refilled for a new consumer.</i>	Ice machine inside surface has reddish slime Clean and sanitize
Dunkin Donuts Highland	9/12/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i>	Bacon at 66°F and employee stated it was take out of the walk in 5-10 mins before. Items all discarded.
Cookies By Design	9/16/2019	3-301.11 (B) Preventing Contamination from Hands - <i>Code: Except when washing fruits and vegetables, food employees may not contact exposed, ready-to-eat food with their bare hands and shall use suitable utensils such as deli tissue, spatulas, tongs, single-use gloves or dispensing equipment.</i> 3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>- Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i> 7-201.11 Storage Separation <i>Code: Poisonous or toxic materials shall be stored so they cannot contaminate food, equipment, utensils, linens, and single-service and single use articles.</i>	Staff decorating cookies without any gloves. Staff did not immediately know where gloves are located. Found the box of gloves and staff member who was decorated added gloves. Need to have adequate supply of gloves. Cookie dough in refrigerated unit is at 47°F. Peanut butter cookie dough at 51.2°F Floor cleaner stored right next to spatulas. Was moved
Fresco	9/28/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i>	Corn beef hash held at room temp under grill line 76 F product discarded.
Cookies By Design	10/1/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i> 3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i>	Peanut butter cookie dough seen at 52°F. Snickerdoodle cookie dough was at 51°F. All doughs were discarded. Reg. Sugar batch made 10/1 seen at 57°. Stuck thermometer in different parts of the dough and the lowest seen was 55°.

The James	10/12/2019	3-501.14 (A) Cooling Cooked Foods- Code: Cooling cooked TCS foods shall be done within 2 hours from 135°F to 70°F and then within 4 hours from 70°F to 41°F.	Ale sauce in walk-in cooling improperly >70F Corrected on site
The Rice Barn	10/12/2019	3-302.11 (A)(1) Raw Animal Foods Separated from RTE - Code: Food shall be protected from cross-contamination by: (1) Separating raw animal foods during storage preparation, holding and display from: (a) Raw RTE food including other raw animal food such as fish for sushi or molluscan shellfish or other raw RTE food such as fruits and vegetables, and (b) cooked RTE food. 7-201.11 Storage Separation - Code: Poisonous or toxic materials shall be stored so they cannot contaminate food, equipment, utensils, linens, and single-service and single use articles. 7-201.11 Storage Separation - Code: Poisonous or toxic materials shall be stored so they cannot contaminate food, equipment, utensils, linens, and single-service and single use articles.	Cooked sliced chicken stored below raw ground chicken and raw salmon filets Paint stored above food refrigerator near back door along with soiled cleaning gloves. Mice rodent traps also stored on top of refrigerator Store segregated away from all food and equipment Draino stored above sink in basement Store away from food equipment
The Farmhouse	10/26/2019	3-501.14 (A) Cooling Cooked Foods - Code: Cooling cooked TCS foods shall be done within 2 hours from 135°F to 70°F and then within 4 hours from 70°F to 41°F. 7-201.11 Storage Separation - Code: Poisonous or toxic materials shall be stored so they cannot contaminate food, equipment, utensils, linens, and single-service and single use articles. 4-702.11 Frequency-Before Use After Cleaning - Code: Utensils and food contact surfaces of equipment shall be sanitized before use and after cleaning.	Prepared sauce cooling improperly on counter. Temp 138F Toxic chemicals stored above vegetable prep sink while employee was washing/ prepping product. Store segregated French fry potato cutter permanently mounted in dry room area, has significant debris and buildup of soil. Must be washed and sanitized before use and after cleaning. Equipment was removed from the wall, and staff is to mount or place it in a location where it can be easily washed rinsed and sanitized property
Masala Art	10/26/2019	3-501.14 (A) Cooling Cooked Foods - Code: Cooling cooked TCS foods shall be done within 2 hours from 135°F to 70°F and then within 4 hours from 70°F to 41°F 3-501.15 (A) Cooling Methods - Code: Cooling shall be accomplished in accordance with the time and temperature criteria specified under 3 501-14 by using one or more of the following: placing food in shallow pans; separating the food into smaller or thinner portions; using rapid cooling equipment; stirring the food in a container placed in an ice water bath; using containers that facilitate heat transfer; adding ice or other effective methods.	Improper cooling of TCS foods Large Milk rice mix on countertop cooling Products brought to blast chiller. A large pan of cooked goat was stored in the refrigerator @179F product was removed and brought to the basement blast chiller

Avita of Needham	11/1/2019	3-304.11 Food Contact with Soiled Items - Code: <i>Food shall only contact surfaces of: equipment and utensils that are cleaned and sanitized; single-service and single-use articles; or linens, such as cloth napkins that are used to line a container for the service of foods AND are replaced each time the container is refilled for a new consumer.</i>	Corrected on site: A kitchen side towel (moist/ wet) was used to wrap a challah bread, to thaw and proof for service. Discussion with Chef to use food grade materials
Briarwood Healthcare Center	11/1/2019	4-501.114 (A)-(E) Chem.San. Temp./pH/Concentr./Hard. <i>Code: A chemical sanitizer used in a sanitizing solution shall be used in accordance with the EPA-registered label use instructions. A chlorine solution shall have a temperature of 55°F-120°F, depending on water hardness, and concentration range of 25ppm to 100ppm. An iodine solution shall have a minimum temperature of 68°F with a concentration range of 12.5ppm to 25ppm. A quaternary ammonium compound solution shall have a minimum temperature of 75°F and be used according to the manufacturer's use directions.</i>	There was no sanitizer in the 3-compartment sink. Quaternary test strips registered 0ppm. Train staff for proper testing of concentration to ensure warewashing and sanitizing of equipment is done correctly. Cook corrected on site.
Gianni's Gourmet Deli	11/12/2019	3-501.16 (A)(2) (B) Proper Cold Holding Temps. <i>Code: All cold TCS foods shall be held at 41°F or below. Eggs that have not been treated to destroy all viable Salmonellae shall be stored in refrigerated equipment that maintains an ambient air temperature of 45°F or less.</i>	Deli prep unit in front is at 43°F. May need repair.
North Hill Bistro	11/16/2019	3-302.11 (A)(1) Raw Animal Foods Separated from RTE <i>Code: Food shall be protected from cross-contamination by: (1) Separating raw animal foods during storage preparation, holding and display from: (a) Raw RTE food including other raw animal food such as fish for sushi or molluscan shellfish or other raw RTE food such as fruits and vegetables, and (b) cooked RTE food.</i>	Raw shell eggs stored above RTE
North Hill Main Kitchen	11/16/2019	3-304.11 Food Contact with Soiled Items - <i>Code: Food shall only contact surfaces of: equipment and utensils that are cleaned and sanitized; single-service and single-use articles; or linens, such as cloth napkins that are used to line a container for the service of foods AND are replaced each time the container is refilled for a new consumer.</i>	Kitchen side towels were observed covering raw endive leaves. Side towels are not approved for food storage or protection. Use food grade approved products only to prevent contamination.
Mandarin Cuisine	11/16/2019	3-302.11 (A)(1) Raw Animal Foods Separated from RTE - <i>Code: Food shall be protected from cross-contamination by: (1) Separating raw animal foods during storage preparation, holding and display from: (a) Raw RTE food including other raw animal food such as fish for sushi or molluscan shellfish or other raw RTE food such as fruits and vegetables, and (b) cooked RTE food.</i> 7-207.11 (B) Restriction and Storage - <i>Code: Medicines that are in a food establishment for the employees use shall be labeled and located to prevent the contamination of food, equipment, utensils, linens, and single-service and single-use articles.</i>	Raw chicken stored to thaw next to cook making dumplings. Prescription medicine stored on food/ takeout paper supply shelf

Sudbury Farms/ Mai Sushi	11/23/2019	8-103.12 Conformation with Approved Procedures/HACCP - <i>If the RA grants a variance or a HACCP plan is otherwise required, the permit holder shall comply with the HACCP plans and procedures that are submitted and approved as a basis for the modification or waiver.</i>	Upon arrival, inspection of Daily Logbook for sushi rice testing of Ph was not completed for the day. Review of previous logs note that sushi rice was not being tested for PH levels every 4 hours as required. Immediate attention is required to comply with all HACCP PLAN requirements. The PIC Jimmy Chen did not know how to use the Ph meter, and did not have test tape available. Failure to may result in Administrative actions by LBOH. This inspector provided PH tape and 4.0 was compliant.
--------------------------	------------	--	--



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/2019

Agenda Item	FY 2021 Budget Discussion and BOH Priorities
Presenter(s)	Timothy Muir McDonald, Director of Health & Human Services

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
The Board of Health will review the FY2021 HHS Budget submission and discuss its priorities for funding to support the Public Health Division's operations and to advance the Board's goals and objectives. The Finance Committee hearing for HHS is on <i>January 15, 2020 at 7 p.m. at Town Hall.</i>	
2.	VOTE REQUIRED BY BOARD OF HEALTH
No vote is required.	
3.	BACK UP INFORMATION ATTACHED
FY 2021 HHS Budget as submitted is attached for the Board of Health's review and reference.	

Department Information DSR1	
Department	Health & Human Services
Department Mission	
The Needham Department of Health & Human Services (HHS) provides programs and services that support and enhance the quality of life in Needham. HHS includes the following divisions: Aging Services, Public Health, Veterans' Services, and Youth & Family Services. Its mission is to protect, preserve, and promote the health, wellness, and social and emotional well-being of all Needham residents. * * * * *	
Aging Services Division <u>Mission:</u> The mission of the Aging Services Division is to provide a welcoming, inclusive, and secure environment where individuals and their families can benefit from services and resources that enhance their quality of life and provide opportunities for growth. Aging Services fulfills its mission by providing services at the Center at the Heights, as well as in community settings. The programs are designed to support adults aged 60 and older to live healthy and independent lives. Services include: outreach and counseling, advocacy, transportation, daily meals, information and referral, Medicare benefits counseling, volunteer opportunities, health & wellness information and screening, educational programs, and special events and trips. The Center at the Heights (CATH) is a 20,000 square foot, handicapped-accessible building which accommodates many programs. The facility includes: a large community room that seats up to 250 people, a fitness center, a cafeteria, an art room, a computer room, a library, several meeting rooms, and a roof deck. CATH promotes health and wellness by providing a place for Needham's older adults to socialize and participate in many recreational, health, educational, and social activities. <u>On the Horizon:</u> Needham's seniors are living longer and are becoming a larger proportion of the populations. With their growing numbers, older adults are presenting with a wide range of needs and interests. According to data from the U.S. Census Bureau, the number of people aged 65 years and older will reach 55 million by 2020. By 2030, there will be about 72.1 million older persons in the US who will make up roughly 20 percent of the U.S. population. The team at the Aging Services Division delivers comprehensive programs that promote the health and wellness of seniors 60 years of age and older. As the proportion of older adults increases, Aging Services will have to adjust programs to meet the growing needs. The Needham Council on Aging continues to support the needs of older residents and families through an eight dimensions of wellness approach, incorporating education, exercise, and entertainment in its programming. The eight dimensions of wellness are: emotional, environmental, financial, intellectual, occupational, physical, social, and spiritual. The Aging services Division continues the movement to improve the quality of life for Needham's older residents with Memory enhancement, Exercise, Music/art, Social, Education Support for caregivers.	

Department Information
DSR1

Department	Health & Human Services
-------------------	-------------------------

Budget Statement:

This year's base budget submission for the Aging Services Division reflects very modest increases for some line items. The largest increase is for wireless communications, which will allow mobile phones for the new Assistant Director and for the new vans that were purchased with state earmark funding. Costs for usage of the Aging Services Division vans (Vehicle Supplies and Gasoline) have been reduced slightly. Past usage increased at a slower rate than expected, despite a significant increase in programs and associated transportation costs (reflecting efficiencies in route planning and the timing of trips). As programs continue to increase and CATH's hours continue to expand, these costs categories will be closely monitored. Please also note that the Aging Services Division has a significant number of part-time and temporary staff members, many of which were affected by an increase in the Schedule C rates for some positions (notably Van Drivers and Building/Kitchen Monitor).

Aging Services Division

Line	Div.	Description	Change from FY20	Comments
Professional/ Technical Software License Fee	Aging Division	Annual license cost for Aging Program	(\$500)	Information Technology is absorbing these costs into its budget
Postage	Aging Division	Mailing	\$250	Reflects increased mailing costs for distribution of The Compass (newsletter)
Wireless Communications	Aging Division	Mobile Phones	\$1,300	Mobile phones for new Assistant Directors and new phone assigned to new COA handicap accessible Van
Office Supplies	Aging Division	Office Supplies	Unchanged	
Vehicle Supplies	Aging Division	Brakes, windshield wipers, etc.	(\$250)	Reduced by \$250 to better reflect anticipated vehicle maintenance costs.
Gasoline/ Diesel	Aging Division	Fuel	(\$500)	Reduced to better reflect anticipated usage
Seminars & Trainings	Aging Division	Trainings and registration costs	Unchanged	
Dues & Memberships	Aging Division	Memberships	Unchanged	
Conf In-State	Aging Division	Registration costs for	Unchanged	

Department Information DSR1					
Department			Health & Human Services		
		trainings			
Other Expenses	Aging Division	Transponder Charges	\$500	Reflect charges against vehicle transponder for tolls taken by COA Vans.	

The Aging Services Division submitted a DSR4 spending request to support the costs of evening and weekend programs, the design of *The Compass*, the Fitness Program, and transportation to support the new hours of programming and services. This is the second year of a multi-year request, and totals \$25,000 in expense costs and \$48,635 in salary costs, all of which are for part-time staff members. The benefit costs associated with those part-time staff members total \$4,935.

Grants and Donations:

The Aging Services Division relied upon two state/federal pass-through grants. It receives \$84,664 in funding for the SHINE program, which funds two 30-hour per week positions and supports the training of dozens of SHINE counselors. The Division also received \$77,976 in funding from the Formula Grant, which supported part-time staff members, programs, recreational supplies, furniture replacements, and upgrades for CATH technology. Those grants were supplemented by a \$90K earmark in the state budget (secured by Needham's legislative delegation led by Representative Denise Garlick) which supported the purchase of two new vans for the Aging Services Division (a six passenger mini-van, and a 7-passenger handicap-accessible van).

The Division received a substantial donation (greater than \$50K) from the Friends of the Center at the Heights in FY 2019, which supported the operation of the Fitness Program at CATH and which helped to support the expansion and mailing of the *Compass* newsletter six times per year. Additionally, FY 2019 was the first year of the substantial five-year (almost \$160,000) commitment that the Beth Israel Deaconess Hospital-Needham has provided to support senior health and wellness.

Volunteers:

The Aging Services Division relies upon a committed group of community volunteers to support the wide array of programs and services which Division provides to the community. Volunteers serve as SHINE Counselors, staff the front desk, answer phones, assist patrons with registering for classes, assist seniors with tax preparation, and assist in the kitchen with the congregate lunch program. There are nearly 150 volunteers in FY 2019, and those volunteers provided an estimated 8,000 hours of service.

Accomplishments and Activities:

Programs at CATH continually evolve to meet the needs of the growing number of older adults in Needham. In recent years well-attended programs have included exercise, meditation, Reiki, smoking cessation, nutrition, cooking, chronic disease management, and other health-focused topics. There are also support groups, creative arts activities, intergenerational programs, movies, and other entertainment.

Social workers provide a wide range of supportive services including: assistance in addressing problems with housing, transportation, utilities, and other concrete problems; supporting individuals struggling with depression, anxiety, grief, and loneliness; offering support groups;

Department Information DSR1	
Department	Health & Human Services
and working with public health nurses on the Safety at Home program. In FY 2019, the Aging Services Division expanded its programs and services into weekday evenings and piloted offering programs and services on Saturday mornings. The Division also implemented a once-a-month Wednesday breakfast program, which has been very popular. SHINE (Serving the Health Information Needs of Everyone) Counselors provided 7,572 counseling sessions with seniors about health insurance options. This worked saved an estimated \$2,000,000 through drug plan enrollments. Transportation services were expanded and transportation added routes to holiday shopping centers to give seniors the freedom to shop for their loved ones without needing to drive.	
On the Horizon	
Public Health <u>Mission:</u> The Needham Public Health Division is empowered through the Needham Board of Health by the Massachusetts General Laws to enforce state and local public health and environmental regulations. The mission of the Division is to prevent disease, promote health, and protect the public health and the social well-being of Needham residents, especially those who are most vulnerable. Public Health staff work toward fulfilling this mission through collaboration with state and local agencies and community partners. The work largely consists of promoting health practices based on research and evidence, enforcing local and state regulations, and advocating for policy and regulatory changes that promote health and well-being. <u>On the Horizon:</u> The Public Health Division and the Board of Health adapt programs and services as emerging issues or new research indicate needs. Recent examples of emerging issues have included concerns about concussions, the potential dangers of vaping, pest management, worrisome infectious diseases. For the coming fiscal year, the Public Health Division anticipates the end of a significant grant that has funded youth-focused substance use prevention. Staff members have been exploring options for maintaining this important work once the Federal funding is gone. <u>Budget Statement:</u> Public Health has been very successful in securing grant funding in numerous areas. Significant grants have supported several years of substance use prevention through the Substance Prevention Alliance of Needham (SPAN). This has allowed the Division to conduct school and community-based awareness programs, work with restaurants and stores with liquor licenses, and work with pharmacists on issues related to prescription drugs. However, the Drug Free Community grant, which has funded so much prevention work, will expire in September 2020, leaving Needham without dedicated youth substance use prevention funding. Smaller grants, ranging from \$1,400 to \$20,000, have supported programs such as elder fall-prevention, adaptation to climate change, initial efforts toward public health accreditation, innovations in sanitary code enforcement, emergency preparedness, and work supporting	

Department Information DSR1	
--------------------------------	--

Department	Health & Human Services
------------	-------------------------

housing options for older adults.

This year's base budget submission from the Public Health Division reflects a modest cost increase of \$1,715. There is a \$250 reduction in general office supplies, but that savings is offset by the addition of \$250 for medical supplies to support the replacement of Stop the Bleed kits co-located with First Aid Kits and AEDs in Town buildings.

Software charges are transferred to the ITC budget, and service from Constant Contact is eliminated. There are small reductions in the funding for wireless communications and licensing charges, but a sizable increase in the cost of services for environmental monitoring of synthetic turf fields. The cost of testing has increased, and the Board of Health now requires that the testing examine not only crumb rubber in-fill and water runoff, but also PFAS chemical applications to the synthetic grass blades. The cost increase of \$2,500 in this line is based off of a preliminary estimate from an environmental testing company on state contract. Please also note that the Public Health Division has a significant number of part-time and temporary staff members, although only a small number of those staff members were affected by an increase in the Schedule C rates for some positions (notably Traveling Meals Program Summer Drivers).

Public Health

Line	Division	Description	Change from FY2020	Comments
Professional/ Technical Software License Fees	Public Health	Software costs for Survey Monkey and Constant Contact	(\$660)	Information Technology is absorbing the costs for Survey Monkey into its budget and those costs have increased slightly due to a change in the company's licensing; the contract with Constant Contact will be terminated
Professional/ Technical Licensed Professional	Public Health	Environmental Testing Services	\$2,500	Costs to cover the full-range of BOH-required environmental testing for new synthetic turf fields (added PFAS tests which nearly double previous cost)
Wireless Communications	Public Health	Mobile Phones	(\$75)	Monthly charges for mobile phones reduced.
Office Supplies	Public Health	General Office Supplies	(\$250)	Reduced costs to more accurately reflect the previous years' spending levels for office supplies

Department Information DSR1				
Department		Health & Human Services		
Medical Supplies	Public Health	Medical Supplies for Town Buildings	\$250	Updated to reflect costs of replacement of Stop the Bleed kits co-located with First Aid
Governmental Charges	Public Health	Licensing charges	(\$50)	Reduction in funding for required licenses
Mileage	Public Health	Mileage	Unchanged	
Conference Out-of-State	Public Health	Conferences & Trainings	Unchanged	

The Public Health Division has submitted two DSR4 budget requests, both of which are high priorities of the Board of Health. The top priority is the request for \$125,000 in funding to support the Substance Prevention Alliance of Needham (SPAN) when its federal grant expires in early FY 2021. The benefit costs for the personnel (one full-time staff member, one 19.5 hr/week part time staff member) in this budget request totals \$36,514, yet it is important to note that these benefit costs have been paid by the Town for the last decade, so this would not be a newly assumed cost.

The second priority is funding to support Public Health Division staffing with a Director for the Public Health Division (\$108,928 in salary costs), expanded hours for environmental health inspections from a part-time staff member (\$18,200 in salary costs), and the benefit costs for those personnel (\$36,866).

Grants and Donations:

Public Health has been very successful in securing grant funding in numerous areas. Significant grants have supported several years of substance use prevention through the Substance Prevention Alliance of Needham (SPAN). This has allowed the Division to conduct school and community-based awareness programs, work with restaurants and stores with liquor licenses, and work with pharmacists on issues related to prescription drugs. However, the Drug Free Community grant, which has funded so much prevention work, will expire in September 2020, leaving Needham without dedicated youth substance use prevention funding.

Smaller grants, ranging from \$1,400 to \$20,000, have supported programs such as elder fall-prevention, adaptation to climate change, initial efforts toward public health accreditation, innovations in sanitary code enforcement, emergency preparedness, and work supporting housing options for older adults. In FY 2019, the Public Health Division received \$125,000 for Drug Free Communities grant, \$100,000 for regional Substance Abuse Prevention Collaborative grant, approximately \$22,000 from the federal Food & Drug Administration for food safety projects, a \$10,000 smoking cessation grant, a \$26,089 climate resiliency for seniors grant, and a \$33,000 grant for community vulnerability assessment to climate change.

Volunteers:

The Public Health Division relies upon a committed group of community volunteers to support the Traveling Meals Program, which delivers two-meal packets to home-bound or vulnerable community members. Meals are cooked by the food program staff at the Beth Israel Deaconess Hospital-Needham; volunteers assist with packing the meals and then drivers deliver the meal packets to program recipients. There are approximately 40 program recipients and over 60

Department Information DSR1	
Department	Health & Human Services
volunteers. Those volunteers provided an estimated 1,850 hours of service in FY 2019. <u>Accomplishments and Activities:</u> Public Health plays a key role in several important community initiatives. The Community Crisis Intervention Team (CCIT) is a joint initiative of the Public Health Division and the Needham Police Department, which includes the Fire Department, the Aging Services Division, and Beth-Israel Deaconess Hospital-Needham. This group offers resources and support to Needham residents who are in crisis. Similarly, Public Health plays a leadership role with the Police Department in the Domestic Violence Action Committee, and co-chairs the Local Emergency Planning Committee with the Fire Department. During the 2020 fiscal year, the Environmental Health Unit successfully transitioned to the new food code and conducted well-received training for all food handlers, while continuing to manage and enforce regulations, permitting, and inspections in food establishments, housing, construction, waste management, hotels, swimming pools, among many areas. Environmental Health has also addressed emerging issues in cannabis, electromagnetic fields, and other concerns. Needham's Public Health Nursing Program, as the clinical arm of the Public Health Division, continued to provide expertise in communicable diseases, illness and injury prevention, and wellness. One very visible example of the nurses' work was the ongoing public education and response to concerns about Eastern Equine Encephalitis (EEE) during the summer of FY2020. The Public Health nurses offered monthly blood pressure clinics to residents and to Town employees and coordinated the annual flu clinics. The nurses also coordinated a range of assistance programs that help residents apply for assistance with utility bills, food stamp applications, and coping with ongoing issues such as housing problems, hoarding, and home safety. In addition to their annual CPR classes, the Public Health nurses also taught a new Stop the Bleed class in conjunction with the installation of kits throughout Town buildings. Public Health continued to manage contracts with Riverside Community Home Based Care (to provide services to high risk adults and seniors and for consultation to critical local committees addressing crisis intervention, domestic violence, and substance use) and with INTERFACE, a referral service for people seeking mental health services.	
Budget Statement	
Veterans Services <u>Mission:</u> The mission of the Veterans Services Division is to provide services determined by Massachusetts law including: the administration of benefits for veterans and their families who meet eligibility criteria; the care of veterans' graves, ensuring the burial of indigent veterans and their eligible family members; the ceremonial observance of national and state holidays dedicated to veterans and patriotic purposes; to take such actions as may be necessary to ensure the well-being of Needham's veterans; and to actively pursue available federal benefits for veterans and their families.	

**Department Information
DSR1**

Department	Health & Human Services
-------------------	------------------------------------

Needham is a member of the West Suburban Veterans District, which was established in fiscal year 2010. The District also includes Wellesley, Weston, and Wayland.

On the Horizon:

Long-term challenges including providing support and services to the population of post-9/11 veterans in Needham and meeting the needs of a larger population of pre-9/11 veterans as they continue to age in our community. On the latter front, existing and new collaborations with the Aging Services Division on programs like a Veterans Writing Group have been a valuable arena for engaging veterans.

Budget Statement:

As a member of the West Suburban Veterans District (WSVD), Needham receives dedicated support for the administration of benefits and services to veterans and their families. There is a modest amount of additional funding available in the Veterans Services budget to support other programs and expenses.

Some of the funds spent on veterans benefits and other services are eligible for up to 75% reimbursement from the Commonwealth. The WSVD has not notified officially Needham of its FY 2021 Assessment. This base budget is preliminary, as the WSVD Board will begin its FY2021 budget discussions towards the end of the calendar year.

This budget was developed based on previous year's spending increases and the surplus that was available in FY 2019 from the two primary funding lines (Governmental Charges and Veterans' Benefits) and the projected spending levels in FY 2020. It reflects a modest reduction (less than 1%) in key budget lines.

Veterans Services

Line	Division	Description	Change from FY 2020	Comments
Governmental Charges	Veteran	District Assessment	(\$290)	Slight reduction in District Assessment costs
Mileage	Veteran	Mileage	Unchanged	
Veterans' Benefits	Veterans	Veterans' Benefits	(\$389)	Benefits Costs reduced slightly to better reflect anticipated expenses

There are no DSR4 budget requests for the Veterans Services Division.

Accomplishments and Activities:

During the last year there were over 2,400 American flags on the graves of Veterans in St. Mary's and Needham cemeteries. Veterans Services coordinated and operated the Memorial Day and the Veterans Day observations. Veterans and widows of veterans have been assisted in identifying and applying for benefits and services to which they are entitled.

Department Information DSR1	
Department	Health & Human Services
Accomplishments and Activities	
Youth & Family Services Division <u>Mission:</u> The mission of Needham Youth & Family Services Division is to provide leadership and a community focus on youth and family issues, and to promote community wellness by: advocating for youth and family interests; developing and implementing quality programs and services; educating and communicating with the public regarding youth and family issues; identifying and addressing youth and family needs; and partnering with other youth and family serving agencies. Needham Youth & Family Services operates as a mental health resource offering a wide array of confidential clinical and programmatic services to children, adolescents, and families. While the division's services are reaching more people and having a greater impact, it is clear that there is an escalating demand for services, and Youth & Family Services has worked diligently to construct meaningful programs designed to meet these needs. <u>On the Horizon:</u> Youth & Family Services has gone through many changes over the past year as many of the programs and services have been assessed and the development of strong community partners has started to develop. Over the next year, the division hopes to accomplish a number of initiatives, in addition to continuing to run past programs that the community has seen as so valuable. • Constantly assessing the community needs ensuring that the programs are addressing these appropriately and providing community members the necessary amount of support. • Address the vaping epidemic by creating a task force and increasing community involvement and planning. We have seen a drastic increased need for vaping awareness, prevention, education and cessation as 35% of Needham High School students and 7% of Middle School students report having used electronic vapor products. This number is steadily increasing in Needham and across all MetroWest regions. • Develop additional programs to address areas of depression, anxiety, suicidality as surveys have recently showed there is such a high need for this • Continue to train Youth Mental Health First Aid to all adult who have any contact with youth so that interventions can be implemented as early as possible. If the Town can be the forefront of have a high percentage of residents and staff trained, mental health crises will decrease, and everyone will be more prepared to intervene when necessary. This effort was initially supported by a grant, and this year is being supported by High Rock Church by organizing a 5K to build awareness and funds for this program. • As families and youth in crisis are increasing in frequency and intensity, additional crisis clinical supports are being implemented. • We are working on building relationships across other Town divisions – we have started running programs with the COA, school system and SPAN, work on crisis intervention with Police, Fire and Rescue and Public Health. In addition, the division is collaborating closely with a number of community organizations such as the Housing Authority, the YMCA, the	

Department Information
DSR1

Department	Health & Human Services
-------------------	------------------------------------

Walker School, the clergy, the hospitals, Early Intervention and many others.

Due to the increased clinical responsibilities necessary to address the needs of the community, constant training and clinical consultation is necessary for all staff. Not only does this allow for the staff to stay current with successful therapeutic techniques and interventions, it also keeps them stimulated and allows for professional growth. Staff members who feel like they are being professionally supported are more likely to have longevity and higher efficiency which will further benefit the community.

Budget Statement:

The Youth & Family Services Division's base budget request includes modest cost increases to replenish/refurbish the Division's stock of therapeutic games and supplies, add a hotspot to the YFS Division Director's work phone, and to support the costs for program supplies, materials, and refreshments for programs aimed at low-income families. This is part of the Division's effort to expand the reach of its services and programs.

Youth & Family Services

Line	Div.	Description	Change from FY2020	Comments
Postage	Y&FS		Unchanged	
Wireless Communication	Y&FS	Cell phones	\$275	Increased cost for conversion to smart phone and an expanded data plan (Hotspot) for the Director.
Printing and Mailing	Y&FS		Unchanged	
Recreation	Y&FS		Unchanged	
Office Supplies	Y&FS		Unchanged	
Food & Services Supplies	Y&FS	Food supplies for programs	\$1,000	Increased costs for materials and access programs, including programs targeted for low income families
Other Supplies and Equipment	Y&FS	Publicity materials, resource cards therapeutic games and activities.	\$500	The cost for publication and advertising has increased and the budget has not kept up with these increased costs. This would enhance the level of outreach and additional therapeutic activities.
Conf Out of State	Y&FS		Unchanged	
Dues and Memberships	Y&FS		Unchanged	

Department Information DSR1	
Department	Health & Human Services
There are no DSR4 budget requests for Youth & Family Services within the Health & Human Services Department budget. A request for a total of \$4,000 was submitted as part of the Information Technology budget submission, which would support two small software applications for YFS – a registration program and a mental health case notes program. <u>Grants and Donations:</u> The Youth & Family Services Division received a \$20,000 grant from the MetroWest Health Foundation to support the implementation of Mental Health First Aid trainings in the community. Additionally, the Division also received small community donations from residents and modest size donations from businesses and community partners like the Needham Community Council. In FY 2019, donations totaled \$1,895. <u>Volunteers:</u> The Youth & Family Services Division engages youth in community-service and give-back activities throughout the year. The Peer Tutor program provides approximately 1,200 hours of service from more than three dozen high-school age tutors. The VIP program provides more than 300 hours of peer support, and Project VAN (Volunteers Around Needham) expanded its offerings and had service projects throughout the community over April school vacation in addition to the summer vacation. <u>Accomplishments and Activities:</u> The services provided by the division include direct clinical services to youth and families, educational outreach and support for families and youth, and involvement in community-based initiatives, groups and trainings. During the 2019 fiscal year, the Division provided several sessions of training for Town staff and for residents about Youth Mental Health First Aid. Clinical service continues to be a strength of the division with the staff providing hundreds of clinical hours to Needham youth and their families. An effort to decrease the waitlist has paid off as there has been a significant drop in wait-time for clients. Other services have included school-based projects, wellness and prevention services, and babysitting training. Youth & Family staff members have been active members of several town-wide committees addressing substance use prevention, domestic violence, as well as groups of peers from youth and family services in other communities. Other accomplishments include: - Youth and Family Services offers almost 1000 hours of clinical services each year to youth and families, in addition to providing crisis management when needed. Also imbedded in these clinical hours, the division offers Substance Abuse Awareness and a Behavior Intervention Program, both which have a specific curriculum to best intervene with youth struggling with substance use or behavioral difficulties. - Over the past decade, the Needham community has grappled with critical youth issues such as loss, self-injury, depression, and anxiety. Youth & Family Services has responded by outreaching to youth, parents, and families in a variety of ways including individual meetings, group sessions, and the distribution of informational materials. In addition, the department was actively involved with groups such as the Needham Coalition for Suicide Prevention and the Substance Abuse Prevention Alliance of Needham (SPAN). A	

Department Information DSR1			
Department		Health & Human Services	
significant number of staff hours were devoted to creating materials, meeting with community leaders and to directly assisting youth and/or their parents with a crisis. In February of 2018, there was a tragedy during which 2 High School students were killed after being hit by a car while crossing the street in a crosswalk. Youth & Family Services responded to this event and at the year anniversary, providing a significant amount of time and support to the students and the school. The division is also dedicating a tremendous number of hours teaching Youth Mental Health First Aid. • We engaged youth in wellness/prevention services such as the Peer Tutor Program (that provided over 1,200 hours of support to youth in the past year); VIP (that provided about 300 hours of support to youth in the past year; Needham Unplugged (in which hundreds of families participated); Project VAN which expanded this past year, offering services to the community during April break in addition to all of the summer projects; we trained 30 new babysitters through our Babysitting Training Seminar and Make A Statement Day (in which we had over 1,000 participated). • We continue to honor an adult in our community with the Patrick and Patricia Forde Good Person Memorial Award to acknowledge the contributions the recipient has made to the lives of youth in the Needham Community • We play a leadership role on the Needham Youth Resource Network by convening a large group of youth serving agency providers together each month to tackle the difficult circumstances and situations that some Needham youth and their families face. In addition, the division plays a role in CCIT (Community Crisis Intervention Team) which also discusses individuals and families in crisis and how the town can best support these individuals. Youth and Family Services provides a number of educational workshops in the schools, being part of the entire 6th, 7th, 8th and 9th grade. The workshops that are being presenting included information about safely surfing the internet, sexual harassment, the relation between social media, body image and self-esteem, and teen dating violence.			
Spending Request Recap			
Description	Base Request DSR2	Additional Request DSR4	Total (DSR2 + DSR4)
a) Salary and Wages	\$1,734,921	\$278,608	\$2,013,529
b) Expenses	\$392,885	\$47,155	\$440,040
c) Capital			
d)			
e)			
f)			
g) Total DSR2 & DSR4 Request (a through f)	\$2,127,806	\$325,763	\$2,453,569
V2021			

Department Expenditure Detail DSR2																		
Department				Health & Human Services														
Object				Description						Amount								
DSR2A																		
Permanent Personnel	Last Year (FY2019)			Current Year (FY2020)			Next Year (FY2021)											
	FT Head Count	PT Head Count	Full Time Equivalent (FTE)	FT Head Count	PT Head Count	Full Time Equivalent (FTE)	FT Head Count	PT Head Count	Full Time Equivalent (FTE)									
	15	6	17.66	15	4	17.14	15	4	17.67									
Non-Budget Personnel: Will the department rely on grant/revolving fund positions to provide services?						Yes	No	FT Head Count	PT Head Count									
						X		2	2									
Union Positions:		BCTIA		Fire A		Fire C	X	ITWA		NIPEA		Police		Police Superior		NA		
1. Salary and Wage Permanent Positions.																		
a.	PRD1 Salary and Wages Base													\$1,419,858				
b.	PRD1 Differentials (Conditions, Requirements, Shifts)																	
c.	PRD1 Education																	
d.	PRD1 Extra Holiday																	
e.	PRD1 Longevity													\$5,149				
f.	PRD1 Snow Program																	
g.	PRD1 Uniform																	
h.	PRD1 Other Compensation																	
i.	PRD1 Budget Adjustments													\$5,481				
													PRD1 Sub Total					
J	DSR3 Other Compensation																	
													Sub Total 1				\$1,430,488	
2. Salary and Wage Seasonal & Temporary Positions (Itemized Below)																		
a.	Aging Services – Recording Secretary at \$2,960 plus DSR3 costs listed below													\$2,960				
b.	Public Health – Temp office coverage at \$3,500, Recording Secretary at \$2,960, After hours inspections at \$14,110, and Program Support Assistants at \$36,525, also includes the date gathering, plus DSR3 costs listed below													\$57,095				
c.	Veterans – Care of Graves at \$2,500 and Seasonal Assistance at \$500													\$3,000				
d.	Youth Services – Part-time Social Workers at \$40,730 and Recording Secretary at \$2,960													\$43,690				
e.	DSR3 Total													\$174,088				
													Sub Total 2				\$280,833	
3. Salary and Wage Overtime (Itemized Below)																		
a.	Scheduled Overtime (contractually obligated)													\$3,000				
b.	Training and Development													\$0				
c.																		
d.																		
e.	DSR3 Total																	
													Sub Total 3				\$3,000	
4. Other Salary and Wage Expenses – (Itemized Below)																		
a.	Incentive Programs																	
b.	Pay In Lieu of Accrued Leave													\$12,100				
c.	Program Stipend													\$8,500				
d.	Tuition Reimbursement																	
e.	Working Out of Grade																	

Department Expenditure Detail DSR2		
Department	Health & Human Services	
f. DSR3 Other Compensation		
	Sub Total 4	\$20,600
5. Total Salary and Wages (1+2+3+4)		\$1,734,921
DSR2B		
Object	Description	Amount
Energy (521x)		
Repairs & Maintenance Services (524x – 525x)	5245 – Maintenance @ \$500) Maintenance and Calibrations on Monitoring Equipment for Environmental Health Inspections needed every other year. This is an on-year for equipment calibration. (PH)	500
Rental & Leases (527X)		
Other Property Related Services (529x)	5290 – Pest Control @ \$500 (PH)	1,900
	Veterans' Event \$1,400 (Vet)	
Professional & Technical Services (530x – 531x)	5300 – Professional & Technical @ \$28,000 for data surveys, technical consultant (PH) 5300 – Professional & Technical @ \$8,500 for group activities (Youth) 5300 – Professional & Technical @ \$8,000 for group activities (Aging) 5303 – Seminars & Trainings @ \$2,000 (PH) 5303 - Seminars & Trainings @ \$2,000 (Aging) 5303 – Seminars & Training @ \$1,800 (Youth) 5309-Licensed Professional Services @ \$87,500 (Riverside, Fuss & O'Neil, etc.) (PH); 5311 – Advertising of flu clinics, public health forums, healthy notes @ \$2,500 (PH)	140,300
Communications (534x)	5340 – Graphic Design @ \$2,000 to support the design of community education materials and public health awareness campaigns (PH)	28,150

Department Expenditure Detail DSR2		
Department	Health & Human Services	
	5341 – Postage @ \$1,500 for mailing permits and licenses and renewal applications (PH) Postage @ \$2,500 (Aging) Postage @ \$100 (Vet) Postage @ \$1,000 Youth 5344 – Wireless Communications @ \$4,925 covering costs of smart phones for Director, two Public Health Nurses, Assistant Director, Environmental Health Agent, Substance Use Prevention Specialists, smart phone for Traveling Meals Program Coordinator, as well as three IPADS for Environmental Health (PH) Wireless Communications @ \$4,250 covering costs of smart phones and data plan for Director and one of two van drivers (Aging) Wireless Communications @ \$1,975 covering costs of smart phone and data plan for Director (Youth) 5345 – Mailing, Printing, and Photocopying @ \$3,250 for both internal (photocopier) and external printing (includes copying of inspection forms, business cards, and posters) (PH) Mailing, Printing, and Photocopying @ \$2,250 for external printing, includes printing of certain program flyers or materials that cannot be produced “in-house” as well as business cards (Aging) Mailing, Printing, and Photocopying @ \$400 for external printing of brochures and program flyers or materials that cannot be produced “in-house” as well as business cards (Youth) 5347 - Legal Notices @\$4,000 for mandated posting of Board of Health	

Department Expenditure Detail DSR2		
Department	Health & Human Services	
	regulations...everytime the BOH adopts a new regulation or revises an existing regulation there is a two-week public notice period pre-hearing and at least a one week posting period post hearing, which costs at least \$657 to post in the Needham Times and Hometown Weekly (PH)	
Recreational & Cultural Services (535x)	Memorial Day Luncheon \$500 (Vet) Program instructors or vendors @ \$28,000 (Aging)	28,500
Other Purchased Services (538x)	5380 – Nuisance Abatement @ \$1,000 (PH)	1,000
Office Supplies (542x)	5420 – Office Supplies and equipment for 6 full time, 3 part-time regular, and 10 part-time/per diem employees, as well as for three committees – Domestic Violence Action Committee, Coalition for Suicide Prevention, and Local Emergency Planning Committee @ \$4,000 (PH) Supplies and equipment necessary for the program and service delivery such as but not limited to paper, pens, files, labels @ \$3,000 (Aging) To purchase basic office supplies --- paper, pens, folders, mailers, etc @ \$800 (Youth) Office Supplies @ \$100 (Vet)	7,900
Building & Equipment Supplies (543x)		
Custodial Supplies (545x)		
Grounds Keeping Supplies (546x)		
Vehicular Supplies (548x)	Parts such as tires, brakes, batteries, inspection stickers for Aging Vans @ \$2,750 (Aging)	2,750
Gasoline and Diesel Fuel (5481)	Gas and oil for the Aging Vans @ \$9,500 (Aging)	9,500
Food and Service Supplies (549x)	Supplies related to program operation @ \$300 Aging and @ \$2,200 Youth	2,500
Medical Supplies (550x)	5500 – Medical Supplies and health materials, largely for public health nursing purposes @ \$1,750 (PH) Supplies related to medical purposes	1,900

Department Expenditure Detail DSR2		
Department	Health & Human Services	
	such as first aid kits @ \$150 (Aging)	
Public Works Supplies (553x)		
Other Supplies & Equipment (558x)	5580 – Other Supplies & Equipment @ \$7,175 Other Supplies & Equipment @ \$2,175 for Wellness Supplies (examples include Stress Balls, Hand Sanitizer Kits) and unexpected expenses like the purchase of Sharps Disposal Containers to be provided free of charge for residents with limited resources and the purchase of water bottles as gift to sports coaches that attended a concussion training offered by the Public Health Department. (PH) Flags and Holders @ \$4,000 (Vet) For a variety of expenses including program materials, off-site printing, etc. To purchase books, manuals, and literature regarding youth/family issues and treatment @ \$3,250 (Youth) Special Event and Public Recognition Expenses @ \$1,750 (Aging)	11,175
Governmental Charges (569x)	5690 – Governmental Charges for the annual cost for Environmental Health Agent licensure for MA Division of Professional Licensure for Environmental Health Agent and for Public Health Specialist @ \$200 (PH) West Suburban Veterans' District Assessment @ \$82,500 (Vet) Licensure for Social Workers @ \$800 (Youth)	83,500
Travel & Mileage (571x – 572x)	5710 – In-State Travel Expenses @ \$2,500 for in-state registration fees (PH) In-State Travel Expenses @ \$1,000 for in-state registration fees (Aging) In-State Travel Expenses @ \$1,500 for	19,500

Department Expenditure Detail DSR2		
Department	Health & Human Services	
	in-state registration fees (Youth) 5711 – Mileage @ \$3,500 for 6 full time, 3 part-time regular, and 10 part-time/per diem employees (PH) Mileage @ \$1,300 (Youth) Mileage @ \$1,100 (Aging) Mileage @ \$100 (Vet) 5720 – Out-of-State Travel Expenses @ \$3,000 for the cost of attendance for one staff member at regional or national event such as training (Youth) Out-of-State Travel Expenses @ \$5,500 for the cost of attendance for one staff member at regional or national events and trainings such as National Association of County and City Health Officials Annual Meeting or the CADCA Leadership Institute in Washington D.C (PH)	
Dues & Subscriptions (573X)	5730 – Dues & Subscriptions for Departmental and staff membership in professional associations and organizations, including the MA Environmental Health Association, the National Association of Local Boards of Health, and the Community Anti-Drug Coalitions of America @ \$2,750 (PH) Professional Subscriptions such as National Association of Social Workers \$1,500 (Aging) Veterans' Association @ \$60 (Vet) Professional Subscriptions @ \$1,000 (Youth)	5,310
Other Expenses (574 X – 579x)	5740 – \$500 for Transponder charges for COA Vans (Aging)	48,500

Department Expenditure Detail DSR2				
Department		Health & Human Services		
		Veterans' Benefits @ \$48,000 (Vets)		
6. Total Expenses				392,885
DSR2C				
Capital Equipment Replacement (587X)				0
7. Total Operating Budget Capital				0
8. Total Base Request (Line 5 + Line 6 + Line 7)				2,127,806
Does the Department depend on any Federal or State grants to provide services?		YES	X	NO
Did the Department submit any requests for FY2021 for the replacement or upgrade of technology or software to the Information Technology Center?		YES	X	NO
Did the Department submit any requests for FY2021 to the Department of Public Works/Building Maintenance division to improve or upgrade a public building or facility?		YES		NO X
V2021				

Department Personnel Supplement DSR3							
Department		Health & Human Services					
	Description	Amount	Amount Reflected DSR2A Section				
			1	2	3	4	
1	Kitchen Assistant/Building Monitor at \$19,140	\$19,140		X			
2	Program Support Assistant III (15.0 hrs - Saturdays)	\$28,710		X			
3	Program Support Assistant II (10.0 hrs - Evenings)	\$11,670		X			
4	Van Drivers (two at 19.5 hrs, one at 7.5 hrs)	\$48,360		X			
5	Per Diem and Substitute Nurses	\$55,840		X			
6	Traveling Meals Program Summer Drivers	\$10,368		X			
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
I	Total	\$174,088					
Sections							
	Amount Reported Under DSR2A Section 1						
	Amount Reported Under DSR2A Section 2						
	Amount Reported Under DSR2A Section 3						
	Amount Reported Under DSR2A Section 4						
II	Total						

V2021

Performance Improvement Funding Request DSR4				
Department	Health & Human Services/ Public Health Division			
Title	Substance Prevention Alliance of Needham (SPAN)	Priority	1	
DSR4				
Expenditure Classification	FTE	Frequency		Total Amount (A + B)
		Recurring Amount (A)	One Time Only Amount (B)	
1. Salary and Wage	1.5	\$102,845		\$102,845
2. Expense		\$22,155		\$22,155
3. Operating Capital				
4. Department Total (1+2+3)		\$125,000		\$125,000
5. Other Costs		\$36,514		\$36,514
6. Grand Total (4+5)		\$161,514		\$161,514
Budgetary Considerations				Yes No
Does this request address a goal of the Select Board or other Board or Committee?				X
If yes, which Board or Committee?		Board of Health		
Has this request been submitted in the last three fiscal years and not funded?				X
Are there additional costs to implement this request (except for future year operating costs which would be ongoing if funding is approved) which are NOT included in this request?				X
Will the assistance of another department be required to provide support (personnel or financial) for this request to be implemented?				X
Will additional staff (beyond the staff requested in this DSR4 submission) be required if the request is approved?				X
Does the request support activities which produce revenue for the Town?				X
If the request is not approved, will current Town revenues be negatively impacted?				X
Is there an increased exposure for the Town if the request is not approved?				X
Is specialized training or licensing required (beyond the initial purchase)?				X
Does this request address a documented health or safety issue?				X
All "YES" responses above must be explained in the narrative below				
Description and Explanation				
Needham youth face many challenges related to substance use which may impact their health and well-being. The 2018 MetroWest Adolescent Health Survey results show: • Electronic vaping has increased from 16% in 2016 to 23% in 2018. • Marijuana use has increased. One fifth of Needham youth reported current marijuana use in 2018, compared to 16% in 2016. • Since the first administration of the survey in 2006, results have consistently shown that the prevalence of marijuana use increases over the high school years. • Self-reported binge drinking remains a problem. The percentage of binge drinking has remained at 19% from 2016 to 2018. Mission and Current State The Substance Prevention Alliance of Needham (SPAN) incorporates a collaborative, community-based, and data-driven approach to reduce alcohol, marijuana, and other drug use among Needham youth. SPAN offers Needham residents education, support, and resources to				

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Substance Prevention Alliance of Needham (SPAN)	Priority	1
address substance use and misuse among youth. For the past ten years, SPAN has received funding from the US Substance Abuse and Mental Health Services Administration (SAMHSA) under its Drug Free Communities grant program. SPAN received \$125,000 in FY2020. When the grant expires in September 2020, Needham will have received a total of \$1.25M over a decade. However, the termination of that grant will leave the Town without a dedicated source of funding to support youth substance use prevention. Funding for SPAN is essential in order to continue addressing substance use among Needham youth. Prior Activities and Accomplishments SPAN has led many successful initiatives to address youth substance use in Needham. Data from the adolescent survey includes: • Alcohol use among Needham High School students declined substantially: from 2006 to 2018, reported lifetime use decreased from 66% to 49%; current use from 28% to 19%. • Lifetime prescription drug misuse has decreased from 11% in 2006 to 4% in 2018. SPAN has several projects that have influenced the decreases in youth substance use rates: • Education and Awareness - o SPAN conducts educational forums along and other activities to raise awareness about youth substance use. Topics have included vaping, underage access to alcohol, marijuana legalization, and opioids. - o An average of 100 community members attended forums in 2018 and 2019. • Policy - o Policy and enforcement efforts have included alcohol licensee compliance checks with the Needham Police Department. These visits ensure licensees are following state and local regulations regarding underage alcohol service. - o SPAN supports a diversion program which helps Needham youth facing juvenile charges avoid prosecution. • Programs - o Medication Disposal: SPAN works with Needham Police to host semiannual Drug Take Back Days. SPAN also worked with Beth Israel Deaconess-Needham hospital to add a medication disposal kiosk. - o Students Advocating Life Without Substance Abuse (SALSA): SPAN supports a club at Needham High School where high school students teach refusal skills and other prevention strategies to middle school students. Since its inception seven years ago, over 3,000 eighth grade students have participated in the program. - o 5th Quarter: For over a decade, SPAN has hosted this popular social program at the end of home football games in order to provide a healthy, fun, and substance-free environment for the students. Each event has attracted 200 to 300 students. - o Hidden in Plain Site: An interactive display of a teenager's bedroom which contains common items that can hide substances shows parents how to spot signs of risky			

**Performance Improvement Funding Request
DSR4**

Department	Health & Human Services/ Public Health Division		
Title	Substance Prevention Alliance of Needham (SPAN)	Priority	1

behavior in their teens.

Elected Board Goals

Continuation of SPAN will achieve the Board of Health's FY19- FY20 Substance Use Prevention Goal #1: *Identify and acquire stable local funding to support Needham's substance use prevention activities and the Substance Prevention Alliance of Needham (SPAN) in light of the expiration of a 10-year federal Drug Free Communities grant in 2020.*

Budget

SPAN plays an essential role in preventing and reducing youth substance use and in supporting Needham families. SPAN has contributed to decreases in youth use of alcohol and prescription drugs. To ensure continuation of this important work, the Public Health Division requests funding for staffing and associated expenses.

Staffing: \$105,000 is requested for a full-time Program Director and a part-time Program Coordinator.

Position	Grade Level	Annual Salary / Rate
Senior Substance Use Prevention Program Coordinator	GE - 20 scale	\$74,568
Project Coordinator	Program Support Asst. III	\$28,277
Total		\$102,845

Description:

The Senior Substance Use Prevention Program Coordinator manages all aspects of the substance prevention work, including data collection, project coordination, community relations, membership recruitment and engagement. The Project Coordinator supports community initiatives including coalition communications, research, mobilizing volunteers, and coordinating coalition logistics.

Expenses: \$22,155 is requested to support evaluation and data collection, office supplies, program marketing, professional development and travel.

Expenses	FY 2021
Program evaluation, reporting, and data collection	\$8,000
Educational materials and publicity	\$8,000
Office and Other Supplies	\$1,000
Wireless Communications	\$750
Community education; staff training and development	\$4,155
Total	\$22,155

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Substance Prevention Alliance of Needham (SPAN)	Priority	1
<u>Description:</u> • Program evaluation will be conducted with a consultant and will include analyzing program efforts and outcomes, analyzing data from the adolescent survey, and generating reports. A consultant will also be employed to implement and evaluate a survey of parents of children in 6th through 12th grades as a complement to the student survey. • Educational material and publicity costs will include graphic design services and printing of brochures, flyers, and website updates. • Community education and staff training includes: membership in the Community Anti-Drug Coalitions of America; training and development of SPAN volunteers and staff, especially in evidenced-based approaches to youth substance use prevention. <u>Scope of substance prevention work:</u> Over the years SPAN has worked to keep its cost low while providing comprehensive, high quality programs for Needham. SPAN would like to continue offering the safe, substance free social events (the 5th Quarter) for teens, and the community education awareness events that address the risks of youth substance use along with strategies to prevent such use. With the end of the Drug Free Communities grant, there is some opportunity to expand SPAN's scope beyond restrictions imposed by the Federal government. The Public Health Division looks forward to addressing substance prevention work beyond youth to include adults during their college and working years, as well as older adults. The Public Health Division will continue to pursue grant opportunities, fundraising, and community support through in-kind services. SPAN will also leverage resources through partnerships with other Town departments and community partners.			
V2021			

Performance Improvement Funding Request Supplement DSR4S										
Position Title	Senior Substance Use Prevention Program Coordinator						Priority	1		
Classification	X	FT		PT		Seasonal				
Part Time /Seasonal	Hours Per Week						Number of Weeks Per Year			
Compensation Detail										
Base Rate	\$74,568									
Other										
Other										
Other										
Other										
Other										
Other										
Other										
Other										
Salary and Wage Total							\$74,568			
If Funded the Position Will Require the Following Additional Items										
Description	No	Yes	Explain			Start Up Cost \$		Annual Recurring Cost \$		
Workstation	X		Workstation already present, current grant-funded position.							
Vehicle	X									
Computer	X		Ibid.							
Software	X		Ibid.							
Mobile Communication Device	X		Ibid.							
Uniform	X									
Tools	X									
Equipment	X									
Other										
Other										
Other										
Totals										
Estimated Annual Benefit Cost								\$34,339		
Description and Explanation										
The Senior Substance Use Prevention Program Coordinator manages the substance use prevention program which is currently funded by the Drug Free Communities (DFC) grant. This program, which has been grant-funded for the past 10 years, provides substance education to Needham youth and parents with emphasis on prevention of substance use among youth. With the grant expiring, Town funding is needed to continue the important work of the Substance Alliance Prevention of Needham (SPAN). Substance use prevention is an ongoing need that responds to changing community conditions; funding this position will allow SPAN to continue the important ongoing work (such as, Drug Take Back Day, SALSA and 5th Quarter events) and to be responsive to emerging needs.										

Performance Improvement Funding Request Supplement DSR4S			
Position Title	Senior Substance Use Prevention Program Coordinator	Priority	1
If this budget request is approved, this currently grant-funded position would continue without interruption. The current occupant of the grant-funded position already has a workstation and other startup items noted above.			
			V2021

Performance Improvement Funding Request Supplement DSR4S									
Position Title	Substance Use Prevention Program Support (PSA III)					Priority	1		
Classification		FT	X	PT		Seasonal			
Part Time /Seasonal	Hours Per Week		19.5		Number of Weeks Per Year			5 2	
Compensation Detail									
Base Rate	\$28,277				\$27.78 x 19.5 hours per week x 52.2 weeks				
Other									
Other									
Other									
Other									
Other									
Other									
Other									
Salary and Wage Total					\$28,277				
If Funded the Position Will Require the Following Additional Items									
Description	No	Yes	Explain		Start Up Cost \$		Annual Recurring Cost \$		
Workstation	X		Workstation already present, current grant-funded position.						
Vehicle	X								
Computer	X		Ibid.						
Software	X		Ibid.						
Mobile Communication Device	X								
Uniform	X								
Tools	X								
Equipment	X								
Other									
Other									
Other									
Totals									
Estimated Annual Benefit Cost									
							\$2,175		
Description and Explanation									
This part-time position works on youth substance use prevention and is supervised by the Senior Substance Use Prevention Program Coordinator. This position supports the efforts of SPAN and the Sr. Substance Use Prevention Program Coordinator, and coordinates focus groups, recruits community volunteers, and coordinates program evaluation and reporting. If this budget request is approved, this currently grant-funded position would continue without interruption. The current occupant of the grant-funded position already has a workstation and other startup items.									

V2021

Performance Improvement Funding Request DSR4				
Department	Health & Human Services/ Public Health Division			
Title	Program and Service Expansion at the Center at the Heights	Priority	2	
DSR4				
Expenditure Classification	FTE	Frequency Recurring Amount (A) One Time Only Amount (B)		Total Amount (A + B)
1. Salary and Wage	1.0	\$48,635		\$48,635
2. Expense		\$25,000		\$25,000
3. Operating Capital				
4. Department Total (1+2+3)		\$73,635		\$73,635
5. Other Costs		\$4,935		\$4,935
6. Grand Total (4+5)		\$78,570		\$78,570
Budgetary Considerations				Yes No
Does this request address a goal of the Select Board or other Board or Committee?				X
If yes, which Board or Committee?		Council on Aging, Select Board, Board of Health		
Has this request been submitted in the last three fiscal years and not funded?				X
Are there additional costs to implement this request (except for future year operating costs which would be ongoing if funding is approved) which are NOT included in this request?				X
Will the assistance of another department be required to provide support (personnel or financial) for this request to be implemented?				X
Will additional staff (beyond the staff requested in this DSR4 submission) be required if the request is approved?				X
Does the request support activities which produce revenue for the Town?				X
If the request is not approved, will current Town revenues be negatively impacted?				X
Is there an increased exposure for the Town if the request is not approved?				X
Is specialized training or licensing required (beyond the initial purchase)?				X
Does this request address a documented health or safety issue?				X
All "YES" responses above must be explained in the narrative below				
Description and Explanation				
This is the second year that the Health & Human Services Department has submitted a budget request to expand the programs, services, and hours of operation at the Center at the Heights (CATH). Last year, just over 50% of the requested funding was approved. This year's request was revised in light of that funding support and incorporates additional staff insight and input from the Council on Aging board members on the need for a continued expansion of programs, services, and hours. It is anticipated that this will be the second year of a combined three year request. In 2013 the Aging Services Division moved from a sub-standard space in the basement of the Stephen Palmer Building into the Center at the Heights (CATH), more than tripling the available space for programs and services. The move into a much larger space did not, however, come with additional staffing or financial resources, and in the interim the Aging Services Division staff has endeavored to expand programs and services to keep up with the increased demands of Needham's aging population.				

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2
Usage of the Center at the Heights has increased as the Aging Services Division expands its classes, trainings, events, and services. The total count of daily guests is a rough measure of how active and vibrant CATH is, and from FY 2018 to FY 2019 the average number of daily guests increased by 29% and totaling 180 daily guests. The first three months of FY 2020 have seen slower growth, but the count of daily guests has continued to increase by a modest 5% and is now 190 guests per day. Some highlights which show the continued progress in programmatic activity are: • The Fitness Center saw a 32.1% increase in participant hours between FY 2018 and FY 2019, increasing from an average of 2011 hours per month to 2,656 hours per month; • Participation in Social Events like cooking classes, the Halloween Party, and the mocktail Sing-Alongs increased by more than 18% between FY 2018 and FY 2019, totaling more than 129,000 participant hours in the most recent fiscal year; • Participant hours spent watching classic movies dropped 12% between FY 2018 and FY 2019, representing a decrease of more than 330 participant hours;¹ and • Overall participant hours across all program categories increased by 12.45% between FY 2018 and FY 2019, representing an additional 21,000+ hours that seniors spent engaged in programs or using the services at CATH. Social work, client support, and mental health services have also expanded significantly over the last fiscal year. Case management services include financial support, resource gathering, referrals, and home visits for seniors in need, and the hours committed to those functions increased 39% and represented 2,634 hours of direct client service time. Part of the reason for this increase was the Aging Services Division conducted additional outreach to, and provided additional support for, the families of seniors and other residents in need (all-age) for which there are not dedicated Town resources. Group support includes caregiver support groups, respite support groups (which includes both the support group for the caregiver as well as the care and supervision of the client in need), and other classes such as grief support. The demand for these services increased markedly from FY 2018 to FY 2019, increasing from an average of just under three hours per month in FY 2018 to 10 hours per month in FY 2019. The Aging Services clinicians are involved in CCIT, or Community Crisis Intervention Team. CCIT is multi-disciplinary group of Town and state agencies along with community partners. CCIT meets monthly to address the highest need residents or those residents experiencing crisis. Examples of a resident in crisis might include an individual or family who has experience domestic or intimate partner violence, or a family dealing with the substance use of a loved one. As the CCIT has become better established in the Needham community, additional referrals have been provided to the Needham Police Department and to the clinical team at the Aging Services Division. In many instances, a CCIT referral to the clinical team opens the door			

¹ It may seem odd to highlight a decrease in hours, but the fact that fewer residents attended classic and contemporary movie screenings, when combined with the sharp increase in overall participant hours, means that there are additional programs and more compelling programs that are pulling seniors away from the TV/movies.

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2
to a range of supports and services including the aforementioned support groups, state-mandated treatments (i.e. sections), legal assistance, and others. The demand for transportation services has grown in-line with the expansion of programs and social work services. As the Aging Services Division has increased the number of programs offered at CATH, the Division has expanded the times when programs are offered to include evenings and select Saturdays as part of a pilot program, and has offered a number of new transportation options to make sure those programs are accessible to the broadest possible group of Needham's seniors. As a result of the strong emphasis on programming, transportation has continued to increase. The total number of rides provided increased 8% between FY 2018 and FY 2019. The total number of clients served by the transportation program increased 35%; 263 individual residents received transportation assistance from the Aging Services Division in FY 2019. There was also a 76% increase in the number of clients participating in different transportation activities—this is one of the Aging Services Division's most important metrics and it indicates that more of the seniors are relying upon our transportation program for rides and are expanding the number and types of programs in which they participate.² The increased demand for programs, support services, and transportation should come as no surprise, given that Needham has one of the highest populations of adults age 60 and over in the MetroWest region. According to demographic information maintained by the Needham Town Clerk, in 2015 fully 24.4% of the town's population (a total of 7,455 residents) are age 60 and above; and this age group represents a great and growing proportion³ of all Needhamites. The number of 60-plus Needham residents has increased by more than 700 over the past two years alone, and that age cohort is projected to grow by 14.9% in Needham over the next five years according to the McCormack School at UMass Boston. By 2020, residents age 60 and older will represent 27.1% of the Town's residents, and a decade later will hit 31%. After two decades of growth that aligned with the Town's overall population trend, by 2010 Needham's senior population began growing both absolutely and in relation to the Town's overall growth rate. Budget This funding request represents an opportunity for continued expansion of the programs and services provided by the Aging Services Division. This expansion would be supported by significant additional funding for the Fitness Program at the Center at the Heights and by the addition of two new, part-time positions: a program assistant with primary responsibility for designing and producing the Aging Services Division's <i>Compass</i> newsletter, and an additional Van Driver to support the continued expansion of evening and weekend hours at CATH.			

² For example, if a senior receives daily transportation to the Center at the Heights he or she is counted amongst the unique clients served. But if that senior then decides to participate in our grocery shopping program, he or she is counted once per activity. This measure shows seniors, especially seniors who rely upon transportation, are taking advantage of more of the rides and programs made available to them.

³ McCormack Graduate School of Policy and Global Studies at the University of Massachusetts Boston and its Center for Social and Demographic Research on Aging. Demographic fact sheet available at: https://www.umb.edu/editor_uploads/images/centers_institutes/center_social_demo_research_aging/Dem_Brief_2.pdf And Dataset available at: https://www.umb.edu/editor_uploads/images/centers_institutes/center_social_demo_research_aging/Projections_by_MA_town_2010_2030_1.xlsx

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2
<i>Program Planning and Design of The Compass:</i> this request would fund one part-time staff member in the Aging Services Division. A 19.5 hour per week Program Support Assistant III would be responsible for planning, developing, and scheduling a range of programs and would have primary responsibility for developing and designing <i>The Compass</i>, the Aging Services Division's newsletter. At 32 pages, <i>The Compass</i> is tied for the biggest senior center newsletter in the state, which is a reflection of the wealth of programs, classes and services which are offered at CATH. Thanks for a unique arrangement with LPI Publisher, there is no cost to Needham for printing <i>The Compass</i> and the total print run each month has increased substantially. That agreement saved the Aging Services Division and the Friends of the Center at the Heights (which provided financial support for those costs not covered by the Town) \$4,000 per issue for a total of \$24,000 during FY 2019. It also has allowed for <i>The Compass</i> to be mailed to every address in Needham where a senior resides, greatly expanding the reach of The Compass and encouraging new seniors to come to CATH and join in the community there.⁴ While the Aging Services Division has increased (and will continue to increase) its use of social media and electronic advertising, a printed brochure is still the most effective way to reach the senior population in Needham. The tradeoff for the larger size of The Compass and for its expanded reach⁵ is that the Aging Services Division is now responsible for the editing, formatting, and graphic design of each issue. And thus the need for a dedicated staff member to support that important work. The Program Support Assistant III would be working 19.5 hours per week at \$27.78 per hour for an annualized salary of \$28,277. The benefits costs for a 19.5 hr/week Program Support Assistant III total \$2,175. The <i>Senior Transportation</i> budget request exists to provide Needham's seniors with the ability to participate in the full range of the Aging Services Division's programs in the evenings and on weekends. The additional part-time Van Driver funded in FY 2020 has allowed for greater access to transportation in the late afternoons and early evenings, and additional funding would support transportation for participants in the expanded evening programs (on Mondays through Thursdays) and for the transition from one Saturday a month to three Saturdays a month beginning in August 2020. If approved, this would support an additional Van Driver working 19.5 hours per week at a rate of \$20.00 per hour for an annualized salary cost of \$20,358. The benefits costs for a 19.5 hr/week Van Driver total \$2,760. The <i>Fitness Program and Activities</i> budget request would bridge the gap between the resources needed to operate the Fitness Program at CATH and the amount of Town funding provided. The total cost to operate the CATH Fitness Program is about \$95,000 in FY 2020 and will increase to just over \$110,000 per year for FY 2021 and 2022 based on the winning bid in the three-year Request for Proposals (RFP), conducted in October 2019. Those costs are based upon the expanded Fitness Program, including weekday evenings and Saturday mornings, that is the			

⁴ *The Compass* is now received in 5,500 approximately households, where it previously was only mailed to 800 addresses.

⁵ That is a nearly six-fold increase (587.5%).

**Performance Improvement Funding Request
DSR4**

Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2

high priority of the Council on Aging. The resources available to meet those costs have been assembled from a variety of sources. They are:

- Effective in the FY 2020 budget, the Town approved \$26,000 to support the costs of the Fitness Program;
- Monthly charges for residents provide revenue of approximately \$18,000 per year thanks to the increase in the monthly fees during FY 2019;
- Small donations from residents and local businesses have historically been modest but are slowly increasing;
- The Friends of the CATH provided approximately \$50,000 in FY 2019 and have committed to a further \$35,000 in FY 2020 and \$20,000 in FY 2021. The Friends will have exhausted their resources by that point and have indicated that no further funding for the Fitness Program will be provided; and
- Determination of Need money focused upon senior health and wellness from Beth Israel Deaconess-Needham. The funding available to support the Fitness Program at CATH will gradually increase from \$15,000 to about \$25,000 in FY 2023. There is no funding commitment beyond FY 2023.

Funding Support

	FY 2019	FY 2020	FY 2021	FY 2022
Town Operating Budget	\$0.00	\$26,000.00	\$50,000.00	\$65,000.00
Fees	\$12,000.00	\$18,000.00	\$18,000.00	\$20,000.00
Friends of CATH	\$50,000.00	\$35,000.00	\$20,000.00	\$0.00
BID-N Determination of Need	\$0.00	\$15,000.00	\$20,000.00	\$22,500.00
Other (Misc. Donations)	\$500.00	\$1,200.00	\$1,300.00	\$1,500.00
Total	\$62,500.00	\$95,200.00	\$109,300.00	\$109,000.00

Costs

	FY 2019	FY 2020	FY 2021	FY 2022
Weekdays (M-F)	\$52,000.00	\$54,600.00	\$58,500.00	\$58,500.00
Evenings (M-Th p.m.) & Weekends	\$0.00	\$25,000.00	\$32,760.00	\$32,760.00
Fitness Classes	\$10,452.00	\$15,600.00	\$19,110.00	\$19,110.00
Total	\$62,452.00	\$95,200.00	\$110,370.00	\$110,370.00

Variance between Projected Funding and Anticipated Costs

	FY 2019	FY 2020	FY 2021	FY 2022
Total	\$48.00	\$0.00	(\$1,070.00)	(\$1,370.00)

6 An additional \$20,000 will be given in December 2019, supplementing the more than \$15,000 donated to the CATH so far this year.

**Performance Improvement Funding Request
DSR4**

Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2

To achieve full funding of the Fitness Program and to gradually reduce the reliance on external grants and donations, the Town of Needham must gradually increase its operating budget support. This request for additional funds will be phased in over a three-year period, and FY 2021 is the second year of that three-year request.

Requested Salary Costs

Personnel	Rate	Hrs per week	Annual Costs	Comments
Program Support Assistant III	\$27.78	19.5	\$28,277	The Aging Services Division has undergone a renaissance, with a widespread expansion of programs and services over the last 2.5 years. This part-time staff position would assist with developing and coordinating programs, and would take on the primary role of designing and producing <i>The Compass</i> , the Aging Services Division's bi-monthly newsletter and program bulletin.
Van Driver	\$20.00	19.5	\$20,358	Van Driver at 19.5 hrs a week to provide transportation for expanded evening programs and for the transition from one Saturday a month to three Saturdays a month in August 2020. This would allow Division to take advantage of new Vans purchased with FY 2017 and 2019 state budget earmarks.

Requested Expense Costs

Spending Category	Expense Type	DSR4 Request	Comments
Postage	Mailing	\$500	Additional funding to support the mailing costs for <i>The Compass</i> , the Aging Services Division's bi-monthly newsletter
Recreation	Activity Instructors	\$24,000	Partial cost support for the Fitness Program at its current practice of 5 hrs from 9:00 a.m. to 2:00 p.m. every weekday, along with expanded weekday evening and Saturday morning hours
Other Supplies	Branded Items	\$500	Branded items and promotional materials for programs like <i>Healthy Aging at Home</i> and <i>Matter of Balance</i> used to increase visibility and encourage participations.

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/ Public Health Division		
Title	Program and Service Expansion at the Center at the Heights	Priority	2
<u>Goals</u> Continuing the expansion of programs and services for Needham's seniors into the evenings and on Saturdays would address a number of goals from elected and appointed boards. Most directly it address the Council on Aging's Overarching Goal #1 which is to expand services and programs available to Needham's residents. Additionally, it would directly address the following goal of the Select Board: • FY 2020 & FY 2021 Guiding Principles #7 "The Town should be an age friendly community." This budget request would tangentially address the following goal of the Select Board: • FY 2020 & FY 2021 Guiding Principles #12 "Opportunities to collaborate on additional programs and services that will benefit Needham's veterans will be explored and implemented." That is because the vast majority of Needham's veterans are seniors who are served by the Aging Services Division in addition to the Veterans Agent. This budget request would also address following <u>Community Health</u> goals of the Board of Health in FY 2019 and FY 2020: • CH #2—"Advocate for resources to support and enhance Healthy Aging in the community"; • CH #4—"Identify financial resources to expand the Safety at Home Program, which addresses older adult falls through home visits, exercise programming, and referrals, to support more comprehensive home modifications"; and • CH #8—"Support existing community initiatives that address public health concerns including senior nutrition, elder isolation, mental health promotion, and domestic violence awareness".			
V2021			

Performance Improvement Funding Request Supplement DSR4S							
Position Title	Program Support Assistant III – <i>The Compass</i> newsletter					Priority	2
Classification		FT		PT		Seasonal	
Part Time /Seasonal	Hours Per Week		19.5		Number of Weeks Per Year		5 2
Compensation Detail							
Base Rate	\$27.78/hr, 19.5 hrs/week					\$28,277	
Other							
Other							
Other							
Other							
Other							
Other							
Other							
Salary and Wage Total						\$28,277	
If Funded the Position Will Require the Following Additional Items							
Description	No	Yes	Explain		Start Up Cost \$	Annual Recurring Cost \$	
Workstation	X		Part-time staff member will use existing share workstation.				
Vehicle	X						
Computer	X		Part-time staff member will use existing shared computer.				
Software	X						
Mobile Communication Device	X						
Uniform	X						
Tools	X						
Equipment	X						
Other							
Other							
Other							
Totals							
Estimated Annual Benefit Cost							
						\$2,175	
Description and Explanation							
The Program Support Assistant III would support the development and delivery of programs and would focus upon the layout and design of <i>The Compass</i>, the Aging Services Division's newsletter. <i>The Compass</i> reflects the programs and services offered at CATH and it is the							

Performance Improvement Funding Request Supplement DSR4S			
Position Title	Program Support Assistant III – <i>The Compass</i> newsletter	Priority	2
primary entrée for attracting new seniors to visit CATH and participate in the programs. If this budget request is approved, this part-time position would share use of a workstation and a computer with existing part-time staff members within Aging Services.			
			V2021

Performance Improvement Funding Request Supplement DSR4S							
Position Title	Van Driver					Priority	2
Classification		FT		PT		Seasonal	
Part Time /Seasonal	Hours Per Week		19.5		Number of Weeks Per Year		5 2
Compensation Detail							
Base Rate	\$20.00/hr, 19.5 hrs/week					\$20,358	
Other							
Other							
Other							
Other							
Other							
Other							
Other							
Salary and Wage Total						\$20,358	
If Funded the Position Will Require the Following Additional Items							
Description	No	Yes	Explain		Start Up Cost \$	Annual Recurring Cost \$	
Workstation	X		Part-time staff member does not need access to a workstation.				
Vehicle	X						
Computer	X		Part-time staff member will not need access to a computer.				
Software	X						
Mobile Communication Device	X						
Uniform	X						
Tools	X						
Equipment	X						
Other							
Other							
Other							
Totals							
Estimated Annual Benefit Cost						\$2,760	
Description and Explanation							
The Van Driver will provide transportation services to Needham' seniors. The additional part-time Van Driver funded in FY 2020 has allowed for greater access to transportation in the late afternoons and early evenings, and additional funding would support transportation for participants in the expanded evening programs (on Mondays through Thursdays) and for the transition from one Saturday a month to three Saturdays a month beginning in August 2020.							

Performance Improvement Funding Request Supplement DSR4S			
Position Title	Van Driver	Priority	2
If this budget request is approved, this part-time position will not need access to a workstation or computer or any other accessories noted above. Safety gear (high visibility vest and clothing) will be provided from the Aging Services Division existing budget and the staff member will receive specific safe driver training; funding for that training will also be drawn from the existing Aging Services Division budget. No startup costs are anticipated.			
			V2021

Performance Improvement Funding Request DSR4				
Department	Health & Human Services/Public Health Division			
Title	Public Health Division Staffing	Priority	3	
DSR4				
Expenditure Classification	FTE	Frequency		Total Amount (A + B)
		Recurring Amount (A)	One Time Only Amount (B)	
1. Salary and Wage	1.5	\$127,128		\$127,128
2. Expense				
3. Operating Capital				
4. Department Total (1+2+3)		\$127,128		\$127,128
5. Other Costs		\$36,866		\$36,866
6. Grand Total (4+5)		\$163,994		\$163,994
Budgetary Considerations				Yes No
Does this request address a goal of the Select Board or other Board or Committee?				X
If yes, which Board or Committee?		Board of Health		
Has this request been submitted in the last three fiscal years and not funded?				X
Are there additional costs to implement this request (except for future year operating costs which would be ongoing if funding is approved) which are NOT included in this request?				X
Will the assistance of another department be required to provide support (personnel or financial) for this request to be implemented?				X
Will additional staff (beyond the staff requested in this DSR4 submission) be required if the request is approved?				X
Does the request support activities which produce revenue for the Town?				X
If the request is not approved, will current Town revenues be negatively impacted?				X
Is there an increased exposure for the Town if the request is not approved?				X
Is specialized training or licensing required (beyond the initial purchase)?				X
Does this request address a documented health or safety issue?				X
All "YES" responses above must be explained in the narrative below				
Description and Explanation				
Through this budget request, the Public Health division seeks sufficient staffing so that: - The Public Health Division has a full-time director who is able to devote his/her full time and attention to advancing the goals and objectives of the Board of Health and the Public Health Division; and - The Public Health Division's Environmental Health Team will be supported by additional hours for part-time staff to conduct after-hours inspections of food service establishments in Needham. Public Health Director The position of Director of Public Health has been vacant since December 31, 2016 when the Health & Human Services Department was fully established. That length of vacancy affects the operations and efficiency of a division entrusted with a range of public health and sanitary responsibilities, all of which have a material effect on the health and wellness of the Town. If/when occupied, the Director of Public Health position oversees a division with:				

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/Public Health Division		
Title	Public Health Division Staffing	Priority	3
19 staff members (10.95 FTE including grant positions – 6 full-time benefitted staff, 3 part-time benefitted staff, and 10 part-time staff members ranging from 5 hours a week to 19.5 hours a week); and - extensive policy and regulatory authority afforded to it by the Needham Board of Health through M.G.L. Chapters 111, Sections 31, 31A, 31B, 122, 127, 127A, and 143; and A Director of Public Health position was requested in FY 2019 and FY 2020. It was not selected for funding during either fiscal year. Without a Director of Public Health, the Director of Health & Human Services divides his/her attention between larger work that crosses divisions and departments, and the more focused activities of one division which has extensive policy and regulatory authority. Progress on updating and revising the Board of Health's existing regulations has been limited since the HHS transition, and research into new policy positions has also stalled. A Public Health Division Director would allow the division to continue to respond to the demands and needs of the growing town by having a direct leader in policy regulation/adaption and changes that are required to meet the growing needs of Needham. If a Director of Public Health were hired, that individual would focus on Public Health Division and Board of Health priorities, and the Director of Health & Human Services would concentrate on interdepartmental activities, Town-wide priorities, and oversight of each division's activities. <u>Funding</u> Funding needed to support the position of Director of Public Health (K-24) is estimated at \$108,298 which represents the midpoint on the K-24 salary range. The benefits costs of the Public Health Division Director position total \$34,999. <u>Goals</u> Filling the long vacant position of Public Health Division Director would address the Board of Health's overarching goal from the Administrative section of the FY 2019 and FY 2020 Board of Health Goals: "Ensure the necessary infrastructure to effectively provide essential public health services." <u>Environmental Health Inspection Hours</u> The Needham Public Health Division's Environmental Health team provides a broad range of public health services to the community while enforcing the State Sanitary, Food Protection, and Environmental Codes. These services include policy development, issuance of permits and licenses, ongoing inspection and surveillance, reporting of potential foodborne illnesses, as well as public education through trainings and published articles. The Environmental Health team currently consists of the Assistant Director, one full-time Environmental Health Agent and one part-time agent for off-hours inspections who works six hours per week. Over the last several years, the team has balanced increasing demands with spearheading new initiatives to improve the health and safety of Town residents. For example, increased demands for more (and more complex) inspections, permits, and plan reviews - due to the Town's continued economic development - mount as the team has also adopted new food			

**Performance Improvement Funding Request
DSR4**

Department	Health & Human Services/Public Health Division		
Title	Public Health Division Staffing	Priority	3

standards, updated the technical capability of the team, and written grants.

The Environmental Health team is responsible for generating the vast majority of the revenue produced by the Public Health Division through the costs for permits, plan reviews, fees, and fines.

As demands increase, the Environmental Health team finds its time is limited to effectively and efficiently enforce Board of Health regulations, research best practices, and ensure that the Public Health Division's processes reflect an evidence-based approach to public health.

The Public Health Division respectfully requests funding to support the employment of a second part-time Environmental Health Agent to support essential activities of the team, including:

- Conducting more detailed food service inspections
 - o The Board of Health recently adopted a new risk-based food inspection protocol that improves health and safety outcomes of inspections but also increases the time needed to conduct each inspection.
- Implementing new regulations and ordinances
 - o The Board of Health has a pending regulation regarding dumpsters and a new ordinance for pest control, which will require more staff time to conduct follow-up inspections and complete enforcement activities.
- Maintaining FDA National Retail Food Regulatory Program Standards
 - o The Board of Health will soon adopt the FDA National Retail Food Regulatory Program Standards which will require more staff time for maintenance, ongoing audits, and the coordination of a new Food Advisory Board.
- Expanding the team's reach
 - o The team plans to make Needham's environmental health work some of the strongest in Massachusetts through: applying for more grants to increase funding; increasing services (such as an annual healthy eating week called Nourishing Needham); updating existing Board of Health regulations; developing new Board of Health regulations; conducting a food safety education campaign; and developing a public food grading system.

As the demands mount, the Environmental Health team requires additional capacity to enforce Board of Health regulations and meet the Board's goals. Lapses in the quality and efficiency of services may negatively impact the health of residents and will begin to affect the revenue generated by the Public Health Division.

Funding

Funding is requested in the amount of \$18,200 for the part-time Environmental Health Agent to work ten hours per week. The benefits costs for a part-time environmental health inspector total \$1,867.

Goals

Funding a part-time Environmental Health Agent will address the Board of Health's FY 2019 and FY 2020 Environmental Health (EH) Goals:

Performance Improvement Funding Request DSR4			
Department	Health & Human Services/Public Health Division		
Title	Public Health Division Staffing	Priority	3
• <u>EH#1</u>: Hire additional staff or provide additional resources to maintain EH Unit capacity for inspections, environmental health monitoring, training, and vendor and general public education. • <u>EH #2</u>: Prioritize positive communication and relationships with food service owners and staff and tobacco vendor owners and staff. • <u>EH #3</u>: Work towards the achievement of all nine (9) FDA Voluntary National Retail Food Regulatory Program Standards; pursue federal, state, and non-profit grant resources to offset the costs for achieving full compliance and apply for future FDA grants to make this possible. • <u>EH #4</u>: Implement FDA Standard 9 through categorization of Needham food establishments and use of risk-based inspections Increasing the Environmental Health team's capacity will allow for more efficiency and the continuation of high-quality services, while achieving several Board of Health goals.			
V2021			

Performance Improvement Funding Request Supplement DSR4S							
Position Title	Public Health Director					Priority	3
Classification	X	FT		PT		Seasonal	
Part Time /Seasonal	Hours Per Week				Number of Weeks Per Year		
Compensation Detail							
Base Rate	\$108,928						
Other							
Other							
Other							
Other							
Other							
Other							
Other							
Other							
Salary and Wage Total						\$108,928	
If Funded the Position Will Require the Following Additional Items							
Description	No	Yes	Explain	Start Up Cost \$	Annual Recurring Cost \$		
Workstation	X		Workstation will be assigned at RRC.				
Vehicle	X						
Computer	X		Computer at RRC will be assigned.				
Software		X	Standard office suite is needed.				
Mobile Communication Device		X	Mobile phone with hotspot needed.				
Uniform	X						
Tools	X						
Equipment	X						
Other							
Other							
Other							
Totals							
Estimated Annual Benefit Cost					\$34,999		
Description and Explanation							
The Public Health Division is the only major department/division in the Town of Needham without a dedicated Director. The Board of Health, an elected Board with wide-ranging statutory authority, has been without a director to implement its vision since January 1, 2017. While existing staff members in the Public Health Division and in the Health & Human Services Department do provide some little staffing and support, the Board of Health's policy priorities need the support and attention of a full-time director. If this budget request is approved, the newly hired Public Health Director will require a							

Performance Improvement Funding Request Supplement DSR4S			
Position Title	Public Health Director	Priority	3
computer, phone, and other startup items noted above. A workstation will be made available at the Rosemary Recreation Complex but changing around the existing workstation assignments.			
			V2021

Performance Improvement Funding Request Supplement DSR4S									
Position Title	Environmental Health Inspections						Priority	3	
Classification	X	FT		PT		Seasonal			
Part Time /Seasonal	Hours Per Week			10.0		Number of Weeks Per Year			5 2
Compensation Detail									
Base Rate	\$35 per hour, 10 hrs/ week					\$18,200			
Other									
Other									
Other									
Other									
Other									
Other									
Other									
Salary and Wage Total						\$18,200			
If Funded the Position Will Require the Following Additional Items									
Description	No	Yes	Explain		Start Up Cost \$		Annual Recurring Cost \$		
Workstation	X		Primary assignment is field inspections.						
Vehicle	X								
Computer	X		No computer needed beyond swing spaces at RRC.						
Software	X								
Mobile Communication Device	X	X	Tablet for inspections is already purchased.						
Uniform	X								
Tools	X								
Equipment	X								
Other									
Other									
Other									
Totals									
Estimated Annual Benefit Cost									
					\$1,867				
Description and Explanation									
The Public Health Division is the only major department/division in the Town of Needham without a dedicated Director. The Board of Health, an elected Board with wide-ranging statutory authority, has been without a director to implement its vision since January 1, 2017. While existing staff members in the Public Health Division and in the Health & Human Services Department do provide some little staffing and support, the Board of Health's policy priorities need the support and attention of a full-time director.									

Performance Improvement Funding Request Supplement DSR4S			
Position Title	Environmental Health Inspections	Priority	3
If this budget request is approved, the newly part-time Environmental Health Agent will be primarily based in the field. He/she would have a tablet with the inspection software (tablet and software already purchased) and would rarely sit at a workstation in the Public Health Division. On those instances, the environmental health agent can use one of the existing computers already assigned for part-time staff. He/she will not require a computer, phone, and other startup items noted above.			
			V2021

Special Financial Warrant Article Request DSR5			
Title	Public Health Division Accreditation		
Fiscal Year	FY 2021	Department	Health & Human Services
Funding Amount	\$70,000	Funding Source	Operating Budget
Article Information			
Formal recognition by the national Public Health Accreditation Board has become an important goal for local and state health departments across the country. Accreditation outcomes include improved performance and quality of services, and increased ability to be responsive to existing and emerging health needs in Needham. Accreditation is a mark of a highly functional, proactive, and professional public health department and its attainment will enhance the Public Health Division's competitiveness for future grant and foundation funding.			
Disclosures		YES	NO
1. Was this request submitted last year?		X	
2. Is this a recurring special financial warrant article?		X	X
3. Is this a matching grant funding request?			X
4. Is this a CPA funding request?			X
5. Is this a revolving fund request?			X
6. Is this a pilot program request?			X
7. Is this a study?			X
8. Is this a program that is planned to be in place for more than one year?		X	
9. Is this required by a court or other jurisdictional order?			X
10. Is this a personnel related request?		X	
11. Is this a local option acceptance request?			X
12. Is this in support of a goal of a Board or Committee?		X	
All "YES" responses must be explained Below			
Disclosure Explanation			
Achieving accreditation for the Public Health Division is a long-standing priority of the Needham Board of Health (BOH), and this request, or one like it, has been submitted four times in total. Public Health Division accreditation has been included in the BOH's goals for five fiscal years, and is the first long-term goal under the Administrative Section of the FY 2019 – 2020 BOH goals. <i>"Pursue Public Health Division accreditation and support the establishment of a culture of continuous quality improvement."</i> The process of achieving accreditation is rigorous and requires significant staff time and resources to conduct health assessments, develop specific plans, procedures, and policies, and complete a formal application. In 2018, the Public Health Division received a nine-month Accreditation Support Initiative grant of \$14,960 from the National Association of County and City Health Officials to help advance these efforts. Additional funding is requested to support these efforts moving forward; funding will cover approximately 5 hours per week from a part-time staff member along with other accreditation-related expenses. Once successful in achieving all of the requirements and pre-requisites for accreditation, the Public Health Division will formally apply using the funding remaining in the Special Warrant Article to cover the initial application fee of \$14,000. If the accreditation application is successful, there will be an annual fee of approximately \$6,000 to maintain accreditation and to support the costs of re-accreditation every five years.			

Special Financial Warrant Article Request DSR5			
Title	Funding to Retain Scientific Experts and Consultants		
Fiscal Year	FY 2021	Department	Health & Human Services
Funding Amount	\$50,000	Funding Source	Operating Budget
Article Information			
The Public Health Division requests funding to support a Board of Health (BOH) goal, a Select Board priority, and pressing community priority. The request is to establish a source of funding that allows the BOH to retain outside scientific experts and consultants to evaluate novel and emerging health issues about which the Board and the Public Health Division lack the necessary expertise. For example, this fund would allow for the retention of an outside expert to evaluate a proposed utility project that has unknown or uncertain environmental and health impacts, such as the Eversource Underground Utility Line Redundancy project. When there is a permit application process, the BOH has the ability to require applicants to pay an 'outside consultant fee.' This funding request addresses the need to access expertise to evaluate community impact in instances when there is no permit application, such as utility projects.			
Disclosures		YES	NO
1. Was this request submitted last year?			X
2. Is this a recurring special financial warrant article?		X	X
3. Is this a matching grant funding request?			X
4. Is this a CPA funding request?			X
5. Is this a revolving fund request?			X
6. Is this a pilot program request?			X
7. Is this a study?			X
8. Is this a program that is planned to be in place for more than one year?		X	
9. Is this required by a court or other jurisdictional order?			X
10. Is this a personnel related request?			X
11. Is this a local option acceptance request?			X
12. Is this in support of a goal of a Board or Committee?		X	
All "YES" responses must be explained Below			
Disclosure Explanation			
There have been a number of large-scale utility projects which have emerged suddenly as a community concern due to possible environmental health impacts; examples include the Eversource underground utility project and Verizon 5G Cell Sites. There is a need to access expertise to understand potential impacts of such projects. There is limited ability to anticipate such projects, and no ability to require utilities to pay for outside experts. Having the resources necessary to understand and respond to new and emerging environmental health challenges in Needham is a high priority of the BOH and was included as the top goal in the Environmental Health Section of the FY 2019 – 2020 BOH goals. "Hire additional staff or provide additional resources to maintain EH unity capacity for inspections, environmental health monitoring, training, and vendor and general public education." Additionally, one of the Select Board's New Initiatives in its FY20-21 Goals is to: "Investigate the potential impact of Small Cell and 5G Technology on the Town and formalize a policy for considering Grant of Location Requests." Funding this request would help reach such goals and strengthen Needham's capacity to assess emerging environmental health threats.			

Performance Improvement Funding Request DSR4					
Department	ITC via HHS/Youth & Family Services				
Title	Electronic Medical Record and Program Registration	Priority	TBD		
DSR4					
Expenditure Classification	FTE	Frequency		Total Amount (A + B)	
		Recurring Amount (A)	One Time Only Amount (B)		
1. Salary and Wage		0	0	0	
2. Expense		\$4,000	0	\$4,000	
3. Operating Capital		0	0	0	
4. Department Total (1+2+3)		\$4,000	0	\$4,000	
5. Other Costs					
6. Grand Total (4+5)		\$4,000	0	\$4,000	
Budgetary Considerations				Yes	No
Does this request address a goal of the Select Board or other Board or Committee?				X	
If yes, which Board or Committee?		Youth Commission			
Has this request been submitted in the last three fiscal years and not funded?					X
Are there additional costs to implement this request (except for future year operating costs which would be ongoing if funding is approved) which are NOT included in this request?					X
Will the assistance of another department be required to provide support (personnel or financial) for this request to be implemented?				X	
Will additional staff (beyond the staff requested in this DSR4 submission) be required if the request is approved?					X
Does the request support activities which produce revenue for the Town?				X	
If the request is not approved, will current Town revenues be negatively impacted?					X
Is there an increased exposure for the Town if the request is not approved?					X
Is specialized training or licensing required (beyond the initial purchase)?					X
Does this request address a documented health or safety issue?					X
All "YES" responses above must be explained in the narrative below					
Description and Explanation					
The Youth and Family Services (YFS) Division has met with clients for treatment since the division was established. Since this time, the division has maintained paper records on all clients and sessions. These thousands of records are then kept in physical file storage. This is also true for all program information and registration. Part of the mission of the division, in addition to the goals of the Youth Commission, is providing services to the community without any barriers to treatment. The division is dedicated to this mission and would like to help eliminate these barriers so that residents can access needed mental health services and program support. Youth and Family Services seeks funding for two software programs, one that would allow for individual client/family records to be kept (Theranest), and one that would allow for online program book-keeping and registration (MyRec). Both of these systems would help the division function at a higher level, being able to have a greater impact on the residents we serve. These systems would help to prevent errors and misprints and have safety features to ensure that the correct information is communicated.					

Performance Improvement Funding Request DSR4			
Department	ITC via HHS/Youth & Family Services		
Title	Electronic Medical Record and Program Registration	Priority	TBD
The Electronic Medical Record (EMR) would provide the opportunity to avoid paper records and move to an electronic record keeping system. Youth & Family Services has three full time clinical staff members and three, soon to be four, part-time staff members. The addition of these part-time staff members has allowed the division to expand its mental health services tremendously, offering after-hours appointments and community outreach. YFS has significantly cut down on our waitlist which will allow residents to get quicker access to services which is crucial as evidence shows that the sooner treatment is sought out, the higher chance for more positive outcomes. The division is providing hundreds of clinical sessions every year, serving several dozen residents at any given time. These numbers are not exact as there is no simple, electronic way to track this data at this time. An EMR allows for all of this data to be tracked much more accurately. This system would further enhance clinical services and improve quality of care as it would allow for notes to be linked directly to the treatment plans and treatment objectives, more easily access an overview of their treatment, past goals that have been met and interventions that have been successful. It would meet HIPAA standards and would allow for easier oversight to ensure that all records are appropriately maintained and that all documentation is completed. In addition, it would improve office workflow, providing a platform for easier scheduling and communication both internally and externally. Staff would also be able to access client records when they are not on site, which is essential when staff members are meeting with clients and families in the community. On another note, the EMR will allow the division to track data and trends, so that we can be more aware of what is going on in the community. For example, the system could analyze what mental health disorders are most present, what treatment has been most successful, how long people require treatment depending on their mental health disorders. This EMR system is first priority in improving the division and will cost about \$1,000 per year. The Youth & Family Services Division has created and implemented a number of different programs over the years, ranging from volunteer programs to peer mentor programs to support groups and parents' seminars and trainings. The division is constantly assessing the needs of the community and implementing additional programming to meet these needs. Last year, the division had approximately 500 participants enrolled in the various programs. At this time, residents have to mail-in or drop off program registrations and payments. This creates a barrier for some families who may have difficulties getting this information to the division. An online system would make registration easy, and would increase participation in YFS programs; residents could just go online, register and submit payment if required. This system would allow YFS to easily monitor all of its programs, allow for electronic signatures and waivers, track attendance and all other required paperwork. In addition, the division staff could easily see who enrolls in which programs, carry over information if families sign up for multiple programs, and structure future program development on some of this information gathered. If the division could cut down on the time needed around organizing paper, it could spend that time planning and implementing new programs to best serve the community. The Aging Services Division is in the process of switching over to this same system, which would also allow for better connectivity across divisions. Although we would require our own license for the program, it would be easier to manage when programs are run collaboratively. This system is our second priority and runs about \$3, 000 per year. To successfully implement the EMR and the program registration software, the YFS division will need assistance from the Information Technology to install the software, and from the			

Performance Improvement Funding Request DSR4			
Department	ITC via HHS/Youth & Family Services		
Title	Electronic Medical Record and Program Registration	Priority	TBD
financial departments (Accounting/Treasurer) to help process payments that are completed through the system.			
V2021			

Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted
Salary and Wage	\$1,734,921.00	\$44,223.00	2.6%	\$278,608.00	\$2,013,529.00	\$322,831.00	19.1%	\$1,690,698
Expenses	\$392,885.00	\$3,611.00	0.9%	\$47,155.00	\$440,040.00	\$50,766.00	13.0%	\$389,274
Operating Capital								
Other								
Total	\$2,127,806.00	\$47,834.00	2.3%	\$325,763.00	\$2,453,569.00	\$373,597.00		\$2,079,972

Health and Human Services	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
Salary and Wage	\$1,422,940	\$1,304,912	\$1,194,266
Expenses	\$326,153	\$282,046	\$254,800
Operating Capital			
Other			
Total	\$1,749,093	\$1,586,958	\$1,449,066

Salary and Wage	\$1,734,921.00	\$44,223.00	2.6%	\$278,608.00	\$2,013,529.00	\$322,831.00	19.1%	1,690,698.00	1,422,939.91	1,304,911.85	1,194,266.33
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
HEALTH SALARIES PERMANENT	\$576,703.00	\$14,759	2.6%	\$183,496.00	\$760,199.00	\$198,255	35.3%	561,944.00	540,129.21	563,424.80	428,005.60
HEALTH SALARIES TEMPORARY	\$123,303.00	\$513	0.4%	\$46,477.00	\$169,780.00	\$46,990	38.3%	122,790.00	101,183.52	72,212.52	77,753.10
HEALTH SALARIES OVERTIME	\$3,000.00				\$3,000.00			3,000.00			
HEALTH SALARIES REGULAR Other	\$4,600.00	-\$25	-0.5%		\$4,600.00	-\$25	-0.5%	4,625.00	4,605.24	4,442.76	2,115.38
HEALTH TUITION REIMBURSEMENT									4,000.00	3,500.00	
HEALTH SALARIES STIPENDS	\$6,500.00	\$500	8.3%		\$6,500.00	\$500	8.3%	6,000.00	3,000.00	3,000.00	1,500.00
AGING SERVICES SALARIES PERMANENT	\$525,887.00	\$24,310	4.8%		\$525,887.00	\$24,310	4.8%	501,577.00	389,294.46	328,735.08	348,535.29
AGING SERVICES SALARIES TEMPORARY	\$110,840.00	-\$13,949	-11.2%	\$48,635.00	\$159,475.00	\$34,686	27.8%	124,789.00	81,028.89	49,829.82	43,610.48
AGING SERVICES SALARIES OVERTIME									181.33	237.22	
AGING SERVICES SALARIES Other	\$4,100.00	-\$19	-0.5%		\$4,100.00	-\$19	-0.5%	4,119.00		3,000.08	
AGING SERVICES SALARIES STIPENDS											
YOUTH AND FAMILY SERVICES SALARIES REGULAR	\$327,898.00	\$18,221	5.9%		\$327,898.00	\$18,221	5.9%	309,677.00	264,478.68	204,012.44	261,501.11
YOUTH AND FAMILY SERVICES SALARIES TEMPORARY	\$43,690.00				\$43,690.00			43,690.00	32,538.58	31,908.08	19,470.41
YOUTH AND FAMILY SERVICES SALARIES OVERTIME											
YOUTH AND FAMILY SERVICES SALARIES Other	\$3,400.00	-\$587	-14.7%		\$3,400.00	-\$587	-14.7%	3,987.00		38,051.40	6,275.00
YOUTH AND FAMILY SERVICES SALARIES STIPENDS	\$2,000.00	\$500	33.3%		\$2,000.00	\$500	33.3%	1,500.00		57.69	3,000.00
VETERANS' SVCS SALARIES REGULAR											
VETERANS' SVCS SALARIES TEMPORARY											
VETERANS' SVCS SALARIES OVERTIME											
VETERANS' SVCS SALARIES REGULAR Other											
VETERANS' SVCS SALARIES STIPEND	\$3,000.00				\$3,000.00			3,000.00	2,500.00	2,499.96	2,499.96

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
1	Animal Permit	100	Annual	Article 4-Keeping of Domestic Animals	April 2019
2	Additional animal per species for laboratory animals	20	Annual	Article 4-Keeping of Domestic Animals	April 2019
3	Biotechnology Initial Registration	750	One time fee		April 2019
4	Biotechnology Renewal	500	Annual		April 2019
5	Body Art Establishment	700	Annual	Article 7-Regulation for Body Art Establishments & Practitioners	April 2019
6	Body Art Practitioner	575	Annual	Article 7-Regulation for Body Art Establishments & Practitioners	April 2019
7	Bodyworks Establishment Plan Review	200	One time fee	Article 19-Regulation Governing the Practice of Bodywork	April 2019
8	Bodyworks Establishment Permit	100	Annual	Article 19-Regulation Governing the Practice of Bodywork	April 2019
9	Bodyworks Practitioner	50	Annual	Article 19-Regulation Governing the Practice of Bodywork	April 2019
10	Breast Milk Registration	25	Annual	M.G.L., Chapter 111, Section 31	April 2019
11	Camp license	175	Annual	M.G.L., Chapter 111, Section 31	April 2019
12	Demolition	60	One time fee	M.G.L., Chapter 111, Section 31	April 2019

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
13	Bottling Permit	500	Annual	M.G.L., Chapter 111, Section	April 2019
14	Food service-less than 50 seats, retail 1500-3000 sq. ft.	265	Annual	M.G.L., Chapter 111, Section 31	April 2019
15	Food Service-more than 50 seats, retail 3000-6000 sq. ft.	460	Annual	M.G.L., Chapter 111, Section 31	April 2019
16	Food Service-150-250 seats, retail 6000-10,000 sq. ft.	525	Annual	M.G.L., Chapter 111, Section 31	April 2019
17	Food Service-more than 250 seats	625	Annual	M.G.L., Chapter 111, Section 31	April 2019
18	Mobile Food; food prep or PHF's; small; retail less than 1500 sq. ft.	Note	Annual	M.G.L., Chapter 111, Section 31	April 2019
19	Food Plan Review	225	Annual	M.G.L., Chapter 111, Section 31	April 2019
20	Food Plan review – per revision	30	One time fee	M.G.L., Chapter 111, Section 31	April 2019
21	Food - Prepackaged (no refrigeration); very limited retail; no coffee; good compliance record	75	Annual	M.G.L., Chapter 111, Section 31	April 2019
22	Food - Prepackaged (refrigeration); limited retail; mobile prepackaged	125	Annual	M.G.L., Chapter 111, Section 31	April 2019
23	Food – Retail more than 10,000 sq. ft	700	Annual	M.G.L., Chapter 111, Section 31	April 2019
24	Food – Temporary/one day event	30	One time fee	M.G.L., Chapter 111, Section 31	Unknown
25	Food – Farmers market/seasonal	50	Annual	M.G.L., Chapter 111, Section 31	April 2019
26	Hauler Truck – septic, grease, rubbish	100	Annual	Article 2- Regulation for Disposal of Refuse	April 2019
27	Hotel/Motel	200	Annual	M.G.L., Chapter 111, Section 31	April 2019
28	Marijuana Plan review (dispensary site)	1000	One time fee	Article 20- Regulation to	April 2019

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
				Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	
29	Marijuana Plan review (cultivation/processing site)	1000	One time fee	Article 20- Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	April 2019
30	Marijuana Plan review (storage disposal)	1000	One time fee	Article 20- Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	April 2019
31	Marijuana Plan review (continuity of	0	One time	Article 20-	April 2019

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
	business/continuity of operations		fee	Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	
32	Marijuana Plan review (security)	0	One time fee	Article 20- Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	April 2019
33	Registered Marijuana Dispensary	2500	Annual	Article 20- Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	April 2019

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
34	Marijuana Home Cultivation	150	Annual	Article 20-Regulation to Ensure the Sanitary and Safe Operations of Registered Marijuana Dispensaries and the Sale of Marijuana to Persons with Documented Medical Needs	April 2019
35	Medical Waste Hauler	100	Annual	Article 2-Regulation for Disposal of Refuse	April 2019
36	Non-Profit	50%	One time or Annual	M.G.L., Chapter 111, Section 31	April 2019
37	Disposal of Sharps	100	Annual	M.G.L., Chapter 111, Section 31	April 2019
38	Public/semi public pool – Plan review	250	One time fee	M.G.L., Chapter 111, Section 31	April 2019
39	Public/semi public – seasonal permit	175	Annual	M.G.L., Chapter 111, Section 31	April 2019
40	Public/semi public pool – annual permit	250	Annual	M.G.L., Chapter 111, Section 31	April 2019
V2019					

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
1	Swimming Pool – variance initial application	140	One time fee	M.G.L., Chapter 111, Section 31	April 2019
2	Swimming pool – variance renewal	75	Annual	M.G.L., Chapter 111, Section 31	April 2019
3	Indoor Tanning – establishment	500	Annual	Article 21- Regulation of Indoor Tanning Facility	April 2019
4	Indoor Tanning – each booth	250	Annual	Article 21- Regulation of Indoor Tanning Facility	April 2019
5	Septic Installer's permit & test	250/125	One time fee	M.G.L., Chapter 111, Section 31	April 2019
6	Septic Installer's test	30	Every two years	M.G.L., Chapter 111, Section 31	April 2019
7	Soil application (less than 2 hours)	425	One time fee	M.G.L., Chapter 111, Section 31	April 2019
8	Soil application (each additional hour 2 initial hours)	75	One time fee	M.G.L., Chapter 111, Section 31	April 2019
9	Septic Plan review	275	One time fee	M.G.L., Chapter 111, Section 31	April 2019
10	Addition to home with Septic	75	One time fee	M.G.L., Chapter 111, Section 31	April 2019
11	Deed restriction	125	One time fee	M.G.L., Chapter 111, Section 31	April 2019
12	Additional Plan Reviews for septic design	50	One time fee	M.G.L., Chapter 111, Section 31	April 2019
13	Septic construction permit	350	One time fee	M.G.L., Chapter 111, Section 31	April 2019
14	Excavation & trench permit	50	One time fee	Article 18- Excavation and Trench Safety	April 2019
15	Construction permit – minor system repair	125	One time fee	M.G.L., Chapter 111, Section 31	April 2019

Schedule of Fees and Charges					
Department		Health Division			
	Description	Rate	Frequency	Authority	Last Reviewed
16	Septic variance request	150	One time fee	M.G.L., Chapter 111, Section 31	April 2019
17	Tobacco Permit to sell	700	Annual	Article 1- Regulation Affecting Smoking and the Sale and Distribution of Tobacco Products in Needham	April 2019
18	Vaccine administration fee: clinics (per shot)	10	One time fee	M.G.L., Chapter 111, Section 31	April 2019
19	Well application – irrigation	150	One time fee	M.G.L., Chapter 111, Section 31	April 2019
20	Well application – geothermal	225	One time fee	M.G.L., Chapter 111, Section 31	April 2019
21	Well application – site visit to well per hour	75	One time fee	M.G.L., Chapter 111, Section 31	April 2019
22	Woodburning boiler permit	100	Annual	M.G.L., Chapter 111, Section 31	April 2019
23	Beaver Removal Permit	75	One time fee	M.G.L. Chapter 111, Section 31	April 2019
24	Pre-Residency Housing Inspection	75	One time fee	M.G.L. Chapter 111, Section 31	April 2019
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					

Schedule of Fees and Charges					
Department		Health and Human Services – Aging Services			
	Description	Rate	Frequency	Authority	Last Reviewed
1	Scott Brumit – Tai Chi	\$48.00	Per Session	Council on Aging Board of Directors	10/10/2019
2	Steve Cadigan – Train the Brain (Monday)	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
3	Steve Cadigan - Arthritis Exercise (Tuesday)	\$72.00	Per Session	Council on Aging Board of Directors	10/10/2019
4	Lisa Karger -Barre	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
5	Steve Cadigan - Arthritis Exercise (Thursday)	\$72.00	Per Session	Council on Aging Board of Directors	10/10/2019
6	Hsiu-Hui Chen – NIA	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
7	Hsiu-Hui Chen – Line Dancing	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
8	Betty Hood – Ballroom Dancing/Hustle	\$32.00	Per Session	Council on Aging Board of Directors	10/10/2019
9	Lisa Karger - Pilates	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
10	Beth Knaus – Creative Writing	Free	Per Session	Council on Aging Board of Directors	10/10/2019
11	Michelle Lawlor –Yoga (Thursday)	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
12	Adrienne Lederman – Printmaking/Drawing	\$15.00	Per Session	Council on Aging Board of Directors	10/10/2019
13	Sandra Levy – Yoga (Monday)	\$32.00	Per Session	Council on Aging Board of Directors	10/10/2019
14	Chris Morrison - Zumba	Free	Per Session	Council on Aging Board of Directors	10/10/2019
15	Pearl Pressman – Strength Training (Monday)	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
16	Pearl Pressman – Strength Training (Friday)	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
17	Randy Sharek - Train the Brain (Monday)	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
18	Randy Sharek- Arthritis Exercise (Tuesday)	\$72.00	Per Session	Council on Aging Board of Directors	10/10/2019
19	Randy Sharek - Train the Brain (Thursday)	\$72.00	Per Session	Council on Aging Board of Directors	10/10/2019
20	Randy Sharek - Ball Arthritis Exercise (Thursday)	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
21	Carol Wein – Technology Classes	\$15.00	Per Session	Council on Aging Board of Directors	10/10/2019
22	Marjorie Wein – Technology Classes	\$15.00	Per Session	Council on Aging Board of Directors	10/10/2019
23	Leslie Worris – Better Bones	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
24	Leslie Worris – Better Balance	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
25	Pearl Pressman - Weight Management	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019

Schedule of Fees and Charges					
Department		Health and Human Services – Aging Services			
	Description	Rate	Frequency	Authority	Last Reviewed
26	Steve Cadigan-PITT Exercise Program	\$64.00	Per Session	Council on Aging Board of Directors	10/10/2019
27	Fitness Room	\$25.00	Monthly	Council on Aging Board of Directors	10/10/2019
28	Lunch Bunch	\$5.00	Per Session	Council on Aging Board of Directors	10/10/2019
29	Beaded Jewelry Class	\$5.00	Per Session	Council on Aging Board of Directors	10/10/2019
30	Betty Hood-Ballroom Dancing/Waltz	\$40.00	Per Session	Council on Aging Board of Directors	10/10/2019
31	Leslie Worris- Better Bones [Thursday]	\$56.00	Per Session	Council on Aging Board of Directors	10/10/2019
32					
33					
34					
35					
36					
37					
38					
39					
40					
V2020					

Schedule of Fees and Charges					
Department		Youth & Family Services			
	Description	Rate	Frequency	Authority	Last Reviewed
1	Employment Listings	10	Per list	Youth Commission	2018
2	Peer Tutor	45	Per year	Youth Commission	2018
3	Family Fun Night	25	Per night	Youth Commission	New
4	Wilderness	25-35	Per program	Youth Commission	new
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
Salary and Wage	\$1,734,921.00	\$44,223.00	2.6%	\$278,608.00	\$2,013,529.00	\$322,831.00	19.1%	\$1,690,698	\$1,422,940	\$1,304,912	\$1,194,266
Expenses	\$392,885.00	\$3,611.00	0.9%	\$47,155.00	\$440,040.00	\$50,766.00	13.0%	\$389,274	\$326,153	\$282,046	\$254,800
Operating Capital											
Other											
Total	\$2,127,806.00	\$47,834.00	2.3%	\$325,763.00	\$2,453,569.00	\$373,597.00		\$2,079,972	\$1,749,093	\$1,586,958	\$1,449,066

Salary and Wage	\$1,734,921.00	\$44,223.00	2.6%	\$278,608.00	\$2,013,529.00	\$322,831.00	19.1%	1,690,698.00	1,422,939.91	1,304,911.85	1,194,266.33
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
HEALTH SALARIES PERMANENT	\$576,703.00	\$14,759	2.6%	\$183,496.00	\$760,199.00	\$198,255	35.3%	561,944.00	540,129.21	563,424.80	428,005.60
HEALTH SALARIES TEMPORARY	\$123,303.00	\$513	0.4%	\$46,477.00	\$169,780.00	\$46,990	38.3%	122,790.00	101,183.52	72,212.52	77,753.10
HEALTH SALARIES OVERTIME	\$3,000.00				\$3,000.00			3,000.00			
HEALTH SALARIES REGULAR Other	\$4,600.00	-\$25	-0.5%		\$4,600.00	-\$25	-0.5%	4,625.00	4,605.24	4,442.76	2,115.38
HEALTH TUITION REIMBURSEMENT									4,000.00	3,500.00	
HEALTH SALARIES STIPENDS	\$6,500.00	\$500	8.3%		\$6,500.00	\$500	8.3%	6,000.00	3,000.00	3,000.00	1,500.00
AGING SERVICES SALARIES PERMANENT	\$525,887.00	\$24,310	4.8%		\$525,887.00	\$24,310	4.8%	501,577.00	389,294.46	328,735.08	348,535.29
AGING SERVICES SALARIES TEMPORARY	\$110,840.00	-\$13,949	-11.2%	\$48,635.00	\$159,475.00	\$34,686	27.8%	124,789.00	81,028.89	49,829.82	43,610.48
AGING SERVICES SALARIES OVERTIME									181.33	237.22	
AGING SERVICES SALARIES Other	\$4,100.00	-\$19	-0.5%		\$4,100.00	-\$19	-0.5%	4,119.00		3,000.08	
AGING SERVICES SALARIES STIPENDS											
YOUTH AND FAMILY SERVICES SALARIES REGULAR	\$327,898.00	\$18,221	5.9%		\$327,898.00	\$18,221	5.9%	309,677.00	264,478.68	204,012.44	261,501.11
YOUTH AND FAMILY SERVICES SALARIES TEMPORARY	\$43,690.00				\$43,690.00			43,690.00	32,538.58	31,908.08	19,470.41
YOUTH AND FAMILY SERVICES SALARIES OVERTIME											
YOUTH AND FAMILY SERVICES SALARIES Other	\$3,400.00	-\$587	-14.7%		\$3,400.00	-\$587	-14.7%	3,987.00		38,051.40	6,275.00
YOUTH AND FAMILY SERVICES SALARIES STIPENDS	\$2,000.00	\$500	33.3%		\$2,000.00	\$500	33.3%	1,500.00		57.69	3,000.00
VETERANS' SVCS SALARIES REGULAR											
VETERANS' SVCS SALARIES TEMPORARY											
VETERANS' SVCS SALARIES OVERTIME											
VETERANS' SVCS SALARIES REGULAR Other											
VETERANS' SVCS SALARIES STIPEND	\$3,000.00				\$3,000.00			3,000.00	2,500.00	2,499.96	2,499.96

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
HEALTH ENERGY											
HEALTH ELECTRIC											
HEALTH OIL											
HEALTH NATURAL GAS											
HEALTH NON-ENERGY UTILITIES											
HEALTH REPAIRS & MAINTENANCE									986.12	280.50	274.98
HEALTH R&M BUILDING											
HEALTH R&M MEP											
HEALTH HARDWARE MAINT AGREEMENTS	\$500.00				\$500.00			500.00			
HEALTH R&M EQUIP											
HEALTH R&M VEHICLES											
HEALTH RENTALS & LEASES										635.60	
HEALTH SOFTWARE LIC & USER FEES									1,480.50		
HEALTH OTHER PROP REL SERVICES	\$500.00				\$500.00			500.00	184.40		
HEALTH SOLID WASTE DISPOSAL											
HEALTH PROFESSIONAL & TECHNICAL	\$28,000.00				\$28,000.00			28,000.00	108,070.48	94,524.49	5,157.59
HEALTH P&T SEM & TRAIN	\$2,000.00			\$2,000.00	\$4,000.00	\$2,000	100.0%	2,000.00	7,698.99	8,338.70	3,303.00
HEALTH P&T SFTWR LIC FEE		-\$660	-100.0%			-\$660	-100.0%	660.00		7,224.00	514.00
HEALTH P&T LIC PROF	\$87,500.00	\$2,500	2.9%	\$8,000.00	\$95,500.00	\$10,500	12.4%	85,000.00			93,605.91
HEALTH P&T LEGAL SVCS											
HEALTH ADVERTISING	\$2,500.00			\$2,000.00	\$4,500.00	\$2,000	80.0%	2,500.00	2,997.60	2,450.00	2,000.00
HEALTH COMMUNICATIONS	\$2,000.00			\$4,000.00	\$6,000.00	\$4,000	200.0%	2,000.00			980.88
HEALTH POSTAGE	\$1,500.00				\$1,500.00			1,500.00	1,034.99	1,019.33	879.07
HEALTH COMM - LANDLINE											

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
HEALTH COMM - CABLE/INTERNET										179.22	
HEALTH WIRELESS COMMUNICATIONS	\$4,925.00	-\$75	-1.5%	\$750.00	\$5,675.00	\$675	13.5%	5,000.00	6,992.85	4,875.00	3,521.88
HEALTH PRINTING & MAILING	\$3,250.00			\$2,000.00	\$5,250.00	\$2,000	61.5%	3,250.00	3,041.41	1,869.77	1,263.50
HEALTH LEGAL NOTICES	\$4,000.00				\$4,000.00			4,000.00	1,700.00	1,200.00	2,400.00
HEALTH RECREATION											
HEALTH OTHER PURCHASED SERVICES	\$1,000.00				\$1,000.00			1,000.00	390.00	325.55	693.24
HEALTH OFFICE ENERGY SUPPLIES											
HEALTH OFFICE SUPPLIES	\$4,000.00	-\$250	-5.9%	\$1,000.00	\$5,000.00	\$750	17.6%	4,250.00	4,233.46	2,160.60	2,585.22
HEALTH BUILD & EQUIP SUPPLIES											
HEALTH CUSTODIAL SUPPLIES									22.53		
HEALTH GROUNDSKEEPING SUPPLIES											
HEALTH VEHICLE SUPPLIES											
HEALTH GASOLINE/DIESEL											
HEALTH FOOD & SERVICE SUPPLIES									2,085.01	2,272.19	1,260.12
HEALTH MEDICAL SUPPLIES	\$1,750.00	\$250	16.7%		\$1,750.00	\$250	16.7%	1,500.00			400.00
HEALTH EDUCATIONAL SUPPLIES											
HEALTH BUILD & EQUIP SUPPLIES											
HEALTH OTHER SUPPLIES	\$2,175.00			\$250.00	\$2,425.00	\$250	11.5%	2,175.00	23,542.49	10,156.34	7,592.55
HEALTH COMPUTER SUPPLIES & EQUIPMENT										9,086.69	11,993.22
HEALTH GOVERNMENTAL CHARGES	\$200.00	-\$50	-20.0%		\$200.00	-\$50	-20.0%	250.00	234.00	243.00	66.00
HEALTH CONF IN-STATE	\$2,500.00			\$375.00	\$2,875.00	\$375	15.0%	2,500.00	448.71	777.00	1,165.60
HEALTH MILEAGE	\$3,500.00			\$375.00	\$3,875.00	\$375	10.7%	3,500.00	3,373.20	4,429.47	3,962.35
HEALTH CONF OUT-STATE	\$5,500.00			\$1,050.00	\$6,550.00	\$1,050	19.1%	5,500.00	3,501.33	2,884.02	2,563.64
HEALTH DUES & MEMBERSHIPS	\$2,750.00			\$355.00	\$3,105.00	\$355	12.9%	2,750.00	2,550.00	2,748.00	1,305.00

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
HEALTH OTHER EXPENSES									111.00		
AGING SERVICES ENERGY											
AGING SERVICES ELECTRIC											
AGING SERVICES OIL											
AGING SERVICES NATURAL GAS											
AGING SERVICES NON-ENERGY UTILITIES											
AGING SERVICES REPAIRS & MAINTENANCE											
AGING SERVICES R&M BUILDING											
AGING SERVICES R&M MEP											
AGING SERVICES HARDWARE MAINTENANCE AGREEMENTS											776.10
AGING SERVICES R&M EQUIP											
AGING SERVICES R&M VEHICLES									1,425.00	35.00	
AGING SERVICES RENTAL & LEASES											
AGING SERVICES SOFTWARE LICENSE & USER FEES											
AGING SERVICES OTHER PROPERTY RELATED SERVICES											
AGING SERVICES SOLID WASTE DISPOSAL											
AGING SERVICES PROFESSIONAL & TECHNICAL	\$8,000.00				\$8,000.00			8,000.00	5,400.00	1,820.00	
AGING SERVICES P&T SEM & TRAIN	\$2,000.00				\$2,000.00			2,000.00	709.00		
AGING SERVICES P&T SFTWR LIC FEE		-\$500	-100.0%			-\$500	-100.0%	500.00	4,665.00	1,360.00	990.00
AGING SERVICES P&T LIC PROF											
AGING SERVICES P&T LEGAL SVCS											
AGING SERVICES ADVERTISING											
AGING SERVICES COMMUNICATIONS											
AGING SERVICES POSTAGE	\$2,500.00	\$250	11.1%	\$500.00	\$3,000.00	\$750	33.3%	2,250.00	1,157.16	43.75	370.20

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
AGING SERVICES COMM - LANDLINE											
AGING SERVICES COMM - CABLE/INTERNET											
AGING SERVICES WIRELESS COMMUNICATIONS	\$4,250.00	\$1,300	44.1%		\$4,250.00	\$1,300	44.1%	2,950.00	1,205.76		
AGING SERVICES PRINTING & MAILING	\$2,250.00				\$2,250.00			2,250.00	1,059.23	352.07	510.50
AGING SERVICES LEGAL NOTICES											
AGING SERVICES RECREATION	\$28,000.00			\$24,000.00	\$52,000.00	\$24,000	85.7%	28,000.00	917.67	350.36	675.00
AGING SERVICES OTHER SERVICES									263.54		
AGING SERVICES ENERGY SUPPLIES											
AGING SERVICES OFFICE SUPPLIES	\$3,000.00				\$3,000.00			3,000.00	4,502.19	2,000.00	994.82
AGING SERVICES BUILD & EQUIP SUPPLIES											
AGING SERVICES CUSTODIAL SUPPLIES											
AGING SERVICES GROUNDSKEEPING SUPPLIES											
AGING SERVICES VEHICLE SUPPLIES	\$2,750.00	-\$250	-8.3%		\$2,750.00	-\$250	-8.3%	3,000.00			
AGING SERVICES GASOLINE/DIESEL	\$9,500.00	-\$500	-5.0%		\$9,500.00	-\$500	-5.0%	10,000.00	6,217.00	5,205.05	3,000.00
AGING SERVICES FOOD & SERVICE SUPPLIES	\$300.00				\$300.00			300.00	1,529.64		486.37
AGING SERVICES MEDICAL SUPPLIES	\$150.00				\$150.00			150.00			
AGING SERVICES EDUCATIONAL SUPPLIES											
AGING SERVICES PUBLIC WORKS SUPPLIES											
AGING SERVICES OTHER SUPPLIES & EQUIPMENT	\$1,750.00			\$500.00	\$2,250.00	\$500	28.6%	1,750.00	171.76	1,032.00	
AGING SERVICES GOVERNMENTAL CHARGES									164.00	173.00	
AGING SERVICES CONF IN-STATE	\$1,000.00				\$1,000.00			1,000.00	41.80		
AGING SERVICES MILEAGE	\$1,100.00				\$1,100.00			1,100.00	327.32		
AGING SERVICES CONF OUT-STATE											
AGING SERVICES DUES & MEMBERSHIPS	\$1,500.00				\$1,500.00			1,500.00	200.00	1,299.60	1,730.00

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
AGING SERVICES OTHER EXPENSES	\$500.00	\$500			\$500.00	\$500			974.37	225.00	228.15
YOUTH AND FAMILY SERVICES ENERGY											
YOUTH AND FAMILY SERVICES ELECTRIC											
YOUTH AND FAMILY SERVICES OIL											
YOUTH AND FAMILY SERVICES NATURAL GAS											
YOUTH AND FAMILY SERVICES NON-ENERGY UTILITIES											
YOUTH AND FAMILY SERVICES REPAIRS & MAINTENANCE											
YOUTH AND FAMILY SERVICES R&M BUILDING											
YOUTH AND FAMILY SERVICES R&M MEP											
YOUTH AND FAMILY SERVICES HARDWARE MAINT AGREE											
YOUTH AND FAMILY SERVICES R&M EQUIP											
YOUTH AND FAMILY SERVICES R&M VEHICLES											
YOUTH AND FAMILY SERVICES RENTAL & LEASES											
YOUTH AND FAMILY SERVICES SOFTWARE LIC & USER FEES											
YOUTH AND FAMILY SERVICES OTHR PROP REL SVCS											
YOUTH AND FAMILY SERVICES SOLID WASTE DISPOSAL											
YOUTH AND FAMILY SERVICES PROFESSIONAL & TECHNICAL	\$8,500.00				\$8,500.00			8,500.00	5,970.00	1,500.00	1,500.00
YOUTH AND FAMILY SERVICES P&T SEM & TRAIN	\$1,800.00				\$1,800.00			1,800.00	3,408.97	654.99	492.67
YOUTH AND FAMILY SERVICES P&T SFTWR LIC FEE											
YOUTH AND FAMILY SERVICES P&T LIC PROF											
YOUTH AND FAMILY SERVICES P&T LEGAL SVCS											
YOUTH AND FAMILY SERVICES ADVERTISING											
YOUTH AND FAMILY SERVICES COMMUNICATIONS											
YOUTH AND FAMILY SERVICES POSTAGE	\$1,000.00				\$1,000.00			1,000.00	325.21	254.76	139.20

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
YOUTH AND FAMILY SERVICES COMM - LANDLINE											
YOUTH AND FAMILY SERVICES COMM - CABLE/INTERNET											
YOUTH AND FAMILY SERVICES WIRELESS COMMUNICATIONS	\$1,975.00	\$275	16.2%		\$1,975.00	\$275	16.2%	1,700.00	1,861.63	1,240.00	1,223.76
YOUTH AND FAMILY SERVICES PRINTING & MAILING	\$400.00				\$400.00			400.00	200.00	115.50	239.98
YOUTH AND FAMILY SERVICES LEGAL NOTICES											
YOUTH AND FAMILY SERVICES RECREATION											
YOUTH AND FAMILY SERVICES OTHER PURCHASED SERVICES											81.00
YOUTH AND FAMILY SERVICES ENERGY SUPPLIES											
YOUTH AND FAMILY SERVICES OFFICE SUPPLIES	\$800.00				\$800.00			800.00	1,150.32	416.61	546.70
YOUTH AND FAMILY SERVICES BUILD & EQUIP SUPPLIES											
YOUTH AND FAMILY SERVICES CUSTODIAL SUPPLIES											
YOUTH AND FAMILY SERVICES GRNDSKPG SUPPLIES											
YOUTH AND FAMILY SERVICES VEHICLE SUPPLIES											
YOUTH AND FAMILY SERVICES GASOLINE/DIESEL											
YOUTH AND FAMILY SERVICES FOOD & SVC SUPPLIES	\$2,200.00	\$1,000	83.3%		\$2,200.00	\$1,000	83.3%	1,200.00	2,464.67	332.43	553.69
YOUTH AND FAMILY SERVICES MEDICAL SUPPLIES											
YOUTH AND FAMILY SERVICES EDUCATIONAL SUPPLIES											
YOUTH AND FAMILY SERVICES PUBLIC WORKS SUPPLIES											
YOUTH AND FAMILY SERVICES OTHR SUPPLIES & EQUIP	\$3,250.00	\$500	18.2%		\$3,250.00	\$500	18.2%	2,750.00	439.52		187.97
YOUTH AND FAMILY SERVICES GOVERNMENTAL CHGS	\$800.00				\$800.00			800.00	354.00		
YOUTH AND FAMILY SERVICES CONF IN-STATE	\$1,500.00				\$1,500.00			1,500.00	98.50	10.00	
YOUTH AND FAMILY SERVICES MILEAGE	\$1,300.00				\$1,300.00			1,300.00	1,322.97	1,123.37	418.99
YOUTH AND FAMILY SERVICES CONF OUT-STATE	\$3,000.00				\$3,000.00			3,000.00	1,414.01		
YOUTH AND FAMILY SERVICES DUES & MEMBERSHIPS	\$1,000.00				\$1,000.00			1,000.00			85.00

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
YOUTH AND FAMILY SERVICES											
OTHER EXPENSES										65.56	92.73
VETERANS' SVCS ENERGY									500.00		
VETERANS' SVCS ELECTRIC											
VETERANS' SVCS OIL											
VETERANS' SVCS NATURAL GAS											
VETERANS' SVCS NON-ENERGY UTILITIES											
VETERANS' SVCS REPAIRS & MAINT											
VETERANS' SVCS R&M BUILDING											
VETERANS' SVCS R&M MEP											
VETERANS' SVCS HRDWR MAINT AGREE											
VETERANS' SVCS R&M EQUIP											
VETERANS' SVCS R&M VEHICLES											
VETERANS' SVCS RENTAL & LEASES											
VETERANS' SVCS SFTWR LIC & USER FEE											
VETERANS' SVCS OTHR PROP REL SVCS	\$1,400.00				\$1,400.00			1,400.00	1,500.00	1,500.00	1,500.00
VETERANS' SVCS SOLID WASTE DISPOSAL											
VETERANS' SVCS PROF & TECH											
VETERANS' SVCS P&T SEM & TRAIN											
VETERANS' SVCS P&T SFTWR LIC FEE											
VETERANS' SVCS P&T LIC PROF											
VETERANS' SVCS P&T LEGAL SVCS											
VETERANS' SVCS ADVERTISING											
VETERANS' SVCS COMMUNICATIONS											
VETERANS' SVCS POSTAGE	\$100.00				\$100.00			100.00	11.77	8.82	18.99

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
VETERANS' SVCS COMM - LANDLINE											
VETERANS' SVCS COMM - LANDLINE											
VETERANS' SVCS WIRELESS COMMUNICATI											
VETERANS' SVCS PRINTING & MAILING											
VETERANS' SVCS LEGAL NOTICES											
VETERANS' SVCS RECREATION	\$500.00				\$500.00			500.00			
VETERANS' SVCS OTHR PURCH OF SVCS											
VETERANS' SVCS ENERGY SUPPLIES											
VETERANS' SVCS OFFICE SUPPLIES	\$100.00				\$100.00			100.00			
VETERANS' SVCS BUILD & EQUIP SUPPLI											
VETERANS' SVCS CUSTODIAL SUPPLIES											
VETERANS' SVCS GRNDSKPG SUPPLIES											
VETERANS' SVCS VEHICLE SUPPLIES											
VETERANS' SVCS GASOLINE/DIESEL											
VETERANS' SVCS FOOD & SVC SUPPLIES										500.00	500.00
VETERANS' SVCS MEDICAL SUPPLIES											
VETERANS' SVCS EDUCATIONAL SUPPLIES											
VETERANS' SVCS PUBLIC WORKS SUPPLIE											
VETERANS' SVCS OTHR SUPPLIE & EQUIP	\$4,000.00				\$4,000.00			4,000.00	3,138.19	3,673.69	3,760.00
VETERANS' SVCS GOVERNMENTAL CHGS	\$82,500.00	-\$290	-0.4%		\$82,500.00	-\$290	-0.4%	82,790.00	71,384.00	70,575.00	71,210.00
VETERANS' SVCS CONF IN-STATE											
VETERANS' SVCS MILEAGE	\$100.00				\$100.00			100.00			
VETERANS' SVCS CONF OUT-OF-STATE											
VETERANS' SVCS DUES & MEMBERSHIPS	\$60.00				\$60.00			60.00			

Expenses	\$392,885.00	\$3,611	0.9%	\$47,155.00	\$440,040.00	\$50,766	13.0%	389,274.00	326,153.27	282,046.03	254,799.57
Health and Human Services	FY2021 DSR2 Request	BASE \$ Change from FY2020	BASE % Change	FY2021 DSR4 Request	FY2021 Total Request	Total \$ Change from FY2020	Total % Change	FY2020 Budgeted	FY2019 Expenditures	FY2018 Expenditures	FY2017 Expenditures
VETERANS' SVCS VETERANS' BENEFITS	\$48,000.00	-\$389	-0.8%		\$48,000.00	-\$389	-0.8%	48,389.00	25,000.00	28,500.00	15,000.00
VETERANS' SVCS OTHER EXPENSES											



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/2019

Agenda Item	Update on Chairs Meeting with Select Board
Presenter(s)	Chair Edward Cosgrove Vice Chair Kathleen Ward Brown

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
The Chair and Vice Chair of the Board of Health will provide the other Board members with an update from their meeting with the Chair and Vice Chair of the Select Board and with the Town Manager.	
2.	VOTE REQUIRED BY SELECT BOARD
No vote is required, nor is one expected.	
3.	BACK UP INFORMATION ATTACHED
No backup information is attached. This agenda item will feature a verbal report from the Board of Health Chair and Vice Chair.	



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**

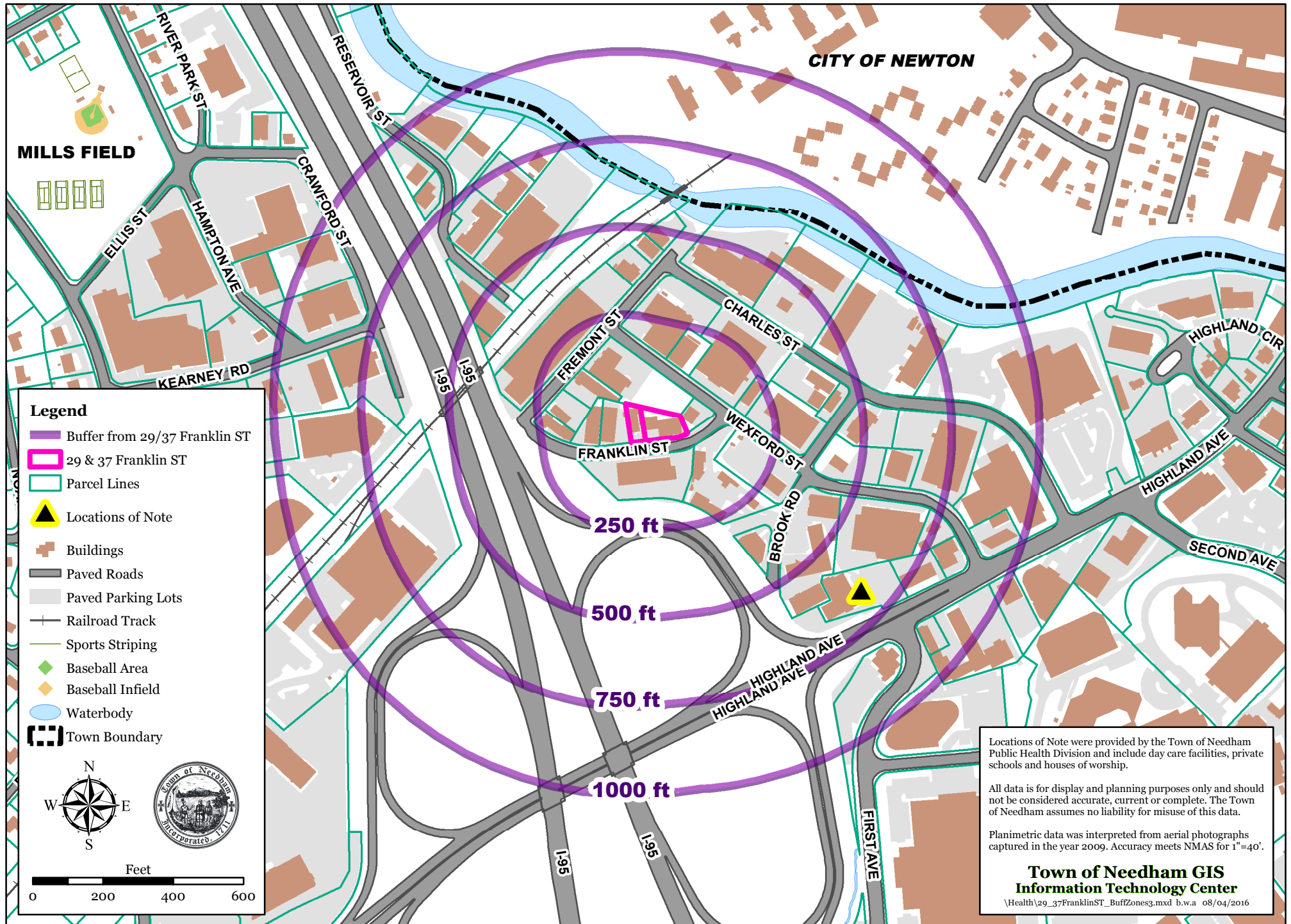


MEETING DATE: 12/10/2019

Agenda Item	Policy Discussion re: Residential Parcels and Distance from Points for Sale for Intoxicating Substances
Presenter(s)	Chair Edward Cosgrove Vice Chair Kathleen Ward Brown Timothy Muir McDonald, Director of Health & Human Services

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
The Chair and Vice Chair of the Board of Health will provide the other Board members with an update from their meeting with the Chair and Vice Chair of the Select Board and with the Town Manager.	
2.	VOTE REQUIRED BY SELECT BOARD
No vote is required, nor is one expected.	
3.	BACK UP INFORMATION ATTACHED
A map of the Mixed Use-128 Zoning Area is attached. It includes concentric distance circles from 29 and 37 Franklin Street, the current location of Sira Naturals, Needham's registered medical marijuana dispensary. This agenda item will include a brief verbal report from the Board of Health Chair and Vice Chair, and some additional background information from the Director of Health & Human Services, followed by a full Board discussion.	

29-37 Franklin Street & Possible Buffer Zones





**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/2019

Agenda Item	Update on Public Information Campaign re: Youth Vaping
Presenter(s)	Karen Shannon, Seniors Substance Use Prevention Program Coordinator

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
Ms. Karen Shannon will present a brief overview of the public information campaign that the Public Health Division will employ to promote the Division and the Board's work to prevent youth vaping.	
2.	VOTE REQUIRED BY SELECT BOARD
No vote is required, nor is one expected.	
3.	BACK UP INFORMATION ATTACHED
A copy of the Board of Health's letter to the community is attached for reference.	



NEEDHAM BOARD OF HEALTH



December 2, 2019

Protecting Community Health in Needham—E-Cigarettes and Vaping

Why is vaping a concern?

A recent surge in severe respiratory illnesses is driven by the use of vaping and electronic cigarette products. As of November 20, 2019, the US Centers for Disease Control and Prevention had confirmed 2,290 confirmed and probable injury cases, and 47 deaths, predominantly among teenagers and young adults. In MA, as of November 27th, there are 82 confirmed and probable cases of vaping related lung disease.

Vaping is the act of inhaling and exhaling the aerosol produced by an e-cigarette or similar battery-powered device that simulates the action and sensation of smoking. E-cigarettes produce an aerosol, commonly called vapor. The aerosol can contain harmful and potentially harmful substances, including: ultrafine particles that can be inhaled deep into the lungs; flavoring such as diacetyl, a chemical linked to a serious lung disease; volatile organic compounds; cancer-causing chemicals; and heavy metals such as nickel, tin, and lead. Further, e-cigarettes contain nicotine. Nicotine is a highly addictive substance, and the vaporization process makes it even easier to become addicted.

E-cigarettes recently surpassed conventional cigarettes as the most commonly used tobacco product among youth. Use of e-cigarettes by youth is of concern because young people are particularly vulnerable to the health effects of nicotine. The US Surgeon General has found that nicotine exposure during adolescence may have lasting consequences for brain development. The risk of nicotine addiction is particularly high among those under age 21; moreover, addiction to nicotine is what keeps young people smoking even after adolescence.

There is evidence that manufacturers of e-cigarettes have specifically targeted younger users in their advertising, especially with flavored products that are popular with teens and young adults. Here in Needham, we know, per the 2018 biennial MetroWest Adolescent Health Survey (MWAHS) results, that:

- 1) 13% of Needham 9th grade students and 33% of Needham 12th grade students used electronic vaping products in the previous month;
- 2) almost half of Needham 11th and 12th graders have used vaping products at least once;
- 3) although monthly use of alcohol and cigarettes has declined since 2016, use of marijuana and electronic vaping products is on the rise among Needham youth.

Needham Response

The Needham Board of Health and the Needham Public Health Division are committed to protecting residents, particularly young people, from the health risks of vaping and nicotine addiction. The Town of Needham Public Health Division offers ongoing youth substance use prevention activities through the Substance Prevention Alliance of Needham (SPAN). SPAN is a

community coalition focused on preventing and reducing youth substance use and misuse that provides education and informational events to our community members. SPAN programming and staff are funded through a soon-to-expire Drug Free Communities grant awarded to the Needham Public Health Division. SPAN has offered two youth vaping awareness forums for Needham parents and the community and is working within the Needham Health and Human Services Department to form a multi-disciplinary Vaping Task Force made up of town officials, community partners, law enforcement, school officials, and healthcare providers. The Vaping Task Force's role will be to make policy recommendations, offer community-based education and awareness programs, and identify treatment options that support cessation efforts.

Preventing teens from buying tobacco products has had a well-documented effect on reducing nicotine addiction. The Needham Board of Health and other boards of health in MA have taken steps to restrict access by young people to e-cigarettes and vaping products. Starting in July 2019, Needham limited the sale of all flavored e-cigarettes and other flavored tobacco products by requiring that they be sold solely in smoke shops, which only admit patrons over age 21.

On September 24, 2019, a public health emergency declaration by Governor Baker placed a 4-month ban on retail and online sales of e-cigarettes and vaping products in MA. The Needham Public Health Division staff have been working to ensure that retailers are in compliance with this state ban. Inspections of tobacco retailers have been and will continue to be conducted to make certain that vaping products are not being sold. Additionally, recognizing that e-cigarettes may be used by those trying to quit smoking cigarettes, the Board of Health and the Public Health Division will continue to work with the MA Department of Public Health to make smoking cessation resources available to residents.

As we learn more about the health risks of vaping products during the pause in sales, the Needham Board of Health will continue to work with residents of our community and the MA Department of Public Health to find a healthy and sensible way forward. We feel this work is urgently needed to protect an entire generation of young people from respiratory illnesses and a lifetime of nicotine addiction.

Sincerely,
The Needham Board of Health



Kathleen Ward Brown, ScD



Edward Cosgrove, PhD



Stephen Epstein, MD, MPP



Christina S. Mathews, MPH



Robert Partridge, MD, MPH



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/2019

Agenda Item	Synthetic Turf Fields and Enhanced Environmental Testing
Presenter(s)	Kathleen Ward Brown, BOH Vice Chair Timothy Muir McDonald, Director of Health & Human Services Tara Gurge, Assistant Public Health Director

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
UPDATE: Vice Chair Kathleen Ward Brown will update the Board of Health about a conference call where she, along with Ms. Gurge and Mr. McDonald, discussed testing options with Fuss & O'Neil, the Town's vendor. The Board of Health will review new and emerging information about chemicals in some types of synthetic turf, and will discuss the Public Health Division's field testing process and possible changes to what is tested and sampled for testing in the current year and in future years.	
2.	VOTE REQUIRED BY BOARD OF HEALTH
No vote is required.	
3.	BACK UP INFORMATION ATTACHED
Two newspaper/periodical articles (Boston Globe and The Intercept) are attached, along with two journal articles (one from the Journal of Exposure Science & Environmental Epidemiology and the other from Environmental Science and Technology) and a backup document with additional materials supporting one of the studies.	

M E M O R A N D U M

TO: Artificial Turf Field Interested Parties

FROM: Steven LaRosa, PFAS Technical Leader
Marie Rudiman, Senior Risk Assessor/Toxicologist

DATE: 10/14/19

SUBJECT: Potential PFAS presence in Artificial Turf

Recent news articles ([Boston Globe](#) dated 10/09/19 and [The Intercept](#) dated 10/08/19) have discussed the potential presence of poly and perfluorinated alkyl substances (PFAS) in artificial turf sports fields. PFAS are a family of compounds used in numerous commercial products to provide durable waterproof coatings. The scientific community is rapidly evolving its understanding of PFAS in the environment. PFAS are considered to be contaminants of emerging concern (CECs). CECs are those chemicals that present potentially unacceptable human health effects or environmental risks, and either: (1) do not have regulatory cleanup standards, or (2) regulatory standards are evolving due to new science, detection capabilities or pathways, or both. Due to their presence in many products under brand names such as Teflon and Gortex, PFAS are ubiquitous in the environment. PFAS has been detected in human blood, sediments, surface and groundwater, and wildlife. Although the scientific research into PFAS is evolving, there is evidence there may be adverse health effects associated with long-term exposure to some PFAS compounds. The primary focus of USEPA and other regulatory agencies for exposure to PFAS is through consumption of PFAS in contaminated drinking water. Based on the limited research studies and what is known about the chemical composition of PFAS, dermal (skin) contact with PFAS containing materials is expected to pose minimal health risk. Similarly, based on available research and the chemical composition of PFAS, PFAS compounds do not appear to be volatile and are expected to pose minimal health risk through inhalation.

While the recently reported sampling and analysis of artificial turf appears to indicate that PFAS are present in some of the components of the turf system, Weston & Sampson has reviewed the reported sampling of the turf field materials for PFAS and found several potential issues with the reporting as highlighted below.

- Currently, there is no certified method for analyzing PFAS concentrations in materials other than an EPA method for analyzing PFAS in drinking water. Since the samples were carpet and not

drinking water, the methods used for analysis were almost certainly not certified and therefore, the results are questionable.

- The articles indicate that two samples of synthetic turf were analyzed and PFOS (one of the PFAS compounds) was detected in both samples. Two samples represent an extremely small sampling size. No scientific conclusions can be made with this small sampling size.
- The article noted that an additional eight samples were analyzed for total fluorine and further noted that total fluorine indicates that PFAS is present. What the article did not mention was that testing total fluorine is an extremely non-specific method that can indicate the presence of PFAS or many other non-PFAS compounds. For example, many household products contain fluorine such as toothpaste, mouthwash, and various household cleaners. The presence of fluorine does not necessarily indicate PFAS compounds are present.
- There was no indication of how the samples were collected or how the samples were preserved so that there is no cross contamination. In the field, cross contamination of PFAS is extremely common. For instance, there has been cross contamination reported in drinking water when field techs have been wearing rain-resistant clothing while collecting the sample.
- The article compared the concentration that was detected in one sample of synthetic turf to the drinking water health advisory. This drinking water health advisory is set very low to protect potential human exposure to PFAS in drinking water and it is not an applicable measure of potential exposures to a chemical while playing on synthetic turf.

Despite the apparent scientific shortcomings identified in the referenced news articles, Weston & Sampson takes this matter seriously. We have contacted synthetic turf suppliers to determine if PFAS are utilized in the manufacture of their products and we have reached out to the Massachusetts DEP for potential guidance. We are working with vendors and manufacturers to ensure that products do not contain PFAS and meet California Prop 65 and European REACH standards of safety.

Weston & Sampson will provide updates on this subject as additional information becomes available.

STC Statement on PFAS

I STC Members

Hello Leon,

A recent story published by The Intercept, a decidedly biased media outlet, purported to show PFAS found in synthetic turf fields based on research done by the Ecology Center, an environmental advocacy group based in Michigan. PFAS stands for a broad group of perfluoroalkyl and polyfluoroalkyl substances that are used in fast-food takeout containers, nonstick pans and pizza boxes. The Ecology Center findings have not been independently verified. Additionally, due to the widespread use of PFAS in everyday products, testing for PFAS runs the high risk of cross contamination and false positive results. The story was also picked up by the Boston Globe. In our initial review, a majority of STC's manufacturers do not use PFAS in the production process. As more information becomes available we will let you know.

If you do receive questions, media inquiries or would like additional information about the PFAS issue, please contact Dan Bond at dan@syntheticturfcouncil.org. The Synthetic Turf Council has talking points available as well upon request.

Dan Bond, CAE
President & Chief Executive Officer
Synthetic Turf Council
dan@syntheticturfcouncil.org

From: Robert May <RMay@fando.com>

Sent: Friday, November 15, 2019 10:49 AM

To: Tara Gurge <TGurge@needhamma.gov>

Cc: Timothy McDonald <tmcdonald@needhamma.gov>; Daniel LaFrance <DLaFrance@fando.com>; Jared Smith <jsmith@fando.com>

Subject: Re: Follow-up on PFAS Testing for Turf Conf. Call request

Tara,

I wanted to update you on our approach for the proposal. We had a conference call with our Risk Assessor/Toxicologist and subsequent conversation with laboratory we will use for analysis. We will develop a proposal for testing but wanted to identify a couple of things for you to consider.

1. We strongly recommend that you contact the contractor and supplier/manufacture of the field and obtain a statement from them if you can on the use or lack thereof for PFAS materials. That could be an initial and maybe better step than testing if you in fact obtain a letter indicating no PFAS used in the current field products.
2. Sampling for PFAS in bulk matrices is problematic as there are no approved laboratory standards for this analysis at present. All current analytical methods are for water and soil. There are also no standards for PFAS in bulk matrices from a risk assessment standpoint.
3. We suggest if the testing route is to be undertaken, we can have the lab perform leachability analysis to determine if PFAS compounds are leachable to soil, groundwater or available for potential human contact.
4. We could also perform analysis in a qualitative way to determine presence or absence of various PFAS compounds in the materials.

Please review and let me know if you believe the approach would support your desired determinations of PFAS in materials. We recognize that in part this may not help totally address likely public concern over use of the fields and potential human exposures and are open to further discussion on right approach to meet your needs.



Robert L. May, Jr.

Senior Vice President | Business Line Leader

Fuss & O'Neill, Inc. | 146 Hartford Road | Manchester, CT 06040

860.646.2469 x4701 | rmay@fando.com | cell: 617.778.3768

www.fando.com | [twitter](#) | [facebook](#) | [linkedin](#)

Toxic chemicals are found in blades of artificial turf

By [David Abel](#) Globe Staff, October 9, 2019, 8:32 p.m.

[49](#)



Kyla Bennett (left) and Tracy Stewart of Medway looked over a pile of turf in Franklin. David L. Ryan/Globe Staff

FRANKLIN — For two years, an abandoned pile of artificial turf had decomposed on a bluff here, a few feet above wetlands that are part of the suburb's drinking water supply. Nearby, ripped bags with the infill of the turf, tiny pellets of shredded tires, littered the embankment.

Public health advocates have long raised alarms about artificial turf pellets, which simulate the give of natural grass but have been shown to contain benzene, cadmium, and other known carcinogens. Now, for the first time, a new series of tests has found that the blades, and their plastic backing, may also contain toxic chemicals.

The test results showed that the turf contained elevated levels of per- and polyfluoroalkyl chemicals known as PFAS, which have been linked to kidney cancer, low infant birth weights, and a range of diseases. The findings have raised concerns about the safety of millions of square feet of artificial turf installed in recent years on public fields and playgrounds across the country.

“This is huge. It’s the first time that PFAS chemistry used in plastic production has been found in finished consumer products,” said Jeff Gearhart, research director of the Ecology Center, a nonprofit environmental research group based in Michigan that tested the turf. “This finding is maybe the tip of the iceberg. We suspect these PFAS chemicals may be found in other plastic building and consumer products.”

The concentrations of chemicals found in the wetlands near Franklin’s Beaver Field are below current federal and state health guidelines but well above standards some states have recently adopted in light of research suggesting that even low PFAS concentrations in drinking water can be harmful. Concerns about PFAS, called “forever chemicals” because they never fully degrade, have mounted in recent years. Developed in the 1940s, the chemicals have been used in products such as flame retardants, nonstick pans, pizza boxes, clothing, and furniture.

In Franklin, questions about the discarded turf led local environmental activists to send swatches of the turf and water samples for testing. The Ecology Center, working with the New England office of the Public Employees for Environmental Responsibility, a Washington D.C.-based advocacy group, found that the swatch of turf from Franklin contained 190 parts per trillion of one of the most common PFAS chemicals, well above federal safety standards for drinking water.

The group recently filed a complaint with state environmental officials about the discarded turf, saying it violated wetland protections. The water samples there contained nearly 10 parts per trillion of the same chemical found in the turf, as well as a combined 40 parts per trillion of two other PFAS chemicals.

Jamie Hellen, the Franklin town administrator, said he had no idea that the old turf was left there or that it was potentially toxic. He said he is waiting for guidance from the state Department of Environmental Protection on how to proceed.

“We will work with DEP to resolve the matter,” he said.

He noted there is no definitive link between the chemicals found in the turf and those in the water. After the Globe inquired about the piles of old turf, crews removed the material within hours.



Tracy Stewart held some runoff by the Beaver Street Field at Chilson Park in Franklin. The Boston Globe/Globe Staff

The Ecology Center also tested samples of turf installed this summer at Oliver Ames High School in Easton and found similarly high levels of another PFAS chemical. In addition, they tested eight other samples of turf blades, which they acquired directly from distributors of artificial turf, and found that all contained high amounts of fluorine, a chemical suggesting the presence of PFAS.

With as many as 1,500 new artificial turf fields installed every year — there are now some 13,000 in the United States, including hundreds in Massachusetts — public health advocates worry the potentially tainted runoff could contaminate water supplies around the country.

“PFAS in synthetic turf should sound alarm bells for all municipalities with these fields,” said Kyla Bennett, science policy director of the Public Employees for Environmental Responsibility. “All turf manufacturers should immediately disclose whether they use PFAS in their manufacturing process.”



A runner on new turf at the Beaver Street Field at Chilson Park, Beaver Street in Franklin. David L Ryan/Globe Staff

The EPA currently recommends municipalities alert the public if two of the most common PFAS chemicals reach 70 parts per trillion in drinking water, and Massachusetts uses the same threshold for five common PFAS chemicals.

But some recent studies have recommended that children not consume water with levels above 1 part per trillion and states such as New Hampshire and New Jersey have adopted stricter standards. Massachusetts is considering adopting a standard similar to one recently enacted in Vermont, advising residents to avoid drinking water if the concentration of six of the chemicals cumulatively reaches 20 parts per trillion.

A DEP spokesman said the agency is reviewing the wetlands complaint regarding Franklin, reaching out to town officials and planning a site visit.

Many communities have installed artificial turf fields because they offer clear advantages over natural grass. They don't have to be mowed or watered, require no expensive fertilizers, and allow for substantially more playing time.

Dan Bond, president of the Synthetic Turf Council, a trade group for an industry that earns \$2.5 billion a year, said repeated studies have shown no elevated health risks from artificial turf, pointing to research by the Consumer Product Safety Commission, the EPA, and state agencies.

"I haven't seen any other reports that have shown any of these concerns," Bond said, referring to the PFAS findings.

The owner of one company that produced some of the turf that the group tested was skeptical about the findings.

“We have never heard any concerns about the chemical composition of our product,” said Mike Hall, co-owner of Turf Factory Direct, a Georgia company. “I’d like to have my lawyer look at this.”

Susan Farris, a spokeswoman for Shaw Industries, another Georgia company that sells artificial turf said, “These chemicals are commonly used by synthetic turf manufacturers as a non-stick agent in the manufacturing equipment.”

Given the recent concerns about PFAS, she said, the company has phased out their use in other products, such as flooring and carpeting.

“As new formulations are available to perform the same or similar functions as PFAS chemicals have historically, Shaw has shifted to new ingredients,” she said.

Questions about the safety of artificial turf emerged five years ago when Amy Griffin, a University of Washington soccer coach, cited a large number of goalkeepers who play on turf and had contracted cancer, mainly blood-related lymphomas. By January 2019, her list included 260 young athletes with cancer.

Federal and state officials have said evidence of the health risks is limited. In 2017, a report by the state of Washington found no connection between the incidence of cancer with soccer players and their exposure to artificial turf.

But evidence of elevated PFAS concentrations may change the calculus.

“That is a big concern, since this turf is in many communities and is designed to drain precipitation off the fields, which can carry soluble contaminants into ground water underlying the turf,” said Betsy Southerland, former director of science and technology in the EPA Office of Water during the Obama administration. “Ground water, in turn, can be the direct source of drinking water for private wells and community water systems.”

David Abel can be reached at dabel@globe.com. Follow him on Twitter [@davabel](https://twitter.com/davabel).



A review of the pathways of human exposure to poly- and perfluoroalkyl substances (PFASs) and present understanding of health effects

Elsie M. Sunderland^{1,2} · Xindi C. Hu^{1,2} · Clifton Dassuncao^{1,2} · Andrea K. Tokranov² · Charlotte C. Wagner² · Joseph G. Allen¹

Received: 6 September 2018 / Revised: 15 October 2018 / Accepted: 19 October 2018 / Published online: 23 November 2018
© Springer Nature America, Inc. 2018

Abstract

Here, we review present understanding of sources and trends in human exposure to poly- and perfluoroalkyl substances (PFASs) and epidemiologic evidence for impacts on cancer, immune function, metabolic outcomes, and neurodevelopment. More than 4000 PFASs have been manufactured by humans and hundreds have been detected in environmental samples. Direct exposures due to use in products can be quickly phased out by shifts in chemical production but exposures driven by PFAS accumulation in the ocean and marine food chains and contamination of groundwater persist over long timescales. Serum concentrations of legacy PFASs in humans are declining globally but total exposures to newer PFASs and precursor compounds have not been well characterized. Human exposures to legacy PFASs from seafood and drinking water are stable or increasing in many regions, suggesting observed declines reflect phase-outs in legacy PFAS use in consumer products. Many regions globally are continuing to discover PFAS contaminated sites from aqueous film forming foam (AFFF) use, particularly next to airports and military bases. Exposures from food packaging and indoor environments are uncertain due to a rapidly changing chemical landscape where legacy PFASs have been replaced by diverse precursors and custom molecules that are difficult to detect. Multiple studies find significant associations between PFAS exposure and adverse immune outcomes in children. Dyslipidemia is the strongest metabolic outcome associated with PFAS exposure. Evidence for cancer is limited to manufacturing locations with extremely high exposures and insufficient data are available to characterize impacts of PFAS exposures on neurodevelopment. Preliminary evidence suggests significant health effects associated with exposures to emerging PFASs. Lessons learned from legacy PFASs indicate that limited data should not be used as a justification to delay risk mitigation actions for replacement PFASs.

Introduction

Poly- and perfluoroalkyl substances (PFASs) are a family of more than 4000 highly fluorinated aliphatic compounds manufactured for diverse applications [1]. They have been

widely used for their hydrophobic and oleophobic properties in consumer products such as disposable food packaging, cookware, outdoor gear, furniture, and carpet. They are also one of the main components (1–5% w/w) [2] of aqueous film forming foams (AFFF) used frequently at airports and military bases for firefighting and training activities [3]. AFFF contamination of groundwater is a major source of drinking water contamination and has been identified as a nationally significant challenge in countries such as the US and Sweden [4, 5]. Releases of PFASs to the environment can occur next to chemical manufacturing locations, at industrial sites where PFASs are used, and at various stages of product use and disposal. The carbon–fluorine bond in these compounds is extremely strong and thus many PFASs are not appreciably degraded under environmental conditions

Electronic supplementary material The online version of this article (<https://doi.org/10.1038/s41370-018-0094-1>) contains supplementary material, which is available to authorized users.

✉ Elsie M. Sunderland
ems@seas.harvard.edu

¹ Department of Environmental Health, Harvard T.H. Chan School of Public Health, Boston, MA, USA

² Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, MA, USA

[6]. This has resulted in their accumulation in the environment since the onset of production in the late 1940s [7].

International concern regarding potential health effects associated with PFAS exposure began in the early 2000s when perfluorooctanesulfonate (PFOS) was detected in the blood of polar bears in the Arctic and wildlife in other remote regions [8]. Early data on PFOS bioaccumulation in aquatic food webs indicated the propensity for human exposure to these compounds through seafood [9]. The U.S. Centers for Disease Control and Prevention (CDC) later reported these compounds are detectable in the blood of virtually all Americans (98%) [10–12]. Between 2000 and 2002, the main global manufacturer of PFASs (3M) voluntarily discontinued manufacturing of the parent chemical used to produce PFOS and its precursors [13]. The US introduced a variety of programs to curb the use of the most abundant environmental PFASs, including the PFOA Stewardship Program enacted in 2006 to end production of the longest chained compounds by 2015. PFOS was added to the Stockholm Convention's list of globally restricted Persistent Organic Pollutants (POPs) in 2009.

Human exposures to PFOS and PFOA have been declining in western countries and Japan over the last decade [14–16] due to these regulatory interventions while understanding of their adverse effects on human health has been rapidly advancing [17]. At the same time, a proliferation of new PFASs has been reported in the environmental literature as the industry has rapidly replaced PFOS and PFOA with shorter chain length PFASs and new chemicals that are difficult to detect using standard methods [3]. Emerging evidence from animal experiments suggests some of these alternative PFASs can be equally hazardous [18]. Environmental health scientists thus face a considerable challenge in understanding the relative importance of diverse exposure pathways to PFASs in different human populations and their potential effects on human health in a rapidly changing chemical landscape.

Here we review current understanding of: (1) the predominant exposure pathways for PFASs for different populations, (2) health impacts associated with exposure, and (3) critical research needs for the future. We focus on four health effects: cancer, immune effects, metabolic effects, and neurodevelopment. We use this review to summarize key knowledge gaps and future research needs.

PFAS nomenclature

All PFASs contain at least one perfluoroalkyl moiety (C_nF_{2n+1}) [19]. Fully fluorinated aliphatic carbon chains are known as perfluoroalkyl substances while those with the incomplete replacement of hydrogen atoms by fluorine are referred to as polyfluoroalkyl substances. Perfluoroalkyl

acids (PFAAs) include perfluoroalkyl carboxylic, sulfonic, phosphonic, and phosphinic acids, which are differentiated by their functional groups. Most research has focused on perfluoroalkyl carboxylic acids (PFCAs) and perfluoroalkyl sulfonic acids (PFSAs) with between four and sixteen (C_4 – C_{16}) carbons. Long-chain PFASs are defined as PFCAs with seven or more perfluorinated carbons and PFSAs with six or more perfluorinated carbons. The fluorinated carbon chain of these chemicals is both hydrophobic and oleophobic but the head group for many PFASs is easily deprotonated, resulting in high stability in solution. High water solubility of some PFASs has led to their accumulation in groundwater, rivers, and the ocean and contamination of drinking water resources, fish and marine mammals.

PFAA precursors, hereon referred to as “precursors”, are compounds that can biotically, and sometimes abiotically, degrade to PFAAs [6, 20]. Volatile precursors can be transported long distances in the atmosphere prior to deposition in regions remote from pollution sources [21, 22]. Precursors are often not measured during standard PFAA analysis, which can result in an underestimate of human exposure because they can be metabolized to terminal PFAAs in the human body [23, 24].

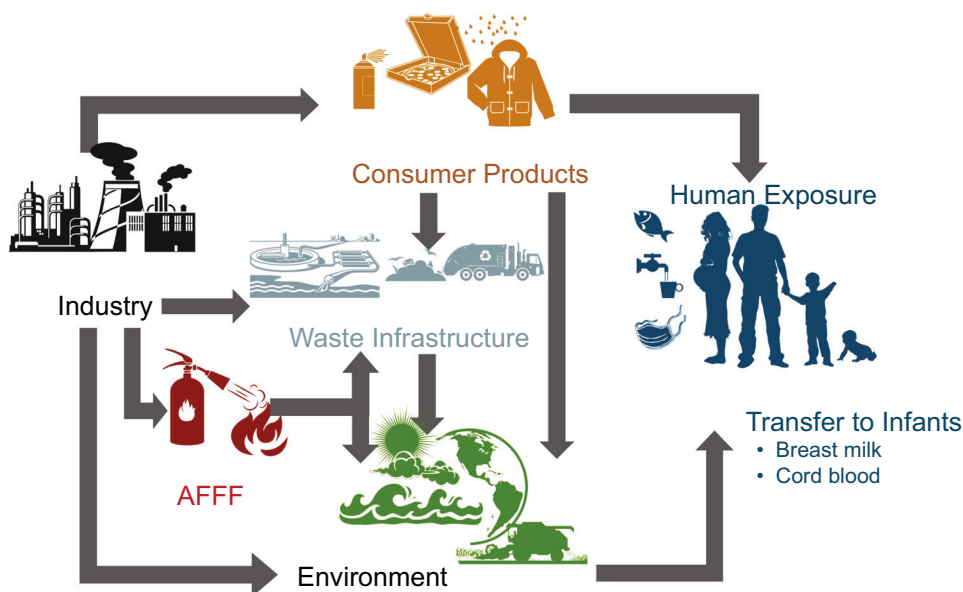
Human exposure pathways

Figure 1 provides an overview of the pathways for human exposure to PFASs. Human exposure to PFASs occurs through ingestion of contaminated drinking water and seafood, inhalation of indoor air, and contact with other contaminated media [25]. PFASs are often used for their “non-stick” and surface-tension lowering properties, which makes them useful for repelling oil and water (preventing stains) and modifying surface chemistry. The latter includes applications such as AFFF, processing aids for fluoropolymer manufacture, metal plating, and the production of semiconductors [26, 27]. Direct exposures due to use in products can be quickly phased out by shifts in chemical production but exposures driven by PFAS accumulation in the ocean and marine food chains and AFFF contamination of groundwater persist over long timescales [28, 29]. Understanding the relative importance of these different exposure pathways is thus critical for interpreting drivers of temporal differences in serum PFAS concentrations measured in biomonitoring studies [28, 30], and for anticipating future exposure risks.

Consumer products, indoor air, and dust

PFASs have been detected in jackets, upholstery, carpets, papers, building materials, food contact materials, impregnation agents, cleansers, polishes, paints, and ski waxes,

Fig. 1 Overview of PFAS exposure pathways for different human populations outside of occupational settings



among many other items commonly found in offices, households, and cars [31–40]. PFASs can migrate from fluorochemical-treated food contact papers into food-simulants such as butter, water, vinegar, and water/ethanol mixtures, indicating a direct exposure route to humans [36, 41, 42]. Dermal exposure to PFOS and PFOA from products is thought to be low [25]. In a study of 41 Norwegian women, Haug et al. [23] reported that food is typically the dominant exposure pathway, although the indoor environment (dust, air) could account for up to ~50% of the total PFAS intake.

Precursor compounds in many consumer products can be biotransformed in the human body to PFAAs, leading to additional uncertainty regarding the significance of exposures from this source [23, 24]. Inhalation of volatile precursors is known to occur and these precursors have been measured in indoor environments where PFAS containing products are used [43, 44]. The phase-out of PFOS and PFOA and their precursors has led to the increased production of short-chain compounds and structurally similar alternative compounds [3, 6], requiring a more holistic approach to determining human exposure from fluorinated compounds. To address this challenge, Robel et al. [32] measured total fluorine concentrations and determined the fraction of fluorine that can migrate from a select group of consumer products and is available for human exposure. The authors reported that typical measurement techniques for PFASs only account for up to 16% of the total fluorine measured using particle-induced gamma ray emission (PIGE) [32]. Additional research is thus needed to establish the link between the PFAS concentrations in products and the concentrations in dust, air, and food and their overall

contributions to human exposure in populations with diverse product use patterns.

Drinking water

Drinking water has been identified as a substantial source of PFAS exposure for many populations, particularly those living near contaminated sites [4, 5]. The United States Environmental Protection Agency (U.S. EPA) proposed a lifetime health advisory level for PFOS+PFOA of 70 ng/L in drinking water in 2016 [45]. In 2018, the Agency for Toxic Substances and Disease Registry (ATSDR) in the US further lowered the Minimum Risk Levels (MRLs) for PFOS and PFOA by approximately an order of magnitude compared to the reference dose (RfD) used by the U.S. EPA to develop the 2016 lifetime advisory [46]. Drinking water advisory levels corresponding to the MRLs used by ATSDR would be 11 ng/L for PFOA and 7 ng/L for PFOS. Some lifetime drinking water advisories proposed by other state and international agencies include up to 11 or 12 PFASs (Sweden and Denmark) and range from less than 10 ng/L up to hundreds to thousands of ng/L for different PFASs in Canada [47]. Notably, Grandjean and Budtz-Jørgensen [48] estimated the lifetime drinking water advisory level should be less than 1 ng/L based on the benchmark dose for immunotoxicity associated with PFAS exposure for children in the Faroe Islands.

Figure 2 shows the growth in the identification of sites contaminated by PFASs across the US between 1999 and 2017. PFAS contamination of drinking water was first reported in the US in public and private drinking water supplies near a fluoropolymer manufacturing facility in Washington, WV in 1999 [49]. The average PFOA

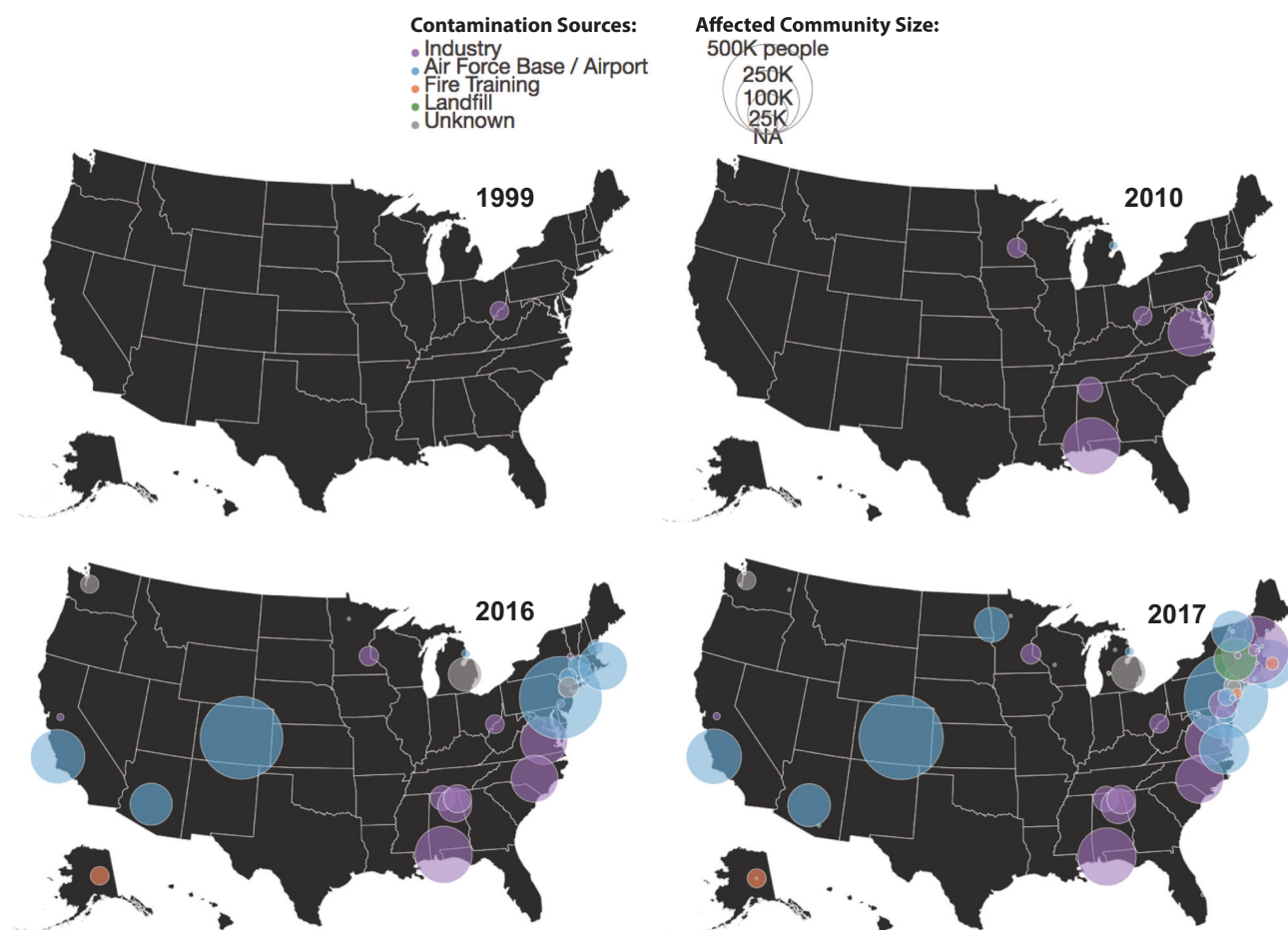


Fig. 2 Discovery of sites contaminated by PFASs leading to elevated concentrations in drinking water across the US. Figure adapted from data compiled by Northeastern University's Social Science

Environmental Health Research Institute (SSEHRI) that was last updated 12/17/17 [162]. Colors of circles represent different types of pollution source, and magnitudes indicate sizes of local communities

concentration of in one public water supply, the Little Hocking water system, was 3550 ng L^{-1} (range $1500\text{--}7200 \text{ ng L}^{-1}$) between 2002 and 2005. Drinking water contamination near a military base was first discovered in Michigan in 2010. Many additional cases of high concentrations of PFASs in finished drinking water across the US have since been reported (Fig. 2).

Most of these cases focus on single communities or small areas with a known point source of contamination. The first statewide study of PFAS occurrence in the US drinking water was conducted by New Jersey, where PFOA was detected in 59% of the public water supplies and maximum concentrations reached 190 ng L^{-1} [50]. The first nationwide occurrence survey of PFASs in public water supplies was conducted between 2013 and 2015 by the U.S. EPA under the third Unregulated Contaminant Monitoring Rule (UMCR3) [51]. Hu et al. [4] noted that drinking water concentrations of PFOS and/or PFOA exceeding the U.S. EPA 2016 health advisory levels were detected in large public water supplies serving approximately six million Americans. Further, there are no data for approximately 100

million Americans who obtain their water from small public water supplies serving less than 10,000 individuals and private wells, representing a critical research need for the future.

Following the shift in PFAS production away from PFOS, PFOA and their precursors, different PFASs may now be accumulating in drinking water and become relevant for human exposure. Newer PFASs, such as GenX, have been detected at high concentration (hundreds of ng L^{-1}) in the Cape Fear River watershed in North Carolina, downstream of a PFAS manufacturing plant [52]. The large-scale implications of such findings have yet to be evaluated and knowledge of the international significance of drinking water contamination by PFASs continues to advance at a rapid pace.

Seafood

Elevated serum concentrations of PFASs have been reported for a number of seafood consuming populations, including Inuit men in Greenland who frequently consume

seafood and marine mammals [53], whaling men in the Faroe Islands [54], and commercial fishery employees in China [55]. Seafood PFAS concentrations vary considerably with highest concentrations measured next to contaminated sites [56, 57]. Environmental concentrations of long-chain compounds appear to be the main driver of variability in tissue concentrations across sites and species [56, 58, 59]. Long-chained compounds and PFASs bioaccumulate to a greater degree than shorter chain length compounds and PFCAs [60, 61]. However, early studies of bioaccumulation potential were based on assays designed for highly lipophilic substances and therefore do not provide comprehensive information on all PFASs presently in use [58].

There is considerable variability in the contribution of seafood to the overall exposure of humans to PFASs. Cooking has been shown to reduce concentrations of some PFASs such as PFOS [59]. Christensen et al. [62] found higher concentrations of serum PFASs among high-frequency fish consumers in the U.S. National Health and Nutrition Exam Survey between 2007 and 2014. The European Food Safety Authority (EFSA) recently estimated that “fish and other seafood” account for up to 86% of dietary PFAS exposure in adults [57]. Hu et al. [63] showed that the presence of elevated serum concentrations of PFASs with $C \geq 9$ chain-length in humans is useful for identifying when seafood is a dominant exposure source. Birth cohort data from the Faroe Islands confirmed this observation by showing strong associations between serum concentrations of perfluoroundecanoic acid (PFUnDA, C11) and hair mercury concentrations, which are a strong tracer of seafood consumption [30]. Concentrations of legacy PFASs in marine biota have lagged shifts in production away from these compounds, resulting in increased significance of seafood as an exposure source [30].

Biosolids and agriculture

Many PFASs used in products or in industry enter the waste stream and are channeled to wastewater treatment plants. Wastewater treatment plants themselves are thus point sources for PFAS pollution [57]. The presence of greater than three treatment plants within a catchment has been associated with increased likelihood of PFAS detection in drinking water [4]. Data on the full suite of PFASs present in wastewater plumes are limited and this is expected to change temporally as chemical production and use in products shifts.

Figure 3 shows temporal changes in catchment level discharges of PFOS from wastewater treatment plants across the US between 1995 and 2005 [29]. PFOS discharges were modeled based on wastewater flow rates ($\text{m}^3 \text{ day}^{-1}$) from the Clean Watersheds Needs Survey (CWNS)

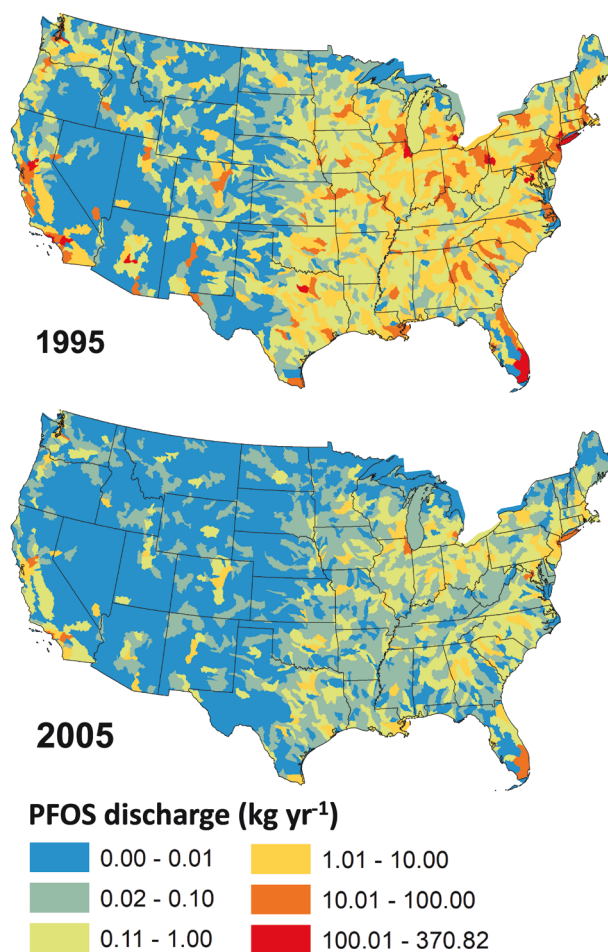


Fig. 3 PFOS discharges from wastewater treatment plants into streams and rivers across the US in 1995 and 2005. Adapted from data presented in Zhang et al. [29] and PFOS production estimates Wang et al. [166]

2008 Report to Congress and an empirical relationship between population served by wastewater treatment plants and PFOS concentrations, as described in Zhang et al. [29]. Higher levels of PFOS discharges from wastewater treatment plants are apparent in 1995 prior to the phase-out between 2000 and 2002 [26, 29]. Discharges from wastewater enter regional river networks and ultimately result in large inputs to marine ecosystems as the terminal sink. For PFOS, wastewater was thought to account for approximately 85% of releases on a continental scale, while industrial sites can be most significant at the local scale [64, 65].

Sewage sludge from wastewater treatment plants is often used for fertilizer in agriculture, presenting another potential vector for human exposure. Several studies have detected PFASs in such biosolids [66–68]. The 2001 U.S. EPA National Sewage Sludge Survey suggested that the load of PFASs in the US biosolids was $2749\text{--}3450 \text{ kg year}^{-1}$ based on the 13 PFASs measured. Of this total US load, an estimated $1375\text{--}2070 \text{ kg year}^{-1}$ was applied for agriculture and

467–587 kg year⁻¹ was transported to landfills [68]. Several studies have also investigated the uptake of PFASs into crops and earthworms from biosolids application [69–71]. In one study, concentration factors for roots relative to soil up to 4.7 and 10.3 were found for PFOS and PFOA, respectively, and all seven plants investigated displayed root concentration factors greater than one [71]. Elevated PFAS concentrations in meat and dairy products have also been reported [57, 72], suggesting PFAS uptake from biosolids contaminated agriculture is a source of dietary exposure for farm animals. Additional research on the significance of human exposures to PFASs originating from biosolids and agriculture is needed.

Approaches for quantifying exposure sources

Table 1 presents some literature estimates of source contributions to overall PFAS exposures for adults. There is general agreement that dietary intake is the largest source of PFAS exposure rather than inhalation or dermal contact. However, the relative importance of different source categories varies dramatically across demographic groups and populations (Table 1). Next to contaminated sites, drinking water has been reported to account for up to 75% of total PFAS exposure [73, 74]. Using a compilation of numerous

food samples, dietary survey data and toxicokinetic modeling, EFSA estimated that fish and other seafood dominate the chronic dietary exposure of adults to PFOS (up to 86% of total exposure). For the elderly, EFSA estimated meat and meat products account for up to 52% of PFOS exposure, while eggs and egg products account for up to 42% of infant exposure [57]. For PFOA, EFSA suggested the most important sources of chronic exposure were milk and dairy products for toddlers (up to 86% of exposure), drinking water (up to 60% for infants), and fish and other seafood (up to 56% in elderly).

Human exposures to PFASs (blood PFAS concentrations) are typically estimated using data on measured concentrations in exposure media, contact frequency, and toxicokinetic parameters [23, 25, 74–76]. The reliability of this approach depends on the accuracy of data needed to convert an external dose to internal concentrations. Many of these parameters for PFASs are poorly understood or hard to measure, resulting in large uncertainties about exposure sources (Table 1). For example, Vestergren and Cousins [74] relied on exposure estimates from multiple geographic regions to estimate total PFAS intake from the combination of dietary sources (German data), dust (data from the US and Spain) and inhalation (northwest Europe). Trudel et al. [25] tested a series of scenarios for chemical concentrations and contact frequencies across populations in Europe and

Table 1 Literature estimates of sources contributions (%) to adult PFAS exposures

PFAS	Diet	Dust	Tap water	Food Pkg.	Inhalation	Dermal	Other	Reference
PFOA	16	11		56	14		2 ^a	Trudel et al. [25]
PFOA	85	6	1	3 ^b			4 ^c	Vestergren and Cousins [74]
PFOA	77	8	11		4			Haug et al. [23]
PFOA	66	9	24		<1	<1		Lorber and Egeghy [76]
PFOA	41		37				22 ^d	Tian et al. [163]
PFOA	99		<1					Shan et al. [164]
PFOS	66	10	7		2		16 ^d	Gebbink et al. [165]
PFOS	72	6	22		<1	<1		Egeghy and Lorber [75]
PFOS	96	1	1		2			Haug et al. [23]
PFOS	81	15					4 ^a	Trudel et al. [25]
PFOS	93		4				3 ^d	Tian et al. [163]
PFOS	100		<1					Shan et al. [164]
PFBA		4	96					Gebbink et al. [165]
PFHxA	38	4	38		8		12 ^d	Gebbink et al. [165]
PFOA	47	8	12		6		27 ^d	Gebbink et al. [165]
PFDA	51	2	4		15		28 ^d	Gebbink et al. [165]
PFDoDA	86	2	2		4		5 ^d	Gebbink et al. [165]

^aCarpet

^bConsumer goods

^cPrecursors

^dIndirect

North America and found plausible ranges in PFAS exposures spanned two orders of magnitude.

Uncertainty in such estimates motivates an alternative solution that uses measured serum concentrations to identify predominant exposure sources. The ratio between two chemical homologues and the correlation among multiple chemical homologues in environmental samples, including human serum, contains information on their origin. This process is referred to as “chemometrics” and has been applied to polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) [77, 78]. Applying such techniques to PFASs is complicated by dramatic shifts in production over time and the complex metabolism of PFAS precursors. In prior work, researchers have used PFAS isomer profiles to assess the relative contributions from electrochemical fluorination (ECF) and telomere manufacturing to measured PFOA concentrations in the environment [79, 80]. Zhang et al. [81] showed that the measured PFAS composition in surface water provides useful information on sources of environmental pollution. Hu et al. [63] extended this approach to human biomarkers by comparing human serum samples collected at similar time periods and controlling for physiological differences. Using cohort data from the Faroe Islands and the U.S. National Health and Nutrition Examination Survey (NHANES), the authors showed that elevated C9–C12 PFCAs were associated with predominant exposures through seafood consumption. Further, PFHxS and N-EtFOSAA were linked to exposure from consumer products such as carpet and food packaging [63].

Serum samples are routinely collected during epidemiological studies, but environmental samples pertinent to multiple exposure pathways such as drinking water, diet, air, and dust samples are not [82]. Information on contact frequency is often collected using self-reported questionnaires with known recall bias [83]. In addition, there are limited data on chemical half-lives in the human body ($t_{1/2}$) and distribution volumes (V_D) for PFASs other than PFOS, PFOA, and PFHxS. This means that traditional exposure modeling is limited to only a few relatively well-characterized individual PFASs and cannot be easily applied to the PFAS mixtures that are more relevant for human exposures.

The results presented in Hu et al. [63] are mostly qualitative and cannot quantify the percentage of PFAS exposure from different exposure pathways. This preliminary approach can be enhanced by expanding the list of PFAS analytes. Regular epidemiological studies usually report six legacy PFASs (branched and linear PFOS, PFOA, PFHxS, PFNA, PFDA) but exposure analyses would be enhanced by including additional PFASs that are increasingly relevant to current production patterns. In addition, a total mass balance is needed to provide quantitative assessments of the

relative importance of different exposure sources [84]. Routine measurements of extractable organic fluorine (EOF) in human sera would thus complement data on individual PFASs and allow such quantitative inferences from the chemometric approach [85, 86].

Temporal trends in human exposure to PFASs

The presence of organic fluorine in human blood was first detected by Taves [87] in the 1960s. Data on specific forms of organic fluorine such as PFOS and PFOA in human sera were not published until 1990 [88]. Grandjean [89] pointed out that there has been a lag of more than two decades between industry information on exposures and health effects of PFASs and academic research and regulatory action.

Declines in serum concentrations of PFASs following the phase-out in the production of the parent chemical to PFOS and its precursors between 2000 and 2002 have been reported across diverse populations worldwide and provide a success story for the effectiveness of industrial shifts and regulatory actions. These include children from the Faroe Islands [30] and the eastern US [90], adult women from the western US [91] and Sweden [92], the general Australian population [93], and Norwegian men [94]. However, declines in PFOS and PFOA have primarily driven decreasing legacy PFAS concentrations. Concentrations of total PFASs or EOF in human serum that include newer PFASs in production and precursors have not been measured for most populations. One study that examined EOF in human serum in China found the legacy PFASs measured in standard epidemiologic studies only comprised between 30 and 70% of the total fluorine [95]. These results suggest unquantified PFASs may be exhibiting different trends than legacy compounds.

Following the phase-outs in use of PFOS and PFOA in many products, C6-based fluorocarbons (including perfluorohexanesulfonic acid: PFHxS and perfluorohexanoic acid: PFHxA) were used as an initial replacement [96, 97]. Concentrations of PFHxS and PFCAs with 9–14 carbons in human serum have not decreased concomitantly with PFOS, PFOA and their precursors. No change and some increases in exposures to these compounds have been observed across populations. For example, significant increases in PFNA, PFDA, and PFUnDA and no change in PFHxS was observed in Swedish and Danish women through 2015 [92, 98]. Blood concentrations of PFNA, PFDA, PFUnDA, and PFDoDA from multiple countries show no significant change [13]. Similarly, PFHxS concentrations in the blood of Mexican American NHANES participants showed no

significant trend between 1999 and 2004 and increased from 2005 to 2008 [12, 99].

Increasing trends in concentrations of PFHxS and long-chain PFCAs are noteworthy since they significantly contribute to the overall body burden of PFASs and have longer half-lives than both PFOS and PFOA. Additionally, exposures to the C9–C11 PFCAs for some individuals are primarily from seafood consumption [30, 62, 63]. C9–C11 PFCAs exhibit different temporal patterns than PFOS and PFOA. They are bioaccumulative and concentrations in some seafood have been increasing, as discussed in Das-suncao et al. [30]. This suggests that while exposures to PFOS and PFOA have been successfully reduced by product phase-outs for many populations, exposures to C9–C11 PFCAs have not followed the same trends.

Health effects associated with exposure to PFASs

The 3M Company was the major global manufacturer of PFASs in the 1990s and conducted most of the early studies on the health effects of PFAS exposures in animals and humans [26, 100]. Many of these studies were not published in the peer-reviewed literature but can be found in the U.S. EPA public docket AR-226, and are reviewed in the section below.

Early industry studies

Before 1980, 3M conducted multiple studies of acute animal toxicity associated with exposure to legacy PFASs [101]. Serum PFAS concentrations measured as organic fluorine in 3M workers were ten times higher than the general population in 1980 [102]. Shortly after this, 3M carried out a series of subacute and chronic studies in various animal models such as rats, mice, and monkeys [103–105]. Results showed N-ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE) was carcinogenic in rats after a 2-year chronic study concluded in 1988. However, the results were first misinterpreted as a null finding and only corrected a decade later [106, 107]. In a 90-day rhesus monkey study, all monkeys in all treatment groups died after 20 days and the study had to be aborted [104]. In later monkey studies with lower doses, reductions in total cholesterol, increased liver weight, and toxicity on the reticuloendothelial system (immune system) were observed [103].

Health surveillance of 3M workers produced inconsistent results, mainly due to small sample sizes and a scenario known in epidemiology literature as the “healthy worker effect” [108]. A doctoral thesis that focused on a cohort of 3M workers reported in 1992 that PFOA exposure may significantly alter male reproductive hormones and

leukocyte counts [109]. Later investigations published by 3M did not find the same associations [110]. Differences between these findings may be caused by the exposure assessment methods used: Gilliland [109] measured serum total organic fluorine while Olsen [110] measured serum PFOA concentrations. This suggests adverse effects observed in Gilliland’s work [109] may have result from exposures to fluorochemicals other than PFOA.

Academic studies

Most academic research on PFASs was initiated in the early 2000s after the voluntary phase-out in the production of the parent chemical to PFOS and its precursors by 3M, the major global manufacturer at the time. Results from experimental studies in rodents can be challenging to translate directly to human health impacts because of differences in peroxisome proliferation expression, which is one of the main mechanisms of PFASs toxicity [111]. The most comprehensive longitudinal evidence for adverse health effects associated with PFAS exposure (C8 Health Project) is from the population living near the West Virginia DuPont Washington Works fluorotelomer plant. Probable links between PFOA exposure and six diseases have been identified: high cholesterol, thyroid disease, pregnancy-induced hypertension, ulcerative colitis, and kidney and testicular cancer [112–115].

Children may be more vulnerable to PFAS exposures because they often have higher body burdens than adults and are going through sensitive windows for development. A recent systematic review of the children’s health literature identified positive associations between PFAS exposures and dyslipidemia, immunity, renal function, and age at menarche [116]. Some health effects such as immunotoxicity can be detected at lower exposure levels than others. For example, Grandjean et al. [117] examined the impact of serum PFAS concentrations on serum antibody production in children at ages 5 and 7 years following routine vaccinations for tetanus and diphtheria. A doubling of serum PFOS, PFOA, and PFHxS concentrations at age 5 was associated with a 50% decline in antibody concentrations at age 7. If this effect is causal, average serum concentrations in the general population of most countries with biomonitoring data greatly exceed the benchmark doses of 1.3 ng/mL for PFOS and 0.3 ng/mL for PFOA calculated based on immunotoxicity in children [48].

Cancer

Numerous studies have investigated PFAS carcinogenicity, mainly focusing on PFOA and PFOS. PFHxA is the only other PFAS that has been investigated in an animal study and null findings were reported [118]. Human studies for

PFOS and PFOA include chemical workers, communities with contaminated drinking water, and the general population. A 3.3-fold increase (95% CI, 1.02–10.6) in prostate cancer mortality was reported for each month spent in the chemical division with PFOA production was observed among occupationally exposed workers, but the number of cases was small [119]. Later data from this occupational cohort did not support an association between occupational exposure and cancer mortality or incidence [120]. The strongest evidence for increased cancer risk has been reported by studies among community members whose drinking water was contaminated by PFOA. Barry et al. [112] and Vieira et al. [121] showed a positive association between PFOA levels and kidney and testicular cancers among participants in the C8 Health Project. These studies form the foundation of the overall conclusion from the C8 Health Project. Results among studies conducted in general population are inconsistent. Eriksen et al. [122] were the first to examine PFOA exposure and cancer in the general population and they did not find an association between plasma PFOA or PFOS concentration and prostate, bladder, pancreatic, or liver cancer. The International Agency for Research on Cancer (IARC) classified PFOA as a possibly carcinogenic to humans (Group 2B). No IARC evaluation is available for PFOS.

Immune effects

Immunotoxicity of PFASs has been demonstrated in multiple animal models, including rodents, birds, reptiles and other mammalian and non-mammalian wildlife. Epidemiological data is relatively sparse but mounting evidence suggests that the immunotoxic effects in laboratory animal

models occur at serum concentrations that are comparable to body burden of highly exposed humans and wildlife [123].

Table 2 shows findings from a review of 25 epidemiological studies published between 2008 and 2018. Cohort data were from China, Denmark, the Faroe Islands, Japan, Norway, Taiwan, and the US and 14 out of the 25 studies reviewed were longitudinal. Two studies focused on occupational exposures and the remaining 23 were based on environmental exposures. Infants and children were the most studied demographic group for this health endpoint and accounted for 16 out of the 25 studies. Three studies considered data from teenagers in the U.S. NHANES survey. Six studies were based on either residents or workers from the C8 health project near a fluorotelomer plant in West Virginia. One study examined a group of healthy adults who received vaccination. Serum PFAS concentration measurements were the most widely used exposure assessment method, accounting for 22 out of 25 studies. Four studies from the C8 health project used job-exposure matrix or residential history to estimate lifetime cumulative exposures.

The health outcomes related to PFAS immunotoxicity include both molecular-level (i.e., antibody concentrations) and organ/system-level (i.e., infection of the respiratory system). In general, more consistent results across different studies were reported for molecular-level health endpoints such as vaccine antibody or other immune markers such as immunoglobulin (Table 1).

Five studies examined the association between PFAS exposure and suppression of antibody response to vaccination among children, adolescents or adults. Four out of the five found statistically significant associations between

Table 2 Summary of the epidemiologic literature on PFAS exposures and metabolic outcomes

Outcome	# of total studies	# of studies by results				Other PFASs
		PFOA	PFNA	PFHxS	PFOS	
Lipid profile ^a	39	21/10/1 ^b	8/1/2	4/4/2	20/9/3	Inconsistent results for PFDA, PFUnDA, PFTeDA
Insulin resistance and diabetes	18	6/9/1	3/5/0	1/2/1	7/4/1	Mostly null for PFDA, PFUnDA, PFDoDA, N-EtFOSAA, N-MeFOSAA; One positive finding for PFDoDA and insulin resistance
Hypertension, vascular disease and stroke	10	3/5/1	3/0/1	0/3/1	1/3/1	Only one study reported null for PFDA and PFUnDA
Thyroid disease	8	4/3/0	1/2/0	1/2/0	1/3/0	Positive finding for PFDA and PFUnDA in two studies. Null for PFTeDA
Cardiovascular disease	6	1/4/1	1/0/0	0/1/0	0/1/0	No other PFASs have been investigated
Uric acid	5	4/0/0	0/0/0	0/1/0	2/2/0	No other PFASs have been investigated
Overweight and obese	4	1/3/0	1/1/0	1/1/0	3/1/0	Positive finding for PFDA in only one study (Liu et al. [134])

Details of the studies examined are provided in the Supporting Information Table S1

^aLipid profile includes low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), total cholesterol, and triglycerides

^bNumber of studies with adverse/null/protective results

higher PFAS exposure and suppressed immune response. Grandjean et al. [117] were the first to link PFAS exposure in children to deficits in immune function. The authors reported a 2-fold increase of major PFASs in child serum was associated with a -49% (95% confidence interval (CI), -67% to -23%) decline in tetanus and diphtheria antibody concentrations. This effect size is larger than later studies and can be attributed to different exposure levels, different vaccine strains, and different times elapsed since vaccination (peak antibodies vs. residual antibodies). Other studies have not examined tetanus and diphtheria, but similar associations have been found in PFAS exposure and other childhood vaccinations such as rubella and mumps [124, 125], and adult influenza vaccination such as FluMist [126] and anti-H3N2 [127].

Five out of seven studies that examined associations between PFAS exposure and immune markers found statistically significant evidence of immunosuppression. The strongest evidence has been generated for PFOA and PFOS with limited data for other PFASs. One example for other PFASs is from a case-control study in Taiwan [128] that reported that among children with asthma, nine out of the ten PFASs evaluated were positively associated with at least two of the three immunological biomarkers (immunoglobulin E (IgE), absolute eosinophil counts (AEC), and eosinophilic cationic protein (ECP)). However, this study did not account for the fact that multiple PFASs serum concentrations are positively correlated and therefore did not distinguish whether all PFASs or a subset of PFASs were associated with immune suppression.

Results with organ/system-level outcomes such as asthma, infection, and allergies are more inconsistent. Slightly more than half of the studies on asthma and infection show statistically significant results. Similar to the molecular-level outcomes, stronger evidence has been established for PFOS and PFOA than other more minor PFASs. Buser et al. [129] found serum levels of PFASs were associated with higher odds of self-reported food allergies among teenagers in NHANES 2007–2010. This is the only study out of the six studies reviewed with a statistically significant finding, but the cross-sectional design of this study necessitates further investigation using longitudinal studies. Existing studies have limitations such as outcome measurement error. For example, some studies measure asthma using a self-reported questionnaire but did not validate these data with medical records. Some studies used hospitalization due to infection as an outcome but hospitalization may not be necessary for most infections. In addition, since infection and allergy be caused by food and airborne allergens, it is challenging to identify the contribution of PFAS exposures in a low signal-to-noise setting.

Metabolic effects

We reviewed 69 epidemiological studies published between 1996 and 2018 based on human populations in Australia, Canada, China, several European countries, Japan, South Korea, Taiwan, UK, and the US. We identified 26 out of 69 studies as longitudinal and 59 out of 69 studies were based on environmental exposures. Diverse demographic groups have been studied for this health endpoint, including infants, mother–child pairs, children, teenagers, adults, workers, and special subpopulations such as diabetic patients and obese individuals in randomized clinical trials. Measured serum PFAS concentrations were the most widely used exposure assessment method (65 out of 69 studies). Two occupational studies used job-exposure matrix and work history to estimate lifetime cumulative exposures. Gilliland [130] was the earliest study and used total serum fluorine to quantify the exposure. Only one study [131] examined the different isomers of PFOA and PFOS (linear vs. branched) using data from NHANES 2013–2014.

There is relatively consistent evidence of modest positive associations with lipid profiles such as total cholesterol and triglycerides, although the magnitude of the cholesterol effect is inconsistent across different exposure levels. There is some but much less consistent evidence of a modest positive correlation with metabolic diseases such as diabetes, overweight, obesity, and heart diseases (Table 3). The majority of studies are cross-sectional, which have limited causal interpretation [132]. A few studies provided stronger evidence than observational studies, such as Diabetes Prevention Program Trial [133] and a diet-induced weight-loss trial [134].

The majority of the studies examined found associations between elevated serum PFASs and detrimental lipid profiles, such as elevated total cholesterol and low-density lipoprotein cholesterol (LDL-C), or reduced high-density lipoprotein cholesterol (HDL-C). PFOS and PFOA exhibit the most consistent finding across studies. The effect size varies across studies, which can be a result of different exposure levels. Increases in serum PFOA and PFOS from the lowest to the highest quintiles among children in C8 health project was associated with 4.6 and 8.5 mg/dL total cholesterol (reference level for children is <170 mg/dL) [135]. Among NHANES 2003–2004 participants, increases in serum PFOA and PFOS from the lowest to the highest quartiles were associated with 9.8 and 13.4 mg/dL total cholesterol (reference level for adults is <200 mg/dL) [136]. Maisonet et al. [137] reported a non-linear relationship between prenatal PFOA concentrations and total cholesterol at ages 7 and 15 of the child.

Eighteen studies have examined the associations between PFAS exposures and glucose metabolism, insulin resistance, and diabetes. Overall the results across different

Table 3 Summary of the epidemiologic literature on PFAS exposures and immunotoxicity

Outcome	# of total studies	# of significant studies	# of significant studies by each PFAS
Vaccine antibody	5	4	Mixture: 1; PFOA: 2; PFNA: 1; PFHxS: 1; PFOS: 2
Immune markers	7	5	PFHpA: 1; PFOA: 5; PFNA: 2; PFDA: 1; PFTeDA: 1; PFDoA: 1; PFBS: 1; PFHxS: 2; PFOS: 4
Asthma and biomarker of asthma	9	5	PFHpA: 1; PFOA: 5; PFNA: 3; PFDA: 3; PFDoDA: 1; PFBS: 1; PFHxS: 2; PFOS: 4
Infection and other autoimmune diseases	13	8	PFOA: 6; PFOS: 4; PFDA: 1; PFDoDA: 1; PFNA: 2; PFUnDA: 1; PFHxS: 1; PFOSA: 1
Allergy	6	1	PFOA: 1; PFHxS: 1; PFOS: 1

Details of the studies examined are provided in the Supporting Information Table S2

studies are inconclusive. Lin et al. [138] were the first to report a positive association between serum PFAS concentrations and glucose homeostasis among adults and adolescents in NHANES. They reported a considerable effective size—doubling serum PFNA concentrations was associated with hyperglycemia odds ratio (OR) of 3.16 (95% CI 1.39–7.16). Later studies tend to report smaller effect sizes. Exposure during pregnancy may affect the mother and child during gestation and later in life. In a small pregnancy cohort in the US, each standard deviation of increase in PFOA was associated with a 1.87-fold increase of gestational diabetes risk (95% CI 1.14–3.02) [139]. In a larger Spanish cohort, a null result was reported for PFOA, but PFOS, PFHxS, and gestational diabetes had positive associations: OR per log10-unit increase = 1.99 (95% CI: 1.06, 3.78) and OR = 1.65 (95% CI: 0.99, 2.76), respectively [140].

Results for hypertension and other vascular diseases including stroke are also inconsistent. Two of the earliest studies examined the relationship between PFAS exposure and hypertension among NHANES and found different results for children and adults. Adjusted OR = 2.62 for hypertension comparing 80th vs. 20th percentiles serum PFOA among NHANES adults in the US [141], while among children a null finding was reported [142]. In some later cohort studies, null results and even protective effects associated with PFAS exposure and hypertension were reported [143, 144]. A cross-sectional study on carotid artery intima-media thickness in adolescents reported increased risks with an increase in plasma PFOS [145]. However, a more recent study on artery stiffness found protective effects of PFOA and PFNA among children and adolescents enrolled in the World Trade Center Health Registry [146].

Other metabolic endpoints include thyroid disease (which could also be considered an endpoint for endocrine disruption), cardiovascular diseases, uric acid metabolism, and body weight. Except for uric acid metabolism, most results are inconclusive. An increase in hyperuricemia risks and PFOA exposure was observed in all four studies (two from NHANES and two from C8 Health Project).

In summary, the strongest evidence for a relationship between PFAS exposure and metabolic outcome is in the area of dyslipidemia. Animal studies have found decreases in serum cholesterol levels associated with increased PFAS exposures, which contradicts epidemiological findings. The difference may lie in different levels of expression for nuclear receptors involved in the toxicological pathway, such as peroxisome proliferator-activated receptor (PPAR)-alpha. It may also be related to differences in exposure levels. Dietary factors can influence metabolic outcomes [147], introducing bias into observed relationships if not controlled for properly. Explanations for null findings

include healthy worker effects and non-linear relationships, such as decreasing slopes as exposure increases (log-linear relationships) [148].

Neurodevelopmental effects

In vitro studies suggest PFOS can trigger the “opening” of tight junction in brain endothelial cells and increase the permeability of the blood brain barrier [149]. There has therefore been some interest in investigating the neurotoxic effects associated with PFAS exposures. In laboratory animals, it has been reported that PFOS, PFOA, and PFHxS exposures during the peak time of rapid brain growth in mice resulted in an inability to habituate in the unfamiliar environment [150]. Liew et al. [151] reviewed 21 epidemiological studies in 2018 and concluded that evidence is mixed regarding neurodevelopmental effects of PFAS exposures. Health outcomes examined included developmental milestones in infancy, attention-deficit/hyperactivity disorder (ADHD) and behaviors in childhood, and neuropsychological functions such as IQ and other scales or scores. Neurodevelopmental trajectories are highly complicated and there is great heterogeneity in the instruments and methods to evaluate neurodevelopmental endpoints. Additional research is needed to establish a link between neurodevelopmental outcomes and PFAS exposures.

Future directions

Challenges associated with quantifying the full-diversity of individual PFASs present in environmental samples and a paucity of toxicity data highlight the need for data and tools to better understand new and emerging fluorinated compounds. EOF provides an estimate of all combustible organofluorine compounds present and provides a proxy measure for unquantified PFASs [86]. Yeung and Mabury [152] reported that quantifiable PFASs accounted for 52–100% of EOF in human plasma samples collected between 1982 and 2009 in two German cities. The amount and proportion of unidentified organofluorine in human plasma increased after 2000 in one city. This study hypothesized that humans are exposed to many new and unidentified organofluorine compounds, which is consistent with the environmental exposure literature [3, 74, 153, 154].

The toxicity of new and emerging PFASs for ecosystems and humans is poorly understood. This is problematic because in communities with high concentrations of alternative PFASs, the magnitude of potential health impacts associated with exposures has not been quantified and such information is generally considered necessary to engage in risk mitigation actions. Chemical manufacturers have claimed that replacement PFASs are not associated with

adverse health effects and that shorter-chain homologues with shorter half-lives in the human body are not likely to bioaccumulate [155, 156]. However, ongoing work suggests shorter chain compounds have a higher potential to interact with biomolecules due to less steric hindrance than the longer chain homologues [157, 158]. For example, fluorinated carbon chains in perfluoroalkyl ether carboxylic acids (PFECAs), an important new class of PFASs, are broken into shorter units by the insertion of oxygen molecules that are thought to make them more reactive [159]. One known PFOA alternative is the ammonium salt of perfluoro-2-propoxypropanoic acid, a PFECA that has been produced since 2010 with the trade name “GenX” [160]. A recent hazard assessment based on the internal dose of GenX suggests it has higher toxicity than PFOA after accounting for toxicokinetic differences [18]. The extreme environmental persistence, bioaccumulation, and potential toxicity of the entire class of PFASs has led some researchers to question the use of any highly fluorinated chemicals and call for a class approach in managing them [161].

In summary, additional research is needed to better understand the exposure pathways and health outcomes associated with emerging PFASs and to understand the timescales of exposures to legacy PFASs associated with drinking water and seafood contamination. Risk mitigation measures require new technology for reducing PFAS concentrations at contaminated sites and in drinking water supplies. Delayed action on legacy PFASs has resulted in widespread human exposures and risks and lessons should be learned from this example and not repeated for the newer PFASs entering the market [89]. Although additional data are needed to understand the full extent of impacts of PFAS exposures on human health, particularly at sensitive life stages, we assert that this should not be used as a justification for delaying risk mitigation actions. The phase-out in PFOS and its precursors between 2000 and 2002 was extremely effective at rapidly reducing exposures of humans and wildlife globally to these compounds and provides an example of the potential benefits from the coordinated global action.

Acknowledgements Financial support for this work was provided by the NIH Superfund Research Program P42ES027706 and the Harvard National Institute of Environmental Health and Sciences (NIEHS) Center Grant (P30 ES000002).

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. OECD (The Organisation for Economic Co-operation and Development). Toward a new comprehensive global database of per- and polyfluoroalkyl substances (PFASs): summary report on updating the OECD 2007 list of per and polyfluoroalkyl substances (PFASs); 2018.
2. Vecitis CD, Wang Y, Cheng J, Park H, Mader BT, Hoffmann MR. Sonochemical degradation of perfluorooctane sulfonate in aqueous film-forming foams. *Environ Sci Technol*. 2010;44:432–8.
3. Wang Z, DeWitt JC, Higgins CP, Cousins ITA. Never-ending story of per- and polyfluoroalkyl substances (PFASs)? *Environ Sci Technol*. 2017;51:2508–18.
4. Hu XC, Andrews DQ, Lindstrom AB, Bruton TA, Schaidler LA, Grandjean P, et al. Detection of poly- and perfluoroalkyl substances (PFASs) in U.S. drinking water linked to industrial sites, military fire training areas, and wastewater treatment plants. *Environ Sci Technol Lett*. 2016;3:344–50.
5. Banzhaf S, Filipovic M, Lewis J, Sparrenbom C, Barthel R. A review of contamination of surface-, ground, and drinking water in Sweden by perfluoroalkyl and polyfluoroalkyl substances (PFASs). *Ambio*. 2017;46:335–46.
6. Wang Z, Cousins IT, Scheringer M, Hungerbuehler K. Hazard assessment of fluorinated alternatives to long-chain perfluoroalkyl acids (PFAAs) and their precursors: status quo, ongoing challenges and possible solutions. *Environ Int*. 2015;75:172–9.
7. Armitage J, Cousins IT, Buck RC, Prevedouros K, Russell MH, MacLeod M, et al. Modeling global-scale fate and transport of perfluorooctanoate emitted from direct sources. *Environ Sci Technol*. 2006;40:6969–75.
8. Giesy J, Kannan K. Global distribution of perfluorooctane sulfonate in wildlife. *Environ Sci Technol*. 2001;35:1339–42.
9. Tomy G, Budakowski W, Halldorson T, Helm P, Stern G, Friesent K, et al. Fluorinated organic compounds in an eastern Arctic marine food web. *Environ Sci Technol*. 2004;38:6475–81.
10. Lewis RC, Johns LE, Meeker JD. Serum biomarkers of exposure to perfluoroalkyl substances in relation to serum testosterone and measures of thyroid function among adults and adolescents from NHANES 2011–2012. *Int J Environ Res Public Health*. 2015;12:6098–114.
11. CDC. Fourth national report on human exposure to environmental chemicals. Atlanta: Centers for Disease Control and Prevention; 2015.
12. Calafat AM, Wong L-Y, Kuklenyik Z, Reidy JA, Needham LL. Polyfluoroalkyl chemicals in the U.S. population: data from the National Health and Nutrition Examination Survey (NHANES) 2003–2004 and comparisons with NHANES 1999–2000. *Environ Health Perspect*. 2007;115:1696–702.
13. Land M, de Wit CA, Cousins IT, Herzke D, Johansson J, Martin JW. What is the effect of phasing out long-chain per- and polyfluoroalkyl substances on the concentrations of perfluoroalkyl acids and their precursors in the environment? A systematic review protocol. *Environ Evid*. 2015;4:3.
14. Gomis MI, Vestergren R, MacLeod M, Mueller JF, Cousins IT. Historical human exposure to perfluoroalkyl acids in the United States and Australia reconstructed from biomonitoring data using population-based pharmacokinetic modelling. *Environ Int*. 2017;108:92–102.
15. Okada E, Kashino I, Matsuura H, Sasaki S, Miyashita C, Yamamoto J, et al. Temporal trends of perfluoroalkyl acids in plasma samples of pregnant women in Hokkaido, Japan, 2003–2011. *Environ Int*. 2013;60:89–96.
16. Nøst TH, Vestergren R, Berg V, Nieboer E, Odland JØ, Sandanger TM. Repeated measurements of per- and polyfluoroalkyl substances (PFASs) from 1979 to 2007 in males from Northern Norway: assessing time trends, compound correlations and relations to age/birth cohort. *Environ Int*. 2014;67:43–53.
17. Ritscher A, Wang Z, Scheringer M, Boucher JM, Ahrens L, Berger U et al. Zürich Statement on future actions on per- and polyfluoroalkyl substances (PFASs). *Environ Health Perspect*. 2018. <https://doi.org/10.1289/EHP4158>.
18. Gomis MI, Vestergren R, Borg D, Cousins IT. Comparing the toxic potency in vivo of long-chain perfluoroalkyl acids and fluorinated alternatives. *Environ Int*. 2018;113:1–9.
19. Buck RC, Franklin J, Berger U, Conder JM, Cousins IT, de Voogt P, et al. Perfluoroalkyl and polyfluoroalkyl substances in the environment: terminology, classification, and origins. *Integr Environ Assess Manag*. 2011;7:513–41.
20. Butt CM, Muir DCG, Mabury SA. Biotransformation pathways of fluorotelomer-based polyfluoroalkyl substances: a review. *Environ Toxicol Chem*. 2014;33:243–67.
21. Young C, Mabury S. Atmospheric perfluorinated acid precursors: chemistry, occurrence, and impacts. *Rev Environ Contam Toxicol*. 2010;208:1–109.
22. Pickard H, Criscitiello A, Spencer C, Sharp M, Muir D, De Silva A, et al. Continuous non-marine inputs of per- and polyfluoroalkyl substances to the High Arctic: a multi-decadal temporal record. *Atmos Chem Phys*. 2018;18:5045–58.
23. Haug LS, Huber S, Becher G, Thomsen C. Characterisation of human exposure pathways to perfluorinated compounds—comparing exposure estimates with biomarkers of exposure. *Environ Int*. 2011;37:687–93.
24. Vestergren R, Cousins IT, Trudel D, Wormuth M, Scheringer M. Estimating the contribution of precursor compounds in consumer exposure to PFOS and PFOA. *Chemosphere*. 2008;73:1617–24.
25. Trudel D, Horowitz L, Wormuth M, Scheringer M, Cousins IT, Hungerbuehler K. Estimating consumer exposure to PFOS and PFOA. *Risk Anal*. 2008;28:251–69.
26. 3M Company. Fluorochemical use, distribution and release overview. US EPA Public Docket AR226-0550. St Paul, MN: 3M Company; 1999.
27. Kissa, E. Fluorinated Surfactants and Repellents, 2nd ed.; Vol. 97 in Surfactant Science Series; Marcel Dekker: New York, 2001.
28. Dassuncao C, Hu XC, Zhang X, Bossi R, Dam M, Mikkelsen B, et al. Temporal shifts in poly- and perfluoroalkyl substances (PFASs) in North Atlantic pilot whales indicate large contribution of atmospheric precursors. *Environ Sci Technol*. 2017;51:4512–21.
29. Zhang X, Zhang Y, Dassuncao C, Lohmann R, Sunderland EM. North Atlantic deep water formation inhibits high Arctic contamination by continental perfluorooctane sulfonate discharges. *Glob Biogeochem Cycles*. 2017;31:1332–43.
30. Dassuncao C, Hu XC, Nielsen F, Weihe P, Grandjean P, Sunderland EM. Shifting global exposures to poly- and perfluoroalkyl substances (PFASs) evident in longitudinal birth cohorts from a seafood-consuming population. *Environ Sci Technol*. 2018. <https://doi.org/10.1021/acs.est.7b06044>.
31. Favreau P, Poncioni-Rothlisberger C, Place BJ, Bouchex-Bellomie H, Weber A, Tremp J, et al. Multianalyte profiling of per- and polyfluoroalkyl substances (PFASs) in liquid commercial products. *Chemosphere*. 2017;171:491–501.
32. Robel AE, Marshall K, Dickinson M, Lunderberg D, Butt C, Peaslee G, et al. Closing the mass balance on fluorine on papers and textiles. *Environ Sci Technol*. 2017;51:9022–32.
33. Herzke D, Olsson E, Posner S. Perfluoroalkyl and polyfluoroalkyl substances (PFASs) in consumer products in Norway—a pilot study. *Chemosphere*. 2012;88:980–7.

34. Schaidler LA, Balan SA, Blum A, Andrews DQ, Strynar MJ, Dickinson ME, et al. Fluorinated compounds in U.S. fast food packaging. *Environ Sci Technol Lett*. 2017;4:105–11.
35. Guo Z, Liu X, Krebs AK. Perfluorocarboxylic acid content in 116 articles of commerce: EPA?600/R-09/-33. Research Triangle Park, NC: Environmental Protection Agency; 2009.
36. Yuan G, Peng H, Huang C, Hu J. Ubiquitous occurrence of fluorotelomer alcohols in eco-friendly paper-made food-contact materials and their implication for human exposure. *Environ Sci Technol*. 2016;50:942–50.
37. Zabaleta I, Bizkarguenaga E, Bilbao D, Etxebarria N, Prieto A, Zuloaga O. Fast and simple determination of perfluorinated compounds and their potential precursors in different packaging materials. *Talanta*. 2016;152:353–63.
38. Kotthoff M, Müller J, Jüriling H, Schlummer M, Fiedler D. Perfluoroalkyl and polyfluoroalkyl substances in consumer products. *Environ Sci Pollut Res*. 2015;22:14546–59.
39. Ye F, Zushi Y, Masunaga S. Survey of perfluoroalkyl acids (PFAAs) and their precursors present in Japanese consumer products. *Chemosphere*. 2015;127:262–8.
40. Bečanová J, Melymuk L, Vojta Š, Komprdová K, Klánová J. Screening for perfluoroalkyl acids in consumer products, building materials and wastes. *Chemosphere*. 2016;164:322–9.
41. Begley TH, White K, Honigfort P, Twaroski ML, Neches R, Walker RA. Perfluorochemicals: potential sources of and migration from food packaging. *Food Addit Contam*. 2005;22:1023–31.
42. Begley TH, Hsu W, Noonan G, Diachenko G. Migration of fluorochemical paper additives from food-contact paper into foods and food simulants. *Food Addit Contam: Part A*. 2008;25:384–90.
43. Harrad S, de Wit C, Abdallah M, Bergh C, Bjorklund J, Covaci A, et al. Indoor contamination with hexabromocyclododecanes, polybrominated diphenyl ethers, and perfluoroalkyl compounds: an important exposure pathway for people? *Environ Sci Technol*. 2010;44:3221–31.
44. Fromme H, Dreyer A, Dietrich S, Fembacher L, Lahrz T, Völkel W. Neutral polyfluorinated compounds in indoor air in Germany—the LUPE 4 study. *Chemosphere*. 2015;139:572–8.
45. US EPA. Lifetime health advisories and health effects support documents for perfluorooctanoic acid and perfluorooctane sulfonate. Washington, DC: Environmental Protection Agency; 2016. https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_pfos_prepub_508.pdf [Accessed 31 August 2018].
46. ATSDR. Toxicological profile for perfluoroalkyls: draft for public comment, June 2018. Atlanta, GA: Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services; 2018. Available: <https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf> [Accessed 31 August 2018].
47. Health Canada. Health Canada's drinking water screening values for perfluoroalkylated substances (PFASs). Ottawa, ON; February 2016. Available: <http://scottreid.ca/wp-content/uploads/2016/03/Health-Canada-PFAS-Screening-Values-Fact-Sheet-EN.pdf> [Accessed 20 August 2018].
48. Grandjean P, Budtz-Jorgensen E. Immunotoxicity of perfluorinated alkylates: calculation of benchmark doses based on serum concentrations in children. *Environ Health*. 2013;12:35.
49. Emmett EA, Shofer FS, Zhang H, Freeman D, Desai C, Shaw LM. Community exposure to perfluorooctanoate: relationships between serum concentrations and exposure sources. *J Occup Environ Med/Am Coll Occup Environ Med*. 2006;48:759–70.
50. Post GB, Louis JB, Cooper KR, Boros-Russo BJ, Lippincott RL. Occurrence and potential significance of perfluorooctanoic acid (PFOA) detected in New Jersey public drinking water systems. *Environ Sci Technol*. 2009;43:4547–54.
51. US EPA. The Third Unregulated Contaminant Monitoring Rule (UCMR 3): Data Summary, April 2016. Office of Water, EPA 815-S-16-002; 2016.
52. Sun M, Arevalo E, Strynar M, Linstrom A, Richardson M, Kearns B, et al. Legacy and emerging perfluoroalkyl substances are important drinking water contaminants in the Cape Fear River watershed of North Carolina. *Environ Sci Technol Lett*. 2016;3:415–9.
53. Lindh CH, Rylander L, Toft G, Axmon A, Rignell-Hydbom A, Giwercman A, et al. Blood serum concentrations of perfluorinated compounds in men from Greenlandic Inuit and European populations. *Chemosphere*. 2012;88:1269–75.
54. Weihe P, Kato K, Calafat AM, Nielsen F, Wanigatunga A, Needham L, et al. Serum concentrations of polyfluoroalkyl compounds in Faroese whale meat consumers. *Environ Sci Technol*. 2008;42:6291–5.
55. Zhou Z, Shi Y, Vestergren R, Wang T, Liang Y, Cai Y. Highly elevated serum concentrations of perfluoroalkyl substances in fishery employees from Tangxun Lake, China. *Environ Sci Technol*. 2014;48:3864–74.
56. Berger U, Glynn A, Holmstrom K, Berglund M, Ankarberg E, Tomkvist A. Fish consumption as a source of human exposure to perfluorinated alkyl substances in Sweden—analysis of edible fish from Lake Vattern and the Baltic Sea. *Chemosphere*. 2009;76:799–804.
57. European Food Safety Authority. Risk to human health related to the presence of perfluorooctane sulfonic acid and perfluorooctanoic acid in food (draft). *EFSA J*. 2018;16:1–293.
58. Stahl L, Snyder B, Olsen A, Kinkaid T, Wathen J, McCarty H. Perfluorinated compounds in fish from U.S. urban rivers and the Great Lakes. *Sci Total Environ*. 2014;499:185–95.
59. Del Gobbo L, Tittlemier S, Diamond M, Pepper K, Tague B, Yeudall F, et al. Cooking decreases observed perfluorinated compound concentrations in fish. *J Agric Food Chem*. 2008;56:7551–9.
60. Kelly B, Ikonou M, Blair J, Surridge B, Hoover D, Grace R, et al. Perfluoroalkyl contaminants in an Arctic marine food web: trophic magnification and wildlife exposure. *Environ Sci Technol*. 2009;43:4037–43.
61. Conder J, Hoke R, de Wolf W, Russell MH, Buck RC. Are PFCAs bioaccumulative? A critical review and comparison with regulatory criteria and persistent lipophilic compounds. *Environ Sci Technol*. 2008;42:995–1003.
62. Christensen K, Raymond M, Blackowicz M, Liu Y-J, Thompson B, Anderson H, et al. Perfluoroalkyl substances and fish consumption. *Environ Res*. 2017;154:145–51.
63. Hu XC, Dassuncao C, Zhang X, Grandjean P, Weihe P, Webster G, et al. Can profiles of poly- and perfluoroalkyl substances (PFASs) in human serum provide information on major exposure sources. *Environ Health*. 2018;17. <https://doi.org/10.1186/s12940-018-10355-12944>.
64. Buser A, Morf L. Substance flow analysis of PFOS and PFOA. In: Perfluorinated surfactants perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA) in Switzerland. Bern, Switzerland: Federal Office for the Environment (FOEN); 2009.
65. Earnshaw MR, Paul AG, Loos R, Tavazzi S, Paracchini B, Scheringer M, et al. Comparing measured and modelled PFOS concentrations in a UK freshwater catchment and estimating emission rates. *Environ Int*. 2014;70:25–31.
66. Sepulvado JG, Blaine AC, Hundal LS, Higgins CP. Occurrence and fate of perfluorochemicals in soil following the land application of municipal biosolids. *Environ Sci Technol*. 2011;45:8106–12.
67. Washington JW, Yoo H, Ellington JJ, Jenkins TM, Libelo EL. Concentrations, distribution, and persistence of

- perfluoroalkylates in sludge-applied soils near Decatur, Alabama, USA. *Environ Sci Technol.* 2010;44:8390–6.
68. Venkatesan AK, Halden RU. National inventory of perfluoroalkyl substances in archived U.S. biosolids from the 2001 EPA National Sewage Sludge Survey. *J Hazard Mater.* 2013;252–253:413–8.
 69. Navarro I, de la Torre A, Sanz P, Pro J, Carbonell G, de los Ángeles Martínez M. Bioaccumulation of emerging organic compounds (perfluoroalkyl substances and halogenated flame retardants) by earthworm in biosolid amended soils. *Environ Res.* 2016;149:32–9.
 70. Navarro I, de la Torre A, Sanz P, Porcel MÁ, Pro J, Carbonell G, et al. Uptake of perfluoroalkyl substances and halogenated flame retardants by crop plants grown in biosolids-amended soils. *Environ Res.* 2017;152:199–206.
 71. Wen B, Wu Y, Zhang H, Liu Y, Hu X, Huang H, et al. The roles of protein and lipid in the accumulation and distribution of perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in plants grown in biosolids-amended soils. *Environ Pollut.* 2016;216:682–8.
 72. Domingo JL, Nadal M. Per- and polyfluoroalkyl substances (PFASs) in Food and human dietary intake: a review of the recent scientific literature. *J Agric Food Chem.* 2017;56:533–43.
 73. Hoffman K, Webster T, Bartell S, Weisskopf M, Fletcher T, Vieira V. Private drinking water wells as a source of exposure to perfluorooctanoic acid (PFOA) in communities surrounding a fluoropolymer production facility. *Environ Health Perspect.* 2010;119:92–7.
 74. Vestergren R, Cousins IT. Tracking the pathways of human exposure to perfluorocarboxylates. *Environ Sci Technol.* 2009;43:5565–75.
 75. Egeghy PP, Lorber M. An assessment of the exposure of Americans to perfluorooctane sulfonate: a comparison of estimated intake with values inferred from NHANES data. *J Expo Sci Environ Epidemiol.* 2011;21:150–68.
 76. Lorber M, Egeghy PP. Simple intake and pharmacokinetic modeling to characterize exposure of Americans to perfluorooctanoic acid, PFOA. *Environ Sci Technol.* 2011;45:8006–14.
 77. Johnson GW, Ehrlich R, Full W, Ramos S. Principal components analysis and receptor models in environmental forensics. San Diego: Academic Press; 2002.
 78. Wang Z, Stout SA, Fingas M. Forensic fingerprinting of biomarkers for oil spill characterization and source identification. *Environ Forensics.* 2006;7:105–46.
 79. Benskin JP, Phillips V, St Louis VL, Martin JW. Source elucidation of perfluorinated carboxylic acids in remote alpine lake sediment cores. *Environ Sci Technol.* 2011;45:7188–94.
 80. D'eon JC, Mabury SA. Exploring indirect sources of human exposure to perfluoroalkyl carboxylates (PFCAs): evaluating uptake, elimination, and biotransformation of polyfluoroalkyl phosphate esters (PAPs) in the rat. *Environ Health Perspect.* 2011;119:344.
 81. Zhang X, Lohmann R, Dassuncao C, Hu XC, Weber AK, Vecitis CD, et al. Source attribution of poly- and perfluoroalkyl substances (PFASs) in surface waters from Rhode Island and the New York Metropolitan Area. *Environ Sci Technol Lett.* 2016;3:316–21.
 82. Tittlemier SA, Pepper K, Seymour C, Moisey J, Bronson R, Cao X-L, et al. Dietary exposure of Canadians to perfluorinated carboxylates and perfluorooctane sulfonate via consumption of meat, fish, fast foods, and food items prepared in their packaging. *J Agric Food Chem.* 2007;55:3203–10.
 83. Li M, von Stackelberg K, Rheinberger CM, Hammitt JK, Krabbenhoft DP, Yin R, et al. Insights from mercury stable isotopes into factors affecting the internal body burden of methylmercury in frequent fish consumers. *Elem Sci Anth.* 2016;4:000103.
 84. Thurston GD, Spengler JD. A quantitative assessment of source contributions to inhalable particulate matter pollution in metropolitan Boston. *Atmos Environ.* 1967;1985:9–25.
 85. Yeung LW, Miyake Y, Taniyasu S, Wang Y, Yu H, So MK, et al. Perfluorinated compounds and total and extractable organic fluorine in human blood samples from China. *Environ Sci Technol.* 2008;42:8140–5.
 86. Miyake Y, Yamashita N, So MK, Rostkowski P, Taniyasu S, Lam PK, et al. Trace analysis of total fluorine in human blood using combustion ion chromatography for fluorine: a mass balance approach for the determination of known and unknown organofluorine compounds. *J Chromatogr A.* 2007;1154:214–21.
 87. Taves DR. Evidence that there are two forms of fluoride in human serum. *Nature.* 1968;217:1050.
 88. Hansen KJ, Clemen LA, Ellefson ME, Johnson HO. Compound-specific, quantitative characterization of organic fluorochemicals in biological matrices. *Environ Sci Technol.* 2001;35:766–70.
 89. Grandjean P. Delayed discovery, dissemination, and decisions on intervention in environmental health: a case study on immunotoxicity of perfluorinated alkylated substances. *Environ Health.* 2018;17. <https://doi.org/10.1186/s12940-12018-10405-y>.
 90. Harris MH, Rifas-Shiman SL, Calafat AM, Ye X, Mora AM, Webster TF, et al. Predictors of per- and polyfluoroalkyl substance (PFAS) plasma concentrations in 6–10 year old American children. *Environ Sci Technol.* 2017;51:5193–204.
 91. Hurley S, Goldberg D, Wang M, Park JS, Petreas M, Bernstein L, et al. Time trends in per- and polyfluoroalkyl substances (PFASs) in California women: declining serum levels, 2011–5. *Environ Sci Technol.* 2018;52:277–87.
 92. Glynn A, Benskin J, Lignell S, Gyllenhammar I, Aune M, Cantillana T, et al. Temporal trends of perfluoroalkyl substances in pooled serum samples from first-time mothers in Uppsala 1997–2014. Report to the Swedish EPA; 2015.
 93. Eriksson U, Mueller JF, Toms LL, Hobson P, Karrman A. Temporal trends of PFASs, PFCAs and selected precursors in Australian serum from 2002 to 2013. *Environ Pollut.* 2017;220:168–77.
 94. Haug LS, Thomsen C, Becher GB. Time trends and the influence of age and gender on serum concentrations of perfluorinated compounds in archived human samples. *Environ Sci Technol.* 2009;43:2131–6.
 95. Yeung LW, Miyake Y, Taniyasu S, Wang Y, Yu H, So MK, et al. Perfluorinated compounds and total and extractable organic fluorine in human blood samples from China. *Environ Sci Technol.* 2008;42:8140–5.
 96. Mohsin M, Sarwar N, Ahmad S, Rasheed A, Ahmad F, Afzal A, et al. Maleic acid crosslinking of C-6 fluorocarbon as oil and water repellent finish on cellulosic fabrics. *J Clean Prod.* 2016;112:3525–30.
 97. Ritter SK. Fluorochemicals go short. *Chem Eng News Arch.* 2010;88:12–7.
 98. Bjerregaard-Olesen C, Bach CC, Long M, Ghisari M, Bossi R, Bech BH, et al. Time trends of perfluorinated alkyl acids in serum from Danish pregnant women 2008–2013. *Environ Int.* 2016;91:14–21.
 99. Kato K, Wong L-Y, Jia LT, Kuklenyik Z, Calafat AM. Trends in exposure to polyfluoroalkyl chemicals in the US population: 1999–2008. *Environ Sci Technol.* 2011;45:8037–45.
 100. Paul AG, Jones KC, Sweetman AJ. A first global production, emission, and environmental inventory for perfluorooctane sulfonate. *Environ Sci Technol.* 2009;43:386–92.
 101. Griffith FD, Long JE. Animal toxicity studies with ammonium perfluorooctanoate. *Am Ind Hyg Assoc J.* 1980;41:576–83.

102. Ubel FA, Sorenson SD, Roach DE. Health status of plant workers exposed to fluorochemicals—a preliminary report. *Am Ind Hyg Assoc J*. 1980;41:584–9.
103. Goldenthal EI, Jessup DC, Geil RG, Mehling JS. 90-day sub-acute rhesus monkey toxicity study no. 137-092. Available on USEPA Public Docket AR-226-0137. Mattawan, MI: International Research and Development Corp.; 1978.
104. Goldenthal EI, Jessup DC, Geil RG, Mehling JS. 90-day sub-acute rhesus monkey toxicity study (aborted) no. 137-087. Available on USEPA Public Docket AR-226-0138. Mattawan, MI: International Research and Development Corp.; 1978.
105. RIKER laboratories. Two year oral (diet) toxicity/carcinogenicity study of fluorochemical FM-3924 in rats. Available on USEPA Public Docket AR-226-0257. St. Paul, Minnesota: RIKER Laboratories, Inc./3M Company; 1983.
106. Sibinski LJ, Allen JL, Elrod SV. Two year oral (diet) toxicity—oncogenicity study of fluorocarbon FM-3924 in rats. Available on USEPA Public Docket AR-226-0262. St. Paul, MN; 1988.
107. Pathology Associates International. Pathology review of reported tumorigenesis in a two year study of FM-3924 in rats. Available on U.S. EPA public docket AR-226-0264. West Chester, Ohio; 1998.
108. McMichael AJ. Standardized mortality ratios and the “healthy worker effect”: Scratching beneath the surface. *J Occup Med*. 1976;18:165–8.
109. Gilliland FD. Fluorocarbons and human health: studies in an occupational cohort. Available on U.S. EPA Public Docket AR-226-0473. University of Minnesota; 1992.
110. Olsen GW, Gilliland FD, Burlew MM, Burris JM, Mandel JS, Mandel JH. An epidemiologic investigation of reproductive hormones in men with occupational exposure to perfluorooctanoic acid. *J Occup Environ Med*. 1998;40:614–22.
111. Palmer CN, Hsu M-H, Griffin KJ, Raucy JL, Johnson EF. Peroxisome proliferator activated receptor- α expression in human liver. *Mol Pharmacol*. 1998;53:14–22.
112. Barry V, Winkvist A, Steenland K. Perfluorooctanoic acid (PFOA) exposures and incident cancers among adults living near a chemical plant. *Environ Health Perspect*. 2013;121:1313.
113. Lopez-Espinosa M-J, Mondal D, Armstrong B, Bloom MS, Fletcher T. Thyroid function and perfluoroalkyl acids in children living near a chemical plant. *Environ Health Perspect*. 2012;120:1036.
114. Steenland K, Zhao L, Winkvist A, Parks C. Ulcerative colitis and perfluorooctanoic acid (PFOA) in a highly exposed population of community residents and workers in the mid-Ohio valley. *Environ Health Perspect*. 2013;121:900.
115. Darrow LA, Stein CR, Steenland K. Serum perfluorooctanoic acid and perfluorooctane sulfonate concentrations in relation to birth outcomes in the Mid-Ohio Valley, 2005–2010. *Environ Health Perspect*. 2013;121:1207.
116. Rappazzo K, Coffman E, Hines E. Exposure to perfluorinated alkyl substances and health outcomes in children: a systematic review of the epidemiologic literature. *Int J Environ Res Public Health*. 2017;14:691.
117. Grandjean P, Andersen E, Budtz-Jørgensen E, et al. Serum vaccine antibody concentrations in children exposed to perfluorinated compounds. *JAMA*. 2012;307:391–7.
118. Klaunig JE, Shinohara M, Iwai H, Chengelis CP, Kirkpatrick JB, Wang Z, et al. Evaluation of the chronic toxicity and carcinogenicity of perfluorohexanoic acid (PFHxA) in Sprague–Dawley rats. *Toxicol Pathol*. 2014;43:209–20.
119. Gilliland FD, Mandel JS. Mortality among employees of a perfluorooctanoic acid production plant. *J Occup Med*. 1993;35:950–4.
120. Raleigh KK, Alexander BH, Olsen GW, Ramachandran G, Morey SZ, Church TR, et al. Mortality and cancer incidence in ammonium perfluorooctanoate production workers. *Occup Environ Med*. 2014;71:500–6.
121. Vieira VM, Hoffman K, Shin HM, Weinberg JM, Webster TF, Fletcher T. Perfluorooctanoic acid exposure and cancer outcomes in a contaminated community: a geographic analysis. *Environ Health Perspect*. 2013;121:318–23.
122. Eriksen KT, Sorensen M, McLaughlin JK, Lipworth L, Tjonneland A, Overvad K, et al. Perfluorooctanoate and perfluorooctanesulfonate plasma levels and risk of cancer in the general Danish population. *J Natl Cancer Inst*. 2009;101:605–9.
123. DeWitt JC, Peden-Adams MM, Keller JM, Germolec DR. Immunotoxicity of perfluorinated compounds: recent developments. *Toxicol Pathol*. 2012;40:300–11.
124. Stein CR, McGovern KJ, Pajak AM, Maglione PJ, Wolff MS. Perfluoroalkyl and polyfluoroalkyl substances and indicators of immune function in children aged 12–19 y: National Health and Nutrition Examination Survey. *Pediatr Res*. 2016;79:348–57.
125. Granum B, Haug LS, Namork E, Stolevik SB, Thomsen C, Aaberge IS, et al. Pre-natal exposure to perfluoroalkyl substances may be associated with altered vaccine antibody levels and immune-related health outcomes in early childhood. *J Immunotoxicol*. 2013;10:373–9.
126. Stein CR, Ge YC, Wolff MS, Ye XY, Calafat AM, Kraus T, et al. Perfluoroalkyl substance serum concentrations and immune response to FluMist vaccination among healthy adults. *Environ Res*. 2016;149:171–8.
127. Looker C, Luster MI, Calafat AM, Johnson VJ, Burleson GR, Burleson FG, et al. Influenza vaccine response in adults exposed to perfluorooctanoate and perfluorooctanesulfonate. *Toxicol Sci*. 2014;138:76–88.
128. Dong G-H, Tung K-Y, Tsai C-H, Liu M-M, Wang D, Liu W, et al. Serum polyfluoroalkyl concentrations, asthma outcomes, and immunological markers in a case-control study of Taiwanese children. *Environ Health Perspect*. 2013;121:507–13.
129. Buser MC, Scinicariello F. Perfluoroalkyl substances and food allergies in adolescents. *Environ Int*. 2016;88:74–9.
130. Gilliland FD, Mandel JS. Serum perfluorooctanoic acid and hepatic enzymes, lipoproteins, and cholesterol: a study of occupationally exposed men. *Am J Ind Med*. 1996;29:560–8.
131. Liu HS, Wen LL, Chu PL, Lin CY. Association among total serum isomers of perfluorinated chemicals, glucose homeostasis, lipid profiles, serum protein and metabolic syndrome in adults: NHANES, 2013–2014. *Environ Pollut*. 2018;232:73–9.
132. Steenland K, Fletcher T, Savitz DA. Epidemiologic evidence on the health effects of perfluorooctanoic acid (PFOA). *Environ Health Perspect*. 2010;118:1100–8.
133. Cardenas A, Gold DR, Hauser R, Kleinman KP, Hivert MF, Calafat AM, et al. Plasma concentrations of per- and polyfluoroalkyl substances at baseline and associations with glycemic indicators and diabetes incidence among high-risk adults in the diabetes prevention program trial. *Environ Health Perspect*. 2017;125:107001.
134. Liu G, Dhana K, Furtado JD, Rood J, Zong G, Liang L, et al. Perfluoroalkyl substances and changes in body weight and resting metabolic rate in response to weight-loss diets: a prospective study. *PLoS Med*. 2018;15:e1002502.
135. Frisbee SJ, Shankar A, Knox SS, Steenland K, Savitz DA, Fletcher T, et al. Perfluorooctanoic acid, perfluorooctanesulfonate, and serum lipids in children and adolescents: results from the C8 Health Project. *Arch Pediatr Adolesc Med*. 2010;164:860–9.
136. Nelson JW, Hatch EE, Webster TF. Exposure to polyfluoroalkyl chemicals and cholesterol, body weight, and insulin resistance in the general U.S. population. *Environ Health Perspect*. 2010;118:197–202.

137. Maisonet M, Näyhä S, Lawlor DA, Marcus M. Prenatal exposures to perfluoroalkyl acids and serum lipids at ages 7 and 15 in females. *Environ Int.* 2015;82:49–60.
138. Lin CY, Chen PC, Lin YC, Lin LY. Association among serum perfluoroalkyl chemicals, glucose homeostasis, and metabolic syndrome in adolescents and adults. *Diabetes Care.* 2009;32:702–7.
139. Zhang C, Sundaram R, Maisog J, Calafat AM, Barr DB, Buck Louis GM. A prospective study of prepregnancy serum concentrations of perfluorochemicals and the risk of gestational diabetes. *Fertil Steril.* 2015;103:184–9.
140. Matilla-Santander N, Valvi D, Lopez-Espinosa MJ, Manzano-Salgado CB, Ballester F, Ibarluzea J, et al. Exposure to perfluoroalkyl substances and metabolic outcomes in pregnant women: evidence from the Spanish INMA Birth Cohorts. *Environ Health Perspect.* 2017;125:117004.
141. Min JY, Lee KJ, Park JB, Min KB. Perfluorooctanoic acid exposure is associated with elevated homocysteine and hypertension in US adults. *Occup Environ Med.* 2012;69:658–62.
142. Geiger SD, Xiao J, Shankar A. No association between perfluoroalkyl chemicals and hypertension in children. *Integr Blood Press Control.* 2014;7:1–7.
143. Conway B, Costacou T. Perfluoroalkyl acids and stroke risk in persons with and without diabetes: a salutatory effect of high oxygen carrying capacity environmental contaminants. *Circulation.* 2018;133:AP061.
144. Steenland K, Zhao L, Winquist A. A cohort incidence study of workers exposed to perfluorooctanoic acid (PFOA). *Occup Environ Med.* 2015;72:373–80.
145. Lin CY, Lin LY, Wen TW, Lien GW, Chien KL, Hsu SHJ, et al. Association between levels of serum perfluorooctane sulfate and carotid artery intima-media thickness in adolescents and young adults. *Int J Cardiol.* 2013;168:3309–16.
146. Koshy TT, Attina TM, Ghassabian A, Gilbert J, Burdine LK, Marmor M, et al. Serum perfluoroalkyl substances and cardiometabolic consequences in adolescents exposed to the World Trade Center disaster and a matched comparison group. *Environ Int.* 2017;109:128–35.
147. Olsen GW, Ehresman DJ, Buehrer BD, Gibson BA, Butenhoff JL, Zobel LR. Longitudinal assessment of lipid and hepatic clinical parameters in workers involved with the demolition of perfluoroalkyl manufacturing facilities. *J Occup Environ Med/Am Coll Occup Environ Med.* 2012;54:974–83.
148. Lin CY, Lin LY, Chiang CK, Wang WJ, Su YN, Hung KY, et al. Investigation of the associations between low-dose serum perfluorinated chemicals and liver enzymes in US adults. *Am J Gastroenterol.* 2010;105:1354–63.
149. Wang X, Li B, Zhao W-D, Liu Y-J, Shang D-S, Fang W-G, et al. Perfluorooctane sulfonate triggers tight junction “opening” in brain endothelial cells via phosphatidylinositol 3-kinase. *Biochem Biophys Res Commun.* 2011;410:258–63.
150. Johansson N, Fredriksson A, Eriksson P. Neonatal exposure to perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) causes neurobehavioural defects in adult mice. *Neurotoxicology.* 2008;29:160–9.
151. Liew Z, Goudarzi H, Oulhote Y. Developmental exposures to perfluoroalkyl substances (PFASs): an update of associated health outcomes. *Curr Environ Health Rep.* 2018;5:1–19.
152. Yeung LW, Mabury SA. Are humans exposed to increasing amounts of unidentified organofluorine? *Environ Chem.* 2016;13:102–10.
153. Gomis MI, Vestergren R, Nilsson H, Cousins IT. Contribution of direct and indirect exposure to human serum concentrations of perfluorooctanoic acid in an occupationally exposed group of Ski Waxers. *Environ Sci Technol.* 2016;50:7037–46.
154. Rotander A, Karrman A, Toms LM, Kay M, Mueller JF, Gomez Ramos MJ. Novel fluorinated surfactants tentatively identified in firefighters using liquid chromatography quadrupole time-of-flight tandem mass spectrometry and a case-control approach. *Environ Sci Technol.* 2015;49:2434–42.
155. Olsen GW, Chang S-C, Noker PE, Gorman GS, Ehresman DJ, Lieder PH, et al. A comparison of the pharmacokinetics of perfluorobutanesulfonate (PFBS) in rats, monkeys, and humans. *Toxicology.* 2009;256:65–74.
156. Fujii Y, Niisoe T, Harada KH, Uemoto S, Ogura Y, Takenaka K, et al. Toxicokinetics of perfluoroalkyl carboxylic acids with different carbon chain lengths in mice and humans. *J Occup Health.* 2015;57:1–12.
157. Ritter SK. Fluorochemicals go short. *Chem Eng News.* 2010;88:12–7.
158. Butt CM, Muir DC, Mabury SA. Biotransformation pathways of fluorotelomer-based polyfluoroalkyl substances: a review. *Environ Toxicol Chem/SETAC.* 2014;33:243–67.
159. Strynar M, Dagnino S, McMahan R, Liang S, Lindstrom A, Andersen E, et al. Identification of novel perfluoroalkyl ether carboxylic acids (PFECAs) and sulfonic acids (PFESAs) in natural waters using accurate mass time-of-flight mass spectrometry (TOFMS). *Environ Sci Technol.* 2015;49:11622–30.
160. Wang Z, Cousins IT, Scheringer M, Hungerbühler K. Fluorinated alternatives to long-chain perfluoroalkyl carboxylic acids (PFCAs), perfluoroalkane sulfonic acids (PFASs) and their potential precursors. *Environ Int.* 2013;60:242–8.
161. Blum A, Balan SA, Scheringer M, Trier X, Goldenman G, Cousins IT, et al. The Madrid statement on poly-and perfluoroalkyl substances (PFASs). *Environ Health Perspect.* 2015;123:A107.
162. Boxer E, Chaves N, Niwa Y. Northeastern SSEHRI PFAS contamination site tracker; 2018.
163. Tian Z, Kim S-K, Shoeib M, Oh J-E, Park J-E. Human exposure to per- and polyfluoroalkyl substances (PFASs) via house dust in Korea: implication to exposure pathway. *Sci Total Environ.* 2016;553:266–75.
164. Shan G, Wang Z, Zhou L, Du P, Luo X, Wu Q, et al. Impacts of daily intakes on the isomeric profiles of perfluoroalkyl substances (PFASs) in human serum. *Environ Int.* 2016;89-90:62–70.
165. Gebbink WA, Berger U, Cousins IT. Estimating human exposure to PFOS isomers and PFCA homologues: the relative importance of direct and indirect (precursor) exposure. *Environ Int.* 2015;74:160–9.
166. Wang, Z., J. M. Boucher, M. Scheringer, I. T. Cousins, and K. Hungerbühler (2017), Toward a Comprehensive Global Emission Inventory of C4–C10 Perfluoroalkanesulfonic Acids (PFASs) and Related Precursors: Focus on the Life Cycle of C8-Based Products and Ongoing Industrial Transition, *Environmental Science & Technology*, 51(8), 4482–4493.

Total Fluorine Measurements in Food Packaging: How Do Current Methods Perform?

Lara Schultes,^{*,†} Graham F. Peaslee,[‡] John D. Brockman,[§] Ashabari Majumdar,[‡] Sean R. McGuinness,[‡] John T. Wilkinson,[‡] Oskar Sandblom,[†] Ruth A. Ngwenyama,[§] and Jonathan P. Benskin[†]

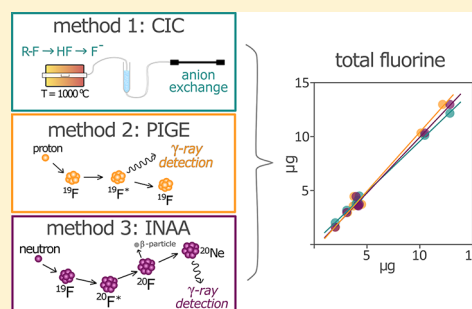
[†]Department of Environmental Science and Analytical Chemistry (ACES), Stockholm University, Svante Arrhenius väg 8, SE-10691 Stockholm, Sweden

[‡]Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556, United States

[§]Department of Chemistry, University of Missouri, Columbia, Missouri 65211, United States

Supporting Information

ABSTRACT: Per- and polyfluoroalkyl substances (PFASs) represent a class of more than 4000 compounds. Their large number and structural diversity pose a considerable challenge to analytical chemists. Measurement of total fluorine in environmental samples and consumer products is therefore critical for rapidly screening for PFASs and for assessing the fraction of unexplained fluorine (i.e., fluorine mass balance). Here we compare three emerging analytical techniques for total fluorine determination: combustion ion chromatography (CIC), particle-induced γ -ray emission spectroscopy (PIGE), and instrumental neutron activation analysis (INAA). Application of each method to a certified reference material (CRM), spiked filters, and representative food packaging samples revealed good accuracy and precision. INAA and PIGE had the advantage of being nondestructive, while CIC displayed the lowest detection limits. Inconsistencies between the methods arose due to the high aluminum content in the CRM, which precluded its analysis by INAA, and sample heterogeneity (i.e., coating on the surface of the material), which resulted in higher values from the surface measurement technique PIGE compared to the values from the bulk volume techniques INAA and CIC. Comparing CIC-based extractable organic fluorine to target PFAS measurements of food packaging samples by liquid chromatography–tandem mass spectrometry revealed large amounts of unidentified organic fluorine not captured by compound-specific analysis.



1. INTRODUCTION

Per- and polyfluoroalkyl substances (PFASs) are a class of ubiquitous chemicals that have found innumerable industrial and consumer applications over the past seven decades.¹ PFASs can be categorized as polymeric or nonpolymeric,² collectively amounting to more than 4700 CAS-registered substances according to the OECD.³ Environmental concerns pertaining to PFASs are centered primarily on the perfluoroalkyl acids (PFAA), a subclass of PFAS which display extreme persistence and chain-length-dependent bioaccumulation and adverse effects in biota.²

The water- and grease-repellent properties of PFASs have led to their extensive use in food contact paper and packaging. Concentrations in the range of 1.0–1.5% per fiber dry weight are typical in most finished products.⁴ Historically, most fluorinated coatings for paper and board were based on perfluorooctanesulfonate (PFOS) precursors, such as *N*-ethyl perfluorooctane sulfonamido alcohol-based phosphate diesters (SamPAPs).^{5,6} However, as a consequence of the phase-out of PFOS and its precursors by 3M in 2001, most contemporary formulations are now based on acrylate polymers with fluorotelomer or sulfonamido alcohol side chains or perfluoro-

polyether-based polymers (PFPEs).^{4,7} Several peer-reviewed studies have reported the occurrence of PFAAs, polyfluoroalkyl phosphates (PAPs), fluorotelomer alcohols, and saturated and unsaturated fluorotelomer acids in various types of food packaging materials.^{5,8–13} While the importance of PFASs in food packaging as a human exposure source remains unclear, some PFASs have been shown to migrate from food packaging into food.^{14,15} In response to concerns surrounding PFASs, several states in the United States have implemented bans on the use of these chemicals in food packaging,¹⁶ and the Danish Ministry of the Environment and Food has established a total fluorine indicator value of 0.1 $\mu\text{g}/\text{cm}^2$ in food packaging.¹⁷

Given their vast number and structural diversity, a comprehensive characterization of PFASs in consumer products represents a considerable analytical challenge.¹⁸ Typically, a limited number of PFASs are quantified using a

Received: December 19, 2018

Revised: January 26, 2019

Accepted: January 28, 2019

Published: February 1, 2019

combination of solvent extraction and either liquid chromatography–tandem mass spectrometry (LC–MS/MS; ionic PFASs) or gas chromatography–mass spectrometry (GC–MS; semivolatile PFASs). These methods cannot capture all PFASs, and even when high-resolution MS is employed (i.e., suspect or nontarget screening), a lack of authentic standards precludes unequivocal identification and quantification. As a result, questions about how many PFASs are missed during routine analysis remain. Several analytical approaches have emerged for quantifying total fluorine (TF) regardless of chemical structure or molecular weight (reviewed by McDonough et al.¹⁹). These approaches can be used for rapid screening of PFASs or in combination with targeted analyses (i.e., LC–MS/MS or GC–MS) to assess the fluorine mass balance in a sample. Combustion ion chromatography (CIC) is the most common method and was first used for fluorine mass balance experiments in 2007 by Miyake et al.²⁰ Since then, there have been several applications of CIC for determination of TF in environmental samples and consumer products.^{21–24} Another method, particle-induced γ -ray emission (PIGE) spectroscopy, is a long-established ion beam technique used for analysis of solid materials.^{25–28} The approach was recently applied to papers and textiles by Robel et al., who showed that Σ PFAS concentrations accounted for a mere 0.2–14% of the TF content.²⁹ Lastly, instrumental neutron activation analysis (INAA) is another nuclear technique with widespread uses,^{30–32} with one recent application involving measurement of fluorine in biological and environmental matrices.³³ The current paper reports the first application of INAA to consumer products. Other approaches for measuring TF exist, such as inductively coupled plasma (ICP) MS,³⁴ molecular absorption spectroscopy,³⁵ and X-ray photoelectron spectroscopy;³⁶ only the latter has recently been applied to fluorine mass balance experiments in consumer products. The data produced by these approaches have not yet been compared. This is clearly needed, given the growing interest in fluorine mass balance experiments and the use of TF for regulation of PFASs in consumer products.

The objectives of this study were (1) to compare the accuracy, precision, linearity, and detection limits of TF measurements by CIC, PIGE, and INAA, (2) to assess the limitations of each approach, and (3) to assess the fluorine mass balance in several food packaging materials from the Swedish market using LC–MS/MS and CIC.

2. MATERIALS AND METHODS

2.1. Sample Collection and Preparation. Total fluorine measurements from three different laboratories were compared using (a) a certified reference material (CRM), (b) PFOA-spiked cellulose filters, and (c) a variety of food packaging materials (Table S1). CIC analysis was carried out at Stockholm University (SU); PIGE analysis was carried out at the University of Notre Dame (UND), and INAA was carried out at the University of Missouri Research Reactor (MURR). The CRM (BCR-461, fluorine in clay) was purchased from Sigma-Aldrich and subsampled at SU into 13 mL polypropylene tubes prior to being shipped to UND and MURR for direct analysis. Cellulose filter papers (Whatman) were prepared by UND by spiking perfluorooctanoic acid (PFOA) solutions (prepared in methanol with food coloring to determine the area with which the standard was applied) with total masses of 0, 1.9, 3.8, 9.5, 19.1, and 38.2 μ g of PFOA. The methanol was evaporated to dryness prior to analysis.

Triplicates of each PFOA-spiked filter were sealed in individual zip-lock bags and shipped to SU and MURR for analysis. Finally, three french-fry bags (FF1–FF3) and six microwave popcorn bags (MP1–MP6) purchased in Sweden in 2012 were selected for analysis in this study. Pieces (2 cm $\times$ 2 cm) of each sample were cut and sealed in individual zip-lock bags and shipped to UND and MURR for analysis.

2.2. Extraction of Food Packaging. For targeted PFAS analysis, food packaging samples were extracted according to a Gebbink et al.³⁷ In short, samples (5 cm $\times$ 5 cm) were cut into small pieces, fortified with internal standards (0.5 ng each), and stirred in 40 mL of methanol at room temperature for 8 h. The extract was concentrated under a stream of nitrogen to approximately 1 mL, cleaned up using EnviCarb, and fortified with a recovery standard (0.5 ng). For analysis of total extractable organic fluorine (EOF), the extraction procedure was modified slightly by omitting the addition of internal and recovery standards and cleanup by EnviCarb.

2.3. Instrumental Analysis. Detailed descriptions of instrumental analysis and quantification for CIC, PIGE, and INAA can be found in the [Supporting Information](#). A brief overview is provided here.

2.3.1. TF and EOF Analysis by CIC. TF and EOF were analyzed according to the method described by Schultes et al.²⁴ Briefly, samples (neat samples and extracts) were placed directly onto a ceramic boat that was introduced into a combustion oven (HF-210, Mitsubishi) heated to 1100 °C under an atmosphere of argon (carrier gas) and oxygen (combustion gas) for $\sim$ 5 min. All gases were collected in Milli-Q water (GA-210, Mitsubishi). Ions were separated on an ion exchange column and measured by conductivity detection.

2.3.2. TF Analysis by PIGE. TF was analyzed according to the method described by Ritter et al.²⁸ Briefly, samples were mounted across a stainless steel target frame and bombarded with a 3.4 MeV beam of protons ($\sim$ 50 nA for 180 s) to produce γ -rays, which were measured using a high-purity germanium detector (HPGe, Canberra, 20%) located at approximately 75° to the beam. The combined number of counts of two γ -rays characteristic of the decay of the ¹⁹F nucleus at 110 and 197 keV/ μ C of beam delivered is proportional to the TF. The beam intensity was measured in a suppressed Faraday cup before and after each 3 min run and normalized to a current measured in a tantalum collimator near the beam exit window. For the powdered CRM material, replicate targets were prepared by hydraulically compressing the powder into a self-supporting pellet at approximately 350 bar for 30 s and then taped onto target frames.

2.3.3. TF Analysis by INAA. Samples were analyzed according to the method described by Spate et al.³² Briefly, samples were weighed into 0.5 mL high-density polyethylene (HDPE) vials. The vials were encapsulated in HDPE “rabbits” for irradiation in the pneumatic tube irradiation position of the MURR at a neutron flux of 5.5×10^{13} n cm^{−2} s^{−1}. Samples were irradiated for 7 s, decayed for 11 s, and were counted for 30 s using an HPGe detector (Canberra, 20%). The ²⁰F decays (11.03 s half-life) by β -particle emission with a characteristic γ -ray at 1633.6 keV. A correction was made for the fast neutron reaction ²³Na(n, α)²⁰F using a single-element Na standard irradiated and counted under the same conditions. The neutron activation product ²⁴Na emits a characteristic γ -ray at 1368.6 keV. The measured ratio of the 1633.6 keV/1368.6 keV γ -ray in the single-element standards is used to correct interference in the samples based on the measured 1368.6 keV

γ -ray. The correction in samples analyzed in this study was <1%.

2.3.4. Target PFAS Analysis by UHPLC–MS/MS. Target PFASs, including perfluoroalkyl carboxylic acids (PFCAs, C4–C15), perfluoroalkyl sulfonic acids (PFSAs, C4, C6, C8, and C10), perfluorooctane sulfonamide (FOSA), perfluoroalkane sulfonamidoacetic acids, fluorotelomer sulfonates (4:2, 6:2, and 8:2 FTSAs), fluorotelomer carboxylic acids (5:3, 7:3, and 9:3), ADONA, F53-B, and polyfluoroalkyl phosphoric acid mono- and diesters (mono- and diPAPs, respectively), were analyzed using a Waters Acquity UHPLC instrument coupled to a Xevo TQ-S triple-quadrupole mass spectrometer according to the methods described by Vestergren et al.³⁸ and Gebbink et al.³⁷ Instrumental parameters are listed in Table S2. Limits of detection (LODs) for individual PFASs are based on the average concentration in the extraction blank plus 3 times the standard deviation. In the absence of a blank signal, the LOD was based on the concentration of the lowest calibration standard at a minimum signal-to-noise ratio of 3. Individual LODs are listed in Table S8.

2.4. Fluorine Mass Balance Calculations. To compare PFAS concentrations (C_{PFAS} , nanograms of PFAS per gram) derived from UHPLC–MS/MS analysis to EOF and TF ($C_{\text{F, EOF}}$ and $C_{\text{F, TF}}$, respectively; nanograms of F per gram) measured by CIC, molecular PFAS concentrations are converted to fluorine equivalents using the following equation:

$$C_{\text{F, PFAS}} = n_{\text{F}} \times A_{\text{F}} / MW_{\text{PFAS}} \times C_{\text{PFAS}} \quad (1)$$

where $C_{\text{F, PFAS}}$ (nanograms of F per gram) is the corresponding fluorine concentration of a given PFAS, n_{F} is the number of fluorine atoms on the molecule, MW_{PFAS} is the molecular weight of the PFAS, and A_{F} is the atomic weight of fluorine.

The total known extractable fluorine concentration ($\Sigma C_{\text{F, PFAS}}$, nanograms of F per gram), which is the sum of all individual $C_{\text{F, PFAS}}$ values, can be related to $C_{\text{F, EOF}}$ by eq 2:

$$C_{\text{F, EOF}} = \Sigma C_{\text{F, PFAS}} + C_{\text{F, extr. unknown}} \quad (2)$$

where $C_{\text{F, extr. unknown}}$ (nanograms of F per gram) is the total concentration of unidentified, extractable organic fluorine.

Lastly, $C_{\text{F, EOF}}$ and $C_{\text{F, TF}}$ are related to each other via the total nonextractable fluorine concentration ($C_{\text{F, non extr.}}$, nanograms of F per gram) according to eq 3:

$$C_{\text{F, TF}} = C_{\text{F, EOF}} + C_{\text{F, non extr.}} \quad (3)$$

2.5. Quality Assurance and Quality Control. Accuracy and precision were assessed through (a) replicate ($n = 3$) spike–recovery experiments using printer paper fortified with 36 native PFASs (targeted analysis) and (b) comparison of replicate ($n = 8$) measurements of the CRM to certified concentrations (TF analysis). Extraction blanks were processed in every batch to monitor for background contamination, while solvent blanks were injected intermittently during UHPLC–MS/MS and CIC analysis to monitor for carryover. Statistical analysis was carried out at an $\alpha = 0.05$ confidence level in all instances.

3. RESULTS AND DISCUSSION

3.1. Total Fluorine Method Comparison. A comparison of the measured ($n = 8$) versus certified concentrations ($568 \pm 60 \mu\text{g/g}$) of CRM BCR-461 revealed no statistically significant differences for CIC ($p = 0.18$) or PIGE ($p = 0.84$) [one-sample t tests (Figure 1a and Table S3)], indicating good accuracy

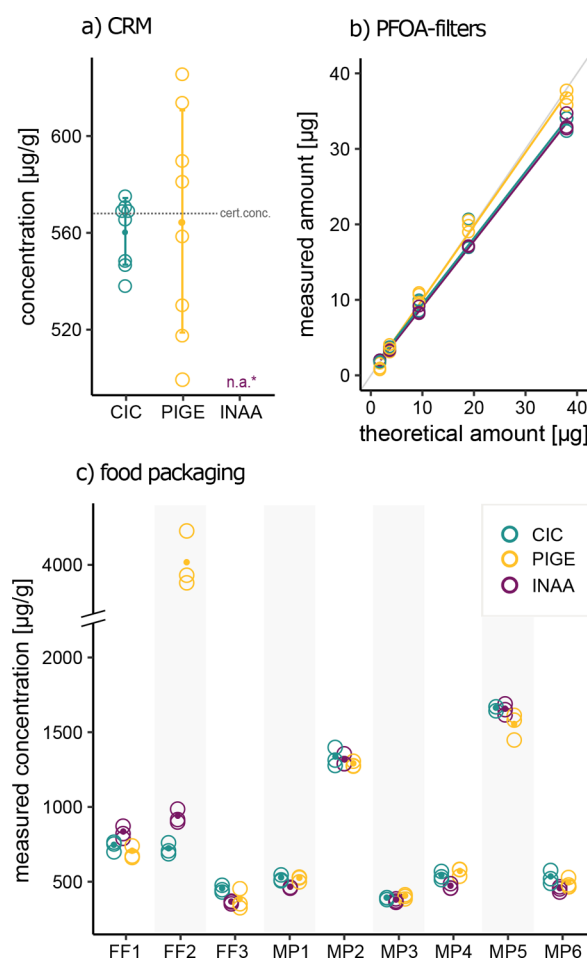


Figure 1. Comparison of TF methods (CIC, PIGE, and INAA) by means of (a) certified reference material (CRM) measurements ($n = 8$; circles) and means (dots) (the error bar represents the standard deviation, and the gray line indicates the certified concentration), (b) PFOA-spiked filter measurements vs theoretical concentrations (the gray line indicates slope = 1 and intercept = 0), and (c) food packaging samples (circles, data points; dots, means). Note the discrepancy in FF2 by PIGE due to the thickness and heterogeneity of this paperboard sample. *n.a., not analyzed due to interference.

for both methods. Precision was also reasonable for both approaches but slightly better for CIC (2.5% CV) than for PIGE (8.1%; $p = 0.005$; F-test). INAA was unable to measure F in the CRM due to the high Al content. The ^{27}Al captures a neutron, yielding unstable ^{28}Al , which decays by β -emission with a characteristic γ -ray at 1779 keV. The high levels of Al in geological materials result in detector dead times of >90% for the F analysis. Thus, INAA was deemed unsuitable for this matrix.

PFOA-fortified filters (six fortification levels, including a blank, each prepared in triplicate) were measured by CIC, PIGE, and INAA (Figure 1b and Table S4). The blank filters were below the LOD for all methods and therefore excluded from statistical analysis. Concentrations measured by CIC were, on average, 2.1% higher than those from PIGE and 4.1% higher than those from INAA, while those from PIGE were 1.9% higher than those from INAA. Repeated t tests with Bonferroni correction revealed that these differences were not statistically significant (for individual p values, see Table S6). All methods displayed good linearity ($r^2 > 0.99$) and precision

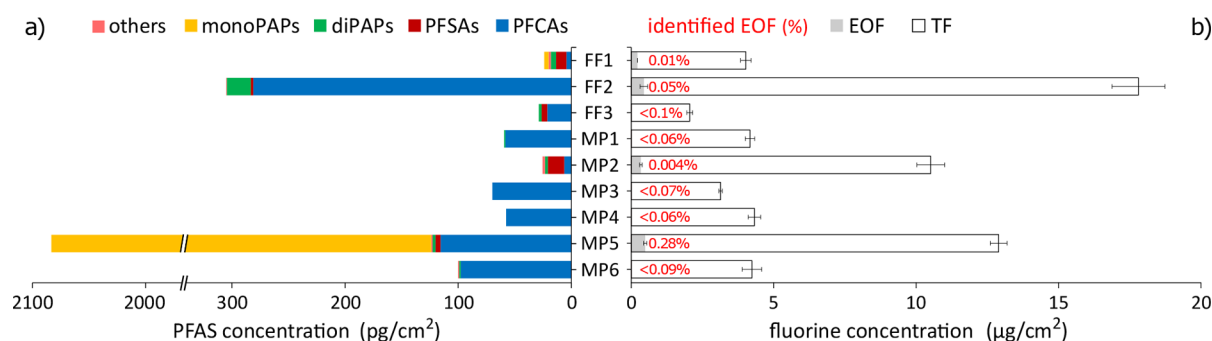


Figure 2. Fluorine mass balance in food packaging samples comprising (a) PFAS concentrations displayed as the sum of each class (in picograms per square centimeter) as measured by UHPLC–MS/MS and (b) total fluorine and extractable organic fluorine contents (error bars represent the standard deviation of triplicate measurements) in micrograms per square centimeter as measured by CIC. The percentage of EOF identified by the sum of target PFAS (ΣC_{F_PFAS}) is indicated in red.

[CV; 3–12% (CIC), 3–39% (PIGE), and 2–6% (INAA)] over the range of concentrations on the filters.

Nine food packaging materials were analyzed in triplicate by CIC, PIGE, and INAA (Figure 1c and Table S5). It is important to note that while measurement replicates were obtained for PIGE and INAA, the destructive nature of CIC requires technical replicates to assess precision. Another difference between methods arises from the fraction of the sample that contributes to the fluorine signal. For example, depending on the penetration depth of the PIGE particle beam, only the surface F content is measured in thick samples; in contrast, CIC and INAA measure the F content of the entire sample independent of material thickness. As a result, TF measurements determined by PIGE will be higher than those determined by INAA and CIC for surface-coated products when expressed on a weight basis. This difference is clearly demonstrated through measurements of FF2, which was the only thick paperboard material analyzed in this work and was over-reported by PIGE relative to CIC and INAA. When FF2 was excluded, CIC produced TF concentrations that were, on average, 2.4% higher than those produced by PIGE and 7.3% higher than those produced by INAA, while PIGE measurements were an average of 4.9% higher than INAA measurements. These differences were not statistically significant [two-way analysis of variance with replication ($p = 0.39$)]. All methods showed good precision [CV; 2–8% (CIC), 1–8% (PIGE), and 1–6% (INAA)]. Assuming a 10 mg sample size, detection limits were lowest for CIC (0.8 $\mu\text{g/g}$), followed by INAA (20 $\mu\text{g/g}$) and PIGE (38 $\mu\text{g/g}$).

3.2. Fluorine Mass Balance of Food Packaging Samples.

3.2.1. Target PFAS Analysis. A total of 22 of 44 target PFASs were detected in the food packaging materials investigated here with $\Sigma_{44}\text{PFAS}$ concentrations ranging from 23.9 to 2220 pg/cm^2 (Figure 2a and Table S8). Spike–recovery experiments demonstrated good accuracy and precision of the targeted PFAS analysis (see Table S7). PFTeDA, PFDODA, PFHpA, 6:2 diPAP, PFHxA, 6:2/8:2 diPAP, and 8:2 diPAP were detected in >50% of the samples. 10:2 monoPAP was detected at by far the highest concentration (2100 pg/cm^2) but only in a single sample (MP5). In all other samples, the contribution of PFAA precursors was minor. PFCAs were the major compound class in 6 samples (FF2, FF3, MP2–MP4 and MP6), with PFHxA (<0.37–160 pg/cm^2) accounting for 53–90% of $\Sigma_{44}\text{PFAS}$ concentrations in these samples. PFOA was detected in only FF2 and MP5 (4.32 and 22.4 pg/cm^2 , respectively), possibly

reflecting the shift among industries from C8 to C6 chain lengths.

3.2.2. Fluorine Mass Balance. CIC-based C_{F_TF} concentrations in food packaging [2.05–17.8 $\mu\text{g/cm}^2$ (Figure 2b)] were high relative to the Danish Ministry of the Environment and Food indicator value of 0.1 $\mu\text{g/cm}^2$. This value was established as a means of differentiating between intentionally added and background PFASs in food packaging.³⁹ The C_{F_EOF} was greater than the method detection limit (MDL) (0.04–0.07 $\mu\text{g/cm}^2$) in four samples, but low (0.22–0.49 $\mu\text{g/cm}^2$) compared to C_{F_TF} (accounting only for 0–5.5%). No significant correlations were observed among C_{F_TF} , C_{F_EOF} , and ΣC_{F_PFAS} . According to eq 3, $C_{F_non\ extr.}$ was high in all samples, ranging from 94.5 to 99.9%. These findings affirm the presence of polymeric coatings [e.g., perfluoropolyethers and fluorotelomer (meth)acrylate-based side-chain fluorinated polymers] on these papers and paperboards, as polymers have low solubility in most nonfluorinated solvents.⁴⁰ Furthermore, the fractions of C_{F_TF} and C_{F_EOF} explained by ΣC_{F_PFAS} were negligible in all samples [means of 0.002 and 0.08%, respectively (Table S9)], leaving the majority of TF and EOF unattributed. Therefore, we assume that our UHPLC–MS/MS method does not capture the PFASs intentionally used in these products. Here it is germane to note that possible degradation products and/or unreacted monomers of the aforementioned polymeric coatings [e.g., FTOHs, fluorotelomer olefins, or fluorotelomer (meth)acrylates] were not included in our targeted analysis.

Previous reports on TF in food packaging align well with concentrations reported in our study. Robel et al. measured concentrations from below the LOD to 8.17 $\mu\text{g/cm}^2$, and Schaidt et al. concentrations of ≤ 15.2 $\mu\text{g/cm}^2$ in U.S. fast food packaging.^{13,29} To the best of our knowledge, no prior studies have performed direct quantification of EOF in food packaging. While Robel et al. analyzed TF by PIGE in packaging samples before and after extraction, thereby indirectly measuring EOF, the differences were not statistically significant.²⁹ This is a general problem arising when comparing two large numbers, whereby a small difference easily lies within the error bounds. In our study, that problem is avoided by direct measurement of EOF. Similar to our results, Robel et al. report that the sum of ionic PFASs accounted for only 0–0.03% of the TF.

3.3. Implications. The results of the method comparison revealed excellent agreement among all three total fluorine methods. However, technical differences help determine their

applicability domains. For example, the rapid and non-destructive nature of PIGE and INAA allows for quick screening applications, as for example for regulatory purposes. CIC on the other hand excels at sensitivity and versatility, with lower detection limits and the possibility for direct IC analysis for determination of inorganic fluoride. All three methods can be used to analyze solid and liquid samples, although preconcentration methods are used to increase sensitivity for PIGE, which are not required for INAA and CIC.

In the case of food packaging materials, all three methods prove to be applicable. Because of the limited penetration depth of the particle beam, PIGE can distinguish between coated and uncoated surfaces. Most fluorine was persistent on the paper and paperboards after methanol extractions, as determined by comparably low EOF and target PFAS concentrations. More broadly, the cross-validation of these three TF methods means that they can be used as a complement to high-specificity targeted analysis. The mass balance measurements demonstrated in this work are critical in fate and transport studies of PFASs in the environment, such as those that can be found in the end-of-life options for paper packaging. For example, regardless of whether PFAS-treated paper decays in a landfill, is composted and used as fertilizer, or is recycled directly into more paper, these TF methods can be used to study the environmental release of all PFASs over a broad range of samples, disposal conditions, and locations. Such a broad question could not be answered in a timely manner with compound-specific analysis, yet LC–MS/MS identification of PFASs will remain an essential complement to these robust TF methods.

■ ASSOCIATED CONTENT

● Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: [10.1021/acs.estlett.8b00700](https://doi.org/10.1021/acs.estlett.8b00700).

Additional information about food packaging samples, instrumental methods, target PFAS compounds, quality assurance and quality control results, *p* values for statistical analysis, and tabular overviews of CIC, PIGE, INAA, and LC–MS/MS results (PDF)

■ AUTHOR INFORMATION

Corresponding Author

*E-mail: lara.schultes@gmail.com. Telephone: 0046729440914.

ORCID

Lara Schultes: 0000-0002-3409-4389

Graham F. Peaslee: 0000-0001-6311-648X

Notes

The authors declare no competing financial interest.

■ ACKNOWLEDGMENTS

The authors thank the Swedish Research Council FORMAS (Grant 2013-00794) for funding this project. Jan-Olov Persson is acknowledged for statistical support. Kristina von Dolwitz (Testfakta) is thanked for providing food packaging materials.

■ REFERENCES

- (1) KEMI Swedish Chemical Agency. Occurrence and Use of Highly Fluorinated Substances and Alternatives. 2015.
- (2) Buck, R. C.; Franklin, J.; Berger, U.; Conder, J. M.; Cousins, I. T.; De Voogt, P.; Jensen, A. A.; Kannan, K.; Mabury, S. A.; van Leeuwen, S. P. J. Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment: Terminology, Classification, and Origins. *Integr. Environ. Assess. Manage.* **2011**, 7 (4), 513–541.
- (3) Organisation for Economic Co-operation and Development. Toward a New Comprehensive Global Database of Per- and Polyfluoroalkyl Substances (PFASs): Summary Report on Updating the OECD 2007 List of per- and Polyfluoroalkyl Substances (PFASs). OECD Environment, Health and Safety Publications Series on Risk Management No. 39; 2018.
- (4) UNEP/POPS/POPRC.9/INF/11. <http://chm.pops.int/Convention/POPsReviewCommittee/LatestMeeting/POPRC9/POPRC9Documents/tabid/3281/Default.aspx> (accessed September 12, 2018).
- (5) Trier, X.; Granby, K.; Christensen, J. H. Polyfluorinated Surfactants (PFS) in Paper and Board Coatings for Food Packaging. *Environ. Sci. Pollut. Res.* **2011**, 18 (7), 1108–1120.
- (6) Trier, X.; Nielsen, N. J.; Christensen, J. H. Structural Isomers of Polyfluorinated Di- and Tri-Alkylated Phosphate Ester Surfactants Present in Industrial Blends and in Microwave Popcorn Bags. *Environ. Sci. Pollut. Res.* **2011**, 18 (8), 1422–1432.
- (7) Posner, S.; Roos, S.; Poulsen, P. B.; Jörundsdóttir, H. Ó.; Gunnlaugsdóttir, H.; Trier, X.; Jensen, A. A.; Katsogiannis, A. A.; Herzke, D.; Bonefeld-Jørgensen, E. C.; et al. *Per- and Polyfluorinated Substances in the Nordic Countries*; 2013.
- (8) Liu, X.; Guo, Z.; Folk, E. E.; Roache, N. F. Determination of Fluorotelomer Alcohols in Selected Consumer Products and Preliminary Investigation of Their Fate in the Indoor Environment. *Chemosphere* **2015**, 129, 81–86.
- (9) Wang, Z.; Cousins, I. T.; Scheringer, M.; Hungerbühler, K. Fluorinated Alternatives to Long-Chain Perfluoroalkyl Carboxylic Acids (PFCAs), Perfluoroalkane Sulfonic Acids (PFASs) and Their Potential Precursors. *Environ. Int.* **2013**, 60, 242–248.
- (10) Zabaleta, I.; Bizkarguenaga, E.; Bilbao, D.; Etchebarria, N.; Prieto, A.; Zuloaga, O. Fast and Simple Determination of Perfluorinated Compounds and Their Potential Precursors in Different Packaging Materials. *Talanta* **2016**, 152, 353–363.
- (11) Yuan, G.; Peng, H.; Huang, C.; Hu, J. Ubiquitous Occurrence of Fluorotelomer Alcohols in Eco-Friendly Paper-Made Food-Contact Materials and Their Implication for Human Exposure. *Environ. Sci. Technol.* **2016**, 50 (2), 942–950.
- (12) Sinclair, E.; Kim, S. K.; Akinleye, H. B.; Kannan, K. Quantitation of Gas-Phase Perfluoroalkyl Surfactants and Fluorotelomer Alcohols Released from Nonstick Cookware and Microwave Popcorn Bags. *Environ. Sci. Technol.* **2007**, 41 (4), 1180–1185.
- (13) Schaidt, L. A.; Balan, S. A.; Blum, A.; Andrews, D. Q.; Strynar, M. J.; Dickinson, M. E.; Lunderberg, D. M.; Lang, J. R.; Peaslee, G. F. Fluorinated Compounds in U.S. Fast Food Packaging. *Environ. Sci. Technol. Lett.* **2017**, 4 (3), 105–111.
- (14) Begley, T. H.; White, K.; Honigfort, P.; Twaroski, M. L.; Neches, R.; Walker, R. A. Perfluorochemicals: Potential Sources of and Migration from Food Packaging. *Food Addit. Contam.* **2005**, 22 (10), 1023–1031.
- (15) Begley, T. H.; Hsu, W.; Noonan, G.; Diachenko, G. Migration of Fluorochemical Paper Additives from Food-Contact Paper into Foods and Food Simulants. *Food Addit. Contam., Part A* **2008**, 25 (3), 384–390.
- (16) Washington State Legislature. HB 2658 - 2017–18 Concerning the use of perfluorinated chemicals in food packaging. <http://apps.leg.wa.gov/WAC/default.aspx?cite=388-78A-2180> (accessed December 9, 2018).
- (17) Granby, K.; Pedersen, G. A. Vurdering Af Metode Til Bestemmelse Af Total Organisk Fluor (TOF) i Fødevarekontaktmaterialer Og Bestemmelse Af Baggrunds niveau for TOF i Pap Og Papir.
- (18) Martin, J. W.; Kannan, K.; Berger, U.; De Voogt, P.; Field, J.; Franklin, J.; Giesy, J. P.; Harner, T.; Muir, D. C. G.; Scott, B.; et al.

Peer Reviewed: Analytical Challenges Hamper Perfluoroalkyl Research. *Environ. Sci. Technol.* **2004**, 38 (13), 248A–255A.

(19) McDonough, C. A.; Guelfo, J. L.; Higgins, C. P. Measuring Total PFASs in Water: The Tradeoff between Selectivity and Inclusivity. *Current Opinion in Environmental Science & Health* **2018**, DOI: 10.1016/j.coesh.2018.08.005.

(20) Miyake, Y.; Yamashita, N.; Rostkowski, P.; So, M. K.; Taniyasu, S.; Lam, P. K. S.; Kannan, K. Determination of Trace Levels of Total Fluorine in Water Using Combustion Ion Chromatography for Fluorine: A Mass Balance Approach to Determine Individual Perfluorinated Chemicals in Water. *J. Chromatogr. A* **2007**, 1143 (1–2), 98–104.

(21) Miyake, Y.; Yamashita, N.; So, M. K.; Rostkowski, P.; Taniyasu, S.; Lam, P. K. S.; Kannan, K. Trace Analysis of Total Fluorine in Human Blood Using Combustion Ion Chromatography for Fluorine: A Mass Balance Approach for the Determination of Known and Unknown Organofluorine Compounds. *J. Chromatogr. A* **2007**, 1154 (1–2), 214–221.

(22) Yeung, L. W. Y.; Miyake, Y.; Li, P.; Taniyasu, S.; Kannan, K.; Guruge, K. S.; Lam, P. K. S.; Yamashita, N. Comparison of Total Fluorine, Extractable Organic Fluorine and Perfluorinated Compounds in the Blood of Wild and Perfluorooctanoate (PFOA)-Exposed Rats: Evidence for the Presence of Other Organofluorine Compounds. *Anal. Chim. Acta* **2009**, 635 (1), 108–114.

(23) Yeung, L. W. Y.; Miyake, Y.; Wang, Y.; Taniyasu, S.; Yamashita, N.; Lam, P. K. S. Total Fluorine, Extractable Organic Fluorine, Perfluorooctane Sulfonate and Other Related Fluorochemicals in Liver of Indo-Pacific Humpback Dolphins (*Sousa chinensis*) and Finless Porpoises (*Neophocaena phocaenoides*) from South China. *Environ. Pollut.* **2009**, 157 (1), 17–23.

(24) Schultes, L.; Vestergren, R.; Volkova, K.; Westberg, E.; Jacobson, T.; Benskin, J. P. Per- and Polyfluoroalkyl Substances and Fluorine Mass Balance in Cosmetic Products from the Swedish Market: Implications for Environmental Emissions and Human Exposure. *Environ. Sci.: Processes Impacts* **2018**, 20 (12), 1680–1690.

(25) Kiss, A. Z.; Koltay, E.; Nyakó, B.; Somorjai, E.; Anttila, A.; Räisänen, J. Measurements of Relative Thick Target Yields for PIGE Analysis on Light Elements in the Proton Energy Interval 2.4–4.2 MeV. *J. Radioanal. Nucl. Chem.* **1985**, 89 (1), 123–141.

(26) Tuurnala, T.; Hautajärvi, A.; Harva, K. Nondestructive Analysis of Paintings by PIXE and PIGE. *Stud. Conserv.* **1985**, 30 (2), 93–99.

(27) Roelandts, I.; Robaye, G.; Weber, G.; Delbrouck-Habaru, J. M. The Application of Proton-Induced Gamma-Ray Emission (PIGE) Analysis to the Rapid Determination of Fluorine in Geological Materials. *Chem. Geol.* **1986**, 54 (1–2), 35–42.

(28) Ritter, E. E.; Dickinson, M. E.; Harron, J. P.; Lunderberg, D. M.; DeYoung, P. A.; Robel, A. E.; Field, J. A.; Peaslee, G. F. PIGE as a Screening Tool for Per- and Polyfluorinated Substances in Papers and Textiles. *Nucl. Instrum. Methods Phys. Res., Sect. B* **2017**, 407, 47–54.

(29) Robel, A. E.; Marshall, K.; Dickinson, M.; Lunderberg, D.; Butt, C.; Peaslee, G.; Stapleton, H. M.; Field, J. A. Closing the Mass Balance on Fluorine on Papers and Textiles. *Environ. Sci. Technol.* **2017**, 51 (16), 9022–9032.

(30) Carioni, V. M. O.; Brockman, J. D.; Morris, M. C.; Ngwenyama, R. A.; Schell, L. A.; Spate, V. L.; Crane, S. Instrumental Neutron Activation Analysis, a Technique for Measurement of Se, Hg, Fe, Zn, K, Mn, Br, and the Hg:Se Ratio in Brain Tissue Samples with Results from the Memory and Aging Project (MAP). *J. Radioanal. Nucl. Chem.* **2018**, 318, 43–48.

(31) Feskanich, D.; Owusu, W.; Hunter, D. J.; Willett, W.; Ascherio, A.; Spiegelman, D.; Morris, S.; Spate, V. L.; Colditz, G. Use of Toenail Fluoride Levels and an Indicator for the Risk of Hip and Forearm Fractures in Women. *Epidemiology* **1998**, 9 (4), 412–416.

(32) Spate, V. L.; Morris, J. S.; Baskett, C. K.; Mason, M. M.; Reams, C. L.; Hunter, D.; Willett, W. C. Determination of Fluoride in Human Nails via Cyclic Instrumental Neutron Activation Analysis. *J. Radioanal. Nucl. Chem.* **1994**, 179 (1), 27–33.

(33) Havránek, V.; Kučera, J.; Randa, Z.; Voseček, V. Comparison of Fluorine Determination in Biological and Environmental Samples by

NAA, PAA and PIXE. *J. Radioanal. Nucl. Chem.* **2004**, 259 (2), 325–329.

(34) Azua Jamari, N. L.; Behrens, A.; Raab, A.; Krupp, E. M.; Feldmann, J. Plasma Processes to Detect Fluorine with ICPMS/MS as [M-F]⁺: An Argument for Building a Negative Mode ICPMS/MS. *J. Anal. At. Spectrom.* **2018**, 33 (8), 1304–1309.

(35) Qin, Z.; McNee, D.; Gleisner, H.; Raab, A.; Kyeremeh, K.; Jaspars, M.; Krupp, E.; Deng, H.; Feldmann, J. Fluorine Speciation Analysis Using Reverse Phase Liquid Chromatography Coupled Off-Line to Continuum Source Molecular Absorption Spectrometry (CS-MAS): Identification and Quantification of Novel Fluorinated Organic Compounds in Environmental and Biological. *Anal. Chem.* **2012**, 84 (14), 6213–6219.

(36) Tokranov, A. K.; Nishizawa, N.; Amadei, C. A.; Zenobio, J. E.; Pickard, H. M.; Allen, J. G.; Vecitis, C. D.; Sunderland, E. M. How Do We Measure Poly- and Perfluoroalkyl Substances (PFASs) at the Surface of Consumer Products? *Environ. Sci. Technol. Lett.* **2019**, 6 (1), 38–43.

(37) Gebbink, W. A.; Ullah, S.; Sandblom, O.; Berger, U. Polyfluoroalkyl Phosphate Esters and Perfluoroalkyl Carboxylic Acids in Target Food Samples and Packaging-Method Development and Screening. *Environ. Sci. Pollut. Res.* **2013**, 20 (11), 7949–7958.

(38) Vestergren, R.; Ullah, S.; Cousins, I. T.; Berger, U. A Matrix Effect-Free Method for Reliable Quantification of Perfluoroalkyl Carboxylic Acids and Perfluoroalkane Sulfonic Acids at Low Parts per Trillion Levels in Dietary Samples. *J. Chromatogr. A* **2012**, 1237, 64–71.

(39) Fluorinated substances in paper and cardboard food contact materials (FCM). www.fvst.dk (accessed October 28, 2018).

(40) Rankin, K.; Mabury, S. A. Influence of Fluorination on the Characterization of Fluorotelomer-Based Acrylate Polymers by Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry. *Anal. Chim. Acta* **2014**, 808, 115–123.



**Board of Health
TOWN OF NEEDHAM
AGENDA FACT SHEET**



MEETING DATE: 12/10/2019

Agenda Item	Mobile Food Truck Permitting Process
Presenter(s)	Diana Acosta, Environmental Health Agent

1.	BRIEF DESCRIPTION OF TOPIC TO BE DISCUSSED
Ms. Diana Acosta will provide an overview of the procedure on permitting a mobile food truck. The Board and Public Health Division staff will discuss a joint program with the Town Manager's Office that has been a pilot program for the past two summers.	
2.	VOTE REQUIRED BY SELECT BOARD
Vice Chair: Based upon the successful results of the two year pilot program, I move that the Board of Health confirm that the Town Manager's Office shall coordinate all mobile food vendor permits and that the Public Health Division continue to assistance the Town Manager's Office in the single application process for mobile food vendors.	
3.	BACK UP INFORMATION ATTACHED
Outline of the mobile food truck application process.	



Mobile Food Truck Process – Health

1. **Mobile Vendor submits online application** - <https://www.needhamma.gov/forms.aspx?FID=381>
 - a. Online application allows entry of name of business, owner, contact information, vehicle information, menus, food prep layout, ServSafe and allergy trainings, driver's license, commissary permit, insurance, and restroom agreement
 - i. Reduces having to rewrite information for each department
 - b. If new vendor, they must also include a physical plan and specification review
 - i. Reports finishes on inside of vehicle, hand and ware washing facilities, kitchen equipment, garbage, information on commissary
2. **After online submission an email is sent from CivicPlus to Diana, Tara, Sandy & Nikki of Town Manager's office, and Kym of Fire Department.**
 - a. Email lists all items that were filled out in the online form
3. **Town Manager's office uploads all attachments to :K > Mobile Food Vendors**
4. **Diana reviews attachments and contacts Mobile Truck applicant.**
 - a. Will attempt to gather any missing information and ask any questions
5. **Once all items are submitted, Diana will coordinate with the vendor to conduct an inspection of the truck. Fire Dept. is contacted to try to coordinate inspections on the same date/time.**
 - a. If it is for a temporary event, the inspection must be completed before the event
 - b. Trucks may not vend seasonally until truck passes inspection
6. **Once the truck passes inspection, they are given a permit for the season**
 - a. If temporary, they will need to submit a temporary food establishment permit application as well. One inspection is valid for the rest of the mobile food truck season (April 1 – November 30).
7. **Diana coordinates with Sandy to verify what days / parking slot vendor has been assigned before issuing permit.**

Mobile Truck Permits	
2018	2019
Bowl Boyz – seasonal (dates depended on weather)	Bowl Boyz – seasonal (dates depended on weather)
Chicken and Rice Guys –seasonal – 2 trucks	Chicken and Rice Guys –seasonal – 2 trucks
Cod Squad – seasonal	Chubby Chickpea – temporary to seasonal
Curbside Caps - Denied	Cookie Monstah – temporary event
Moyzilla – seasonal (dropped out)	Oath Pizza – temporary event
Riceburg -seasonal	
Roadworthy - seasonal	
Roxy's Grilled Cheese – seasonal (early drop out)	
Sam's Hot Dog Cart -seasonal	

Many trucks dropped out early in the 2018 season due to low sales at assigned locations on A Street or Fourth Ave. 2 returns for 2019 season.

Emergency Admin faces communications stru

By Trevor Ballantyne
tballantyne@wickedlocal.com

After 10 years in the Navy as a fighter pilot - deployed in Japan and Washington state, Lt. Commander Rebecca Ping secured a Masters of Science degree in emergency management and began working for Needham in 2017 as its emergency management administrator.

Then, in early 2018, the Naval reservist got a call to deploy. Six months later, she found herself at Al Udeid Air Base in Qatar assigned to a non-flying role in the U.S. military's Combined Air Operations Center.

"The town was really supportive of me when I went away," Ping

said last week as she reflected on her recent deployment ahead of Veterans Day. "So many people picked up the slack while I was gone and kept projects moving."

Ping said the deployment was difficult, but returning to Needham in August, she felt confident in the town's ability to respond to any emergency that may present itself - extreme weather, power outages, and HAZMAT spills to name a few - the biggest challenge, she said, is communicating with residents about what that crisis might be when it arises.

For decades, Needham relied on a reverse 911 dialing system to communicate in times of

See ADMIN, A11



Lt. Commander Rebecca Ping, a former U.S. Navy flight instructor, is Needham's Emergency Management Administrator. [COURTESY OF NEEDHAM]

emergencies, but that technology is increasingly outdated as more and more Needham residents ditch their landlines in favor of exclusive cell phone use.

Currently, there are more than 10,000 landlines included in the town's Rave Alert System, but only 893 people are opted into the emergency communications system with their email address or cell phone number. According to the latest U.S. Census Data, around 29,000 people live in Needham and thousands more commute to work in town each day.

"We are really trying to get people to opt in with their cell phones and emails," Ping said. "There are so many of these sys-

tems out there now, it can be confusing, you might think you are signed up for it, but you are not for our particular system."

Ping got her first exposure to a large scale emergency response following the devastation brought by a massive tsunami in Japan in 2011.

Deployed to a Naval Air Facility at Atsugi, Japan at the time, "that was my first big exposure to emergency management," Ping

For decades, Needham relied on a reverse 911 dialing system to communicate in times of emergencies, but that technology is increasingly outdated as more and more Needham residents ditch their landlines in favor of exclusive cell phone use. Currently, there are more than 10,000 landlines included in the town's Rave Alert System, but only 893 people are opted into the emergency communications system with their email address or cell phone number.

said. "Not only are you taking care of those planes, but you have people, logistics, and hotel rooms and thinking about 'what is our long-term plan?'"

Years after the tsunami, Ping's personal long-term plan began to form as a naval flight officer stationed at Naval Air Station on Whidbey Island in Washington. Her role included teaching flight school students the art of how to fly on and off aircraft carriers and included spending time in the ship's flight control tower.

"Some people loved being in the plane -- I loved being in that tower," Ping remembered. With students training on



A U.S. Navy jet flown by Lt. Commander Rebecca Ping. Ping served in the Navy for ten years. Today, she is a Naval Reservist and works as Needham's Emergency Management Administrator. [COURTESY PHOTO / TOWN OF NEEDHAM]

takeoff and landing, she said she got into a groove and began to love the organized chaos presented by the position. Then in 2013, a crash near the base took the lives of three pilots during a training flight. The fighter plane

went down about 10 miles outside of Harrington, Washington, and Ping remembered sending her students home and flying to the crash site to help with the recovery. "That is when it all started

kind of coming together," Ping said of her future career path in Emergency Management Administration.

In the first couple of months in her role as Needham's Emergency Administrator, Ping said she focused on updating Needham's security protocols and working to establish connections with her colleagues, including the Needham Police and Fire Departments, in addition to contacting counterparts at the local, state, and federal level.

Now Ping's goal is to help increase awareness of the alert system sign up, but she said the goal is not to inundate residents with alerts.

Since she joined the town's Emergency Preparedness Department, the alert notification has only been used twice. Once, when an elderly citizen went missing, and again earlier this year after the state announced plans to spray parts of Needham in an effort to fight the spread of the mosquito borne virus EEE.

"All emergencies start and end local," Ping said. The most important thing is to "prioritize and prepare for the fundamentals that will enable you to handle any type of emergency."

To sign up for the alerts, or to check if you are already signed up, you can visit the town's website, Ping said.

Letter to the Editor



A sticker drive 'thank you'

The Needham High School Boosters Club would like to thank our athletes, families, athletic department, Booster Reps and most importantly our community for supporting our annual Sticker Drive. Thank you for opening your doors and donating to our NHS Athletic Department to provide much needed funding for fee waivers and athletic support.

A special thanks to Roche Bros., Sudbury Farms, Volante Farms, Dunkin Donuts, Starbucks and Trader Joe's for letting our athletes set tables up outside their storefront. If you missed our athletes knock on the door and would like to make a donation or learn more about what we do, please visit www.needhamhighschoolboosters.org.

- Needham High School Boosters Club

A Community Council 'thank you'

Dear Editor:

The Needham Community Council would like to thank the Temple Beth Shalom Congregation for their very generous food donations for our Food Pantry customers. The annual High Holiday food drive always helps just when we really need it! After the summer, our supplies run low and their food drive helps to fill them up again! Over 570 bags of food were donated this year.

More than 200 Needham seniors and families who have limited financial resources visit the food pantry each month. The work of the Needham Community

Council could not continue without the entire community. Food items and donations are appreciated throughout the year. School groups, religious institutions, residents, garden clubs, local grocery stores and restaurants all help keep us a strong and vital organization with their donations and generosity.

We are excited to celebrate our 90th anniversary in 2020. Needham residents started the Council in 1930 to respond to the needs of their neighbors. Although our programs have changed over the years, our mission remains the same...to support Needham residents.

Sincerely,

Sandy Robinson

On the 5th Quarter

Thank you to MA State Rep Denise Gartick for sponsoring the recent 5th Quarter event at Needham High School. The substance free event for Needham

teens was organized by SPAN (Substance Prevention Alliance of Needham). Students enjoy free pizza, snacks and beverages, music, ping pong and basketball after home football games thanks to generous community

donations. Beth Israel Deaconess Needham Health, the Knights of Columbus and the NHS PTC also sponsored 5th Quarter events this fall sending volunteers to set up and serve pizza to the students. It takes a village!



Times 11/2/15

ion

Needham students help police on Drug Take Back Day

Trevor Ballantyne
/ Wicked Local

Three Needham High School students joined the Needham Police Department in participating in the Prescription Drug Take Back Day on Oct. 26.

Students Katie Ewald, Ashley Isenberg, and Maxim Grin joined the Needham Police School Resource Officer, R.J. Poirier, and Sergeant Rich Forbes at Needham Town Hall - one of more than 6,000 such sites operated nationwide on the Drug Enforcement Administration's Prescription Drug Take Back Day Program.

In Needham, the Take Back Day event was coordinated by Karen Shannon, Director for the Needham Drug Free Communities Grant, and supported by the Substance Prevention Alliance of Needham and the Needham Police Department.

The DEA has organized its National Drug Take Back Day for ten years in a row. According to the most recent National Survey on Drug Use and Health, 53 percent of survey respondents who reported misusing pain relievers said they were given, bought or taken from a friend or relative.

This year, the DEA also accepted vaping devices and cartridges as part of its initiative.

In Needham, unwanted or unused prescription medications can be returned anytime. According to the town's website, a secure drop box located in the Needham Police Department lobby is accessible for medication disposal 24 hours a day and seven days a week.



Needham High School students Katie Ewald, Ashley Isenberg and Maxim Grin and Needham Police Dept. officers R.J. Poirier and Sergeant Rich Forbes participated in the recent Prescription Drug Take Back Day at Needham Town Hall. [COURTESY PHOTO/ NEEDHAM PUBLIC HEALTH]

Rep. Garlick pushes vape legislation, ban on flavored tobacco products

The following is a press release from the office of Rep. Denise Garlick, D-Needham:

In an effort to promote the public health of all residents of Massachusetts, last week, State Rep. Denise C. Garlick (D-Needham), alongside her colleagues in the Massachusetts Legislature, voted in favor of legislation placing a ban on flavored tobacco products and an excise tax on electronic nicotine smoking devices, otherwise known as vaping products.

The passage of this legislation is the culmination of more than a decade of work for Representative Garlick on the issue of public health and nicotine addiction. Prior to joining the legislature, Garlick served as a member of the Needham Board of Health, where she voted to raise the age for purchasing tobacco to 21. Following in Needham's footsteps many years later, over 170 municipalities in the Commonwealth of Massachusetts adopted local Tobacco 21 laws in the lead-up to last session's law, which increased the age statewide to 21.

Flavor Ban

Flavored tobacco and vaping products have led to a public health epidemic in Massachusetts and across the country. Menthol flavoring appeals to the youth as 56.7 percent of youth smokers choose menthol cigarettes. While the use of non-menthol cigarettes has decreased as a whole since 2006, the percentage of youth using menthol cigarettes has remained constant and even increased among young adults. In both youth and adult age groups, menthol cigarette use was disproportionately higher by people of color. From 2008 to 2010, 94.9 percent of African American youth smokers used menthol cigarettes, compared to 51.3 percent of white youth smokers.

The legislation implements a ban on the online and retail sale of all flavored tobacco products, including menthol which data shows disproportionately targets young people and people of color.



Representative Garlick speaks with a group Needham students visiting the State House from Pollard Middle School this month." Credit: (Courtesy Photo / Office of Rep. Garlick)

"Menthol flavoring's disproportionate effect on youth, African Americans, and low-income residents is deeply concerning," Garlick said, "and a ban on all flavored tobacco products marks an evidence-based approach to reducing nicotine addiction and improving health outcomes for all residents of the Commonwealth."

Recently, the United States Surgeon General declared vaping among youth an epidemic in the United States. Vape use jumped dramatically among high school students between 2017 and 2018 – in fact, it was the biggest one-year spike in forty-four years among all substances tracked. The nicotine that vape liquids contain is a highly addictive chemical that can harm brain development, affecting crucial parts of the brain that control attention, learning, and mood and impulse control.

Excise Tax

H. 4183 also establishes an excise tax of 75 percent on the wholesale price of electronic nicotine smoking devices and products sold within the Commonwealth of Massachusetts. Of this revenue, 30 percent would be deposited into the Community

Behavioral Health Promotion and Prevention Trust Fund. Established by last session's opioid bill, of which Rep. Garlick was the House author, the purpose of the Trust Fund is to fund programs in communities that promote positive mental, emotional and behavioral health among children and young adults and to boost evidence based practices to prevent substance use disorders among children and young adults – providing the tools to address the needs specific to each community.

"This legislation presents a multi-pronged strategy to combat youth vaping in Massachusetts, which includes eliminating flavored vape products that attract youth users, price sensitivity, and a strong public health response to prevent addiction," said Rep. Garlick. "The data is clear: decreased access results in decreased use. Increasing the excise tax on vaping products will help prevent nicotine addiction and will exponentially impact the health and equity for the most vulnerable residents of our communities."

The bill now goes to the Senate for further consideration.