HEALTH IMPACT ASSESSMENT of the PROPOSED COMPRESSOR STATION, WEYMOUTH, MA

Advisory Committee Meeting #5

October 24, 2018

Agenda

- Welcome and Agenda Overview
- Introductions
- HIA Advisors Updates
- Existing Conditions Review:
  - Health and Air Quality
  - Noise and Land Use/ Natural Resource
- Impact Assessment Discussion: Projected Changes in Air Quality
- Meeting Evaluation and Next Steps

Meeting Objectives

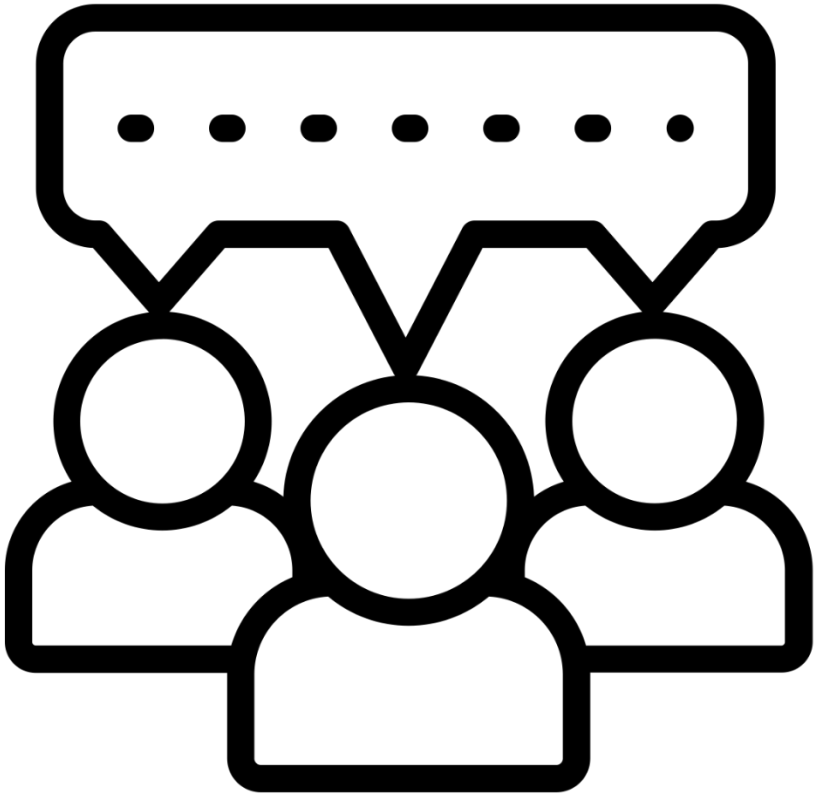
- Understanding of existing conditions data so that advisors can provide feedback on collected data and set the context for the impact assessment
- Understanding of anticipated impacts so that advisors can provide feedback on impact findings and inform direction of potential recommendations
- List of outstanding questions and parking lot items

HIA Project Team

- Massachusetts Department of Public Health (MDPH)
- Massachusetts Department of Environmental Protection (MassDEP)
- Metropolitan Area Planning Council (MAPC)

Advisory Committee Member Introductions

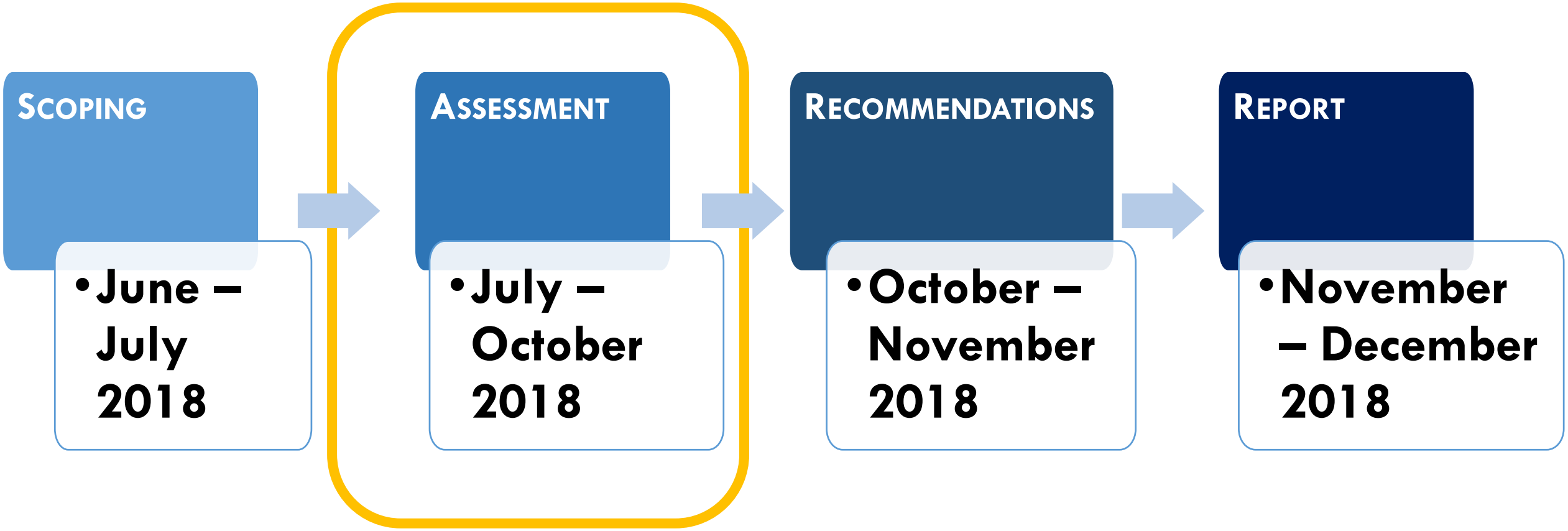
- Name
- Where from/Who Representing
- Icebreaker Question



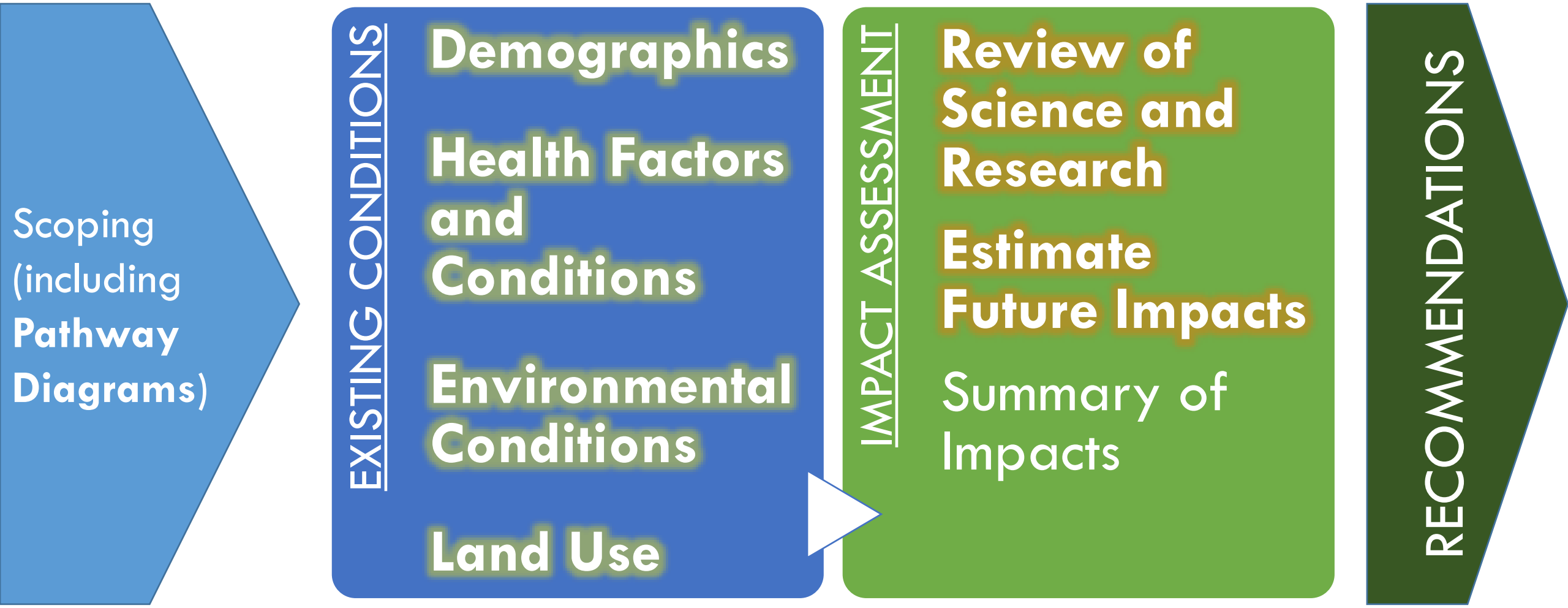
Advisory Committee Roles and Responsibilities

- Advise the project team during all phases of the HIA (e.g., scoping the HIA, assessment of health impacts)
- Share expertise and range of experiences and perspectives related to the HIA
- Consultation by phone and email

HIA Timeline



Assessment Step of HIA



HIA Advisors Update

Participant updates and information sharing

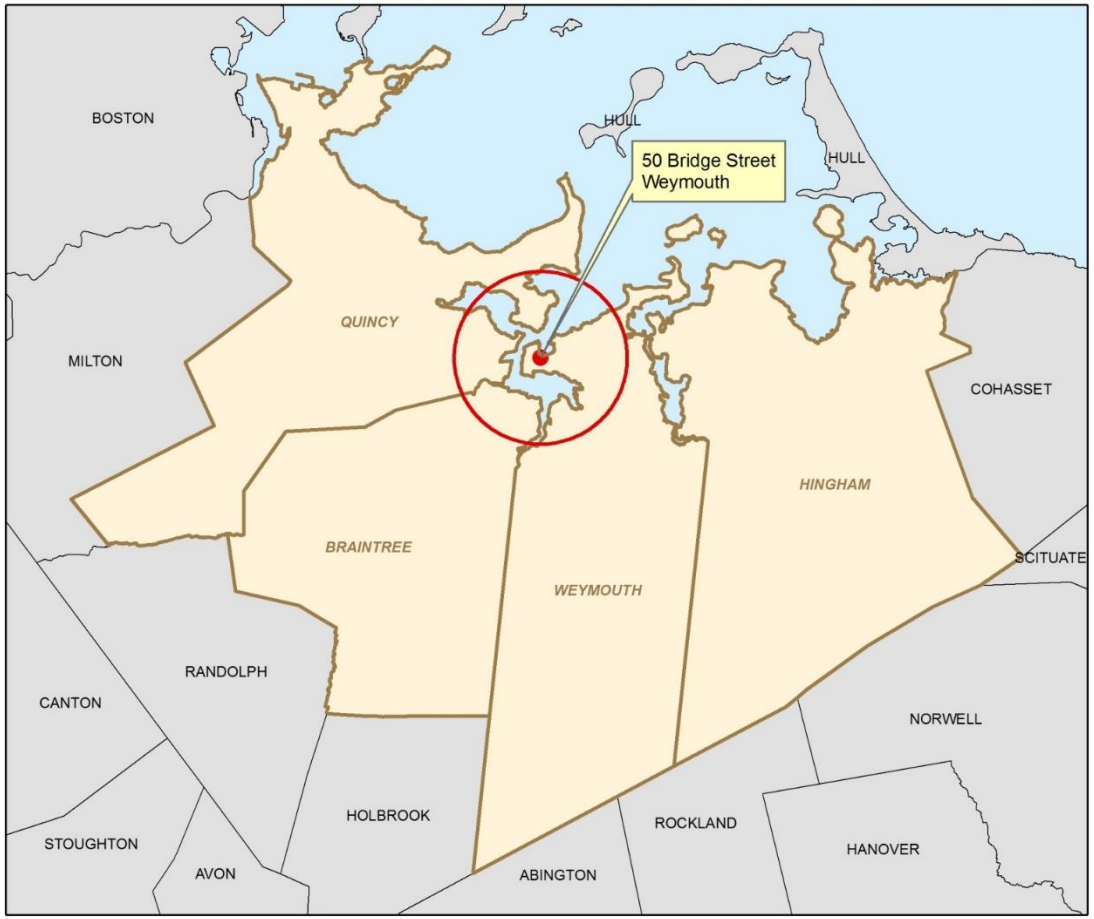
Exploration of Existing Conditions Data for Health and Air Quality

Participatory assessment and discussion of the existing health and air quality data for people and the areas surrounding the proposed compressor station

Health Data: To Date

Health Outcome	Health Measure	Geography	Source
Cancer	Standardized Incidence Ratios (SIRs) for 23 cancer types	Community	Massachusetts Cancer Registry
Cardiovascular Disease	Rates of hospital admissions for myocardial infarction (heart attack)	Community	Center for Health Information and Analysis (CHIA)
Respiratory Conditions	Pediatric asthma prevalence	Community; Schools	MDPH Bureau of Environmental Health
	Rates of hospital admissions for asthma	Community	CHIA
	Rates of ED visits for asthma	Community	CHIA
	Rates of hospital admissions for COPD	Community	CHIA
	Rates of ED visits for COPD	Community	CHIA
Reproductive Outcomes	Percent low birth weight	Community	MA Registry of Vital Records and Statistics

Health Data: To Date



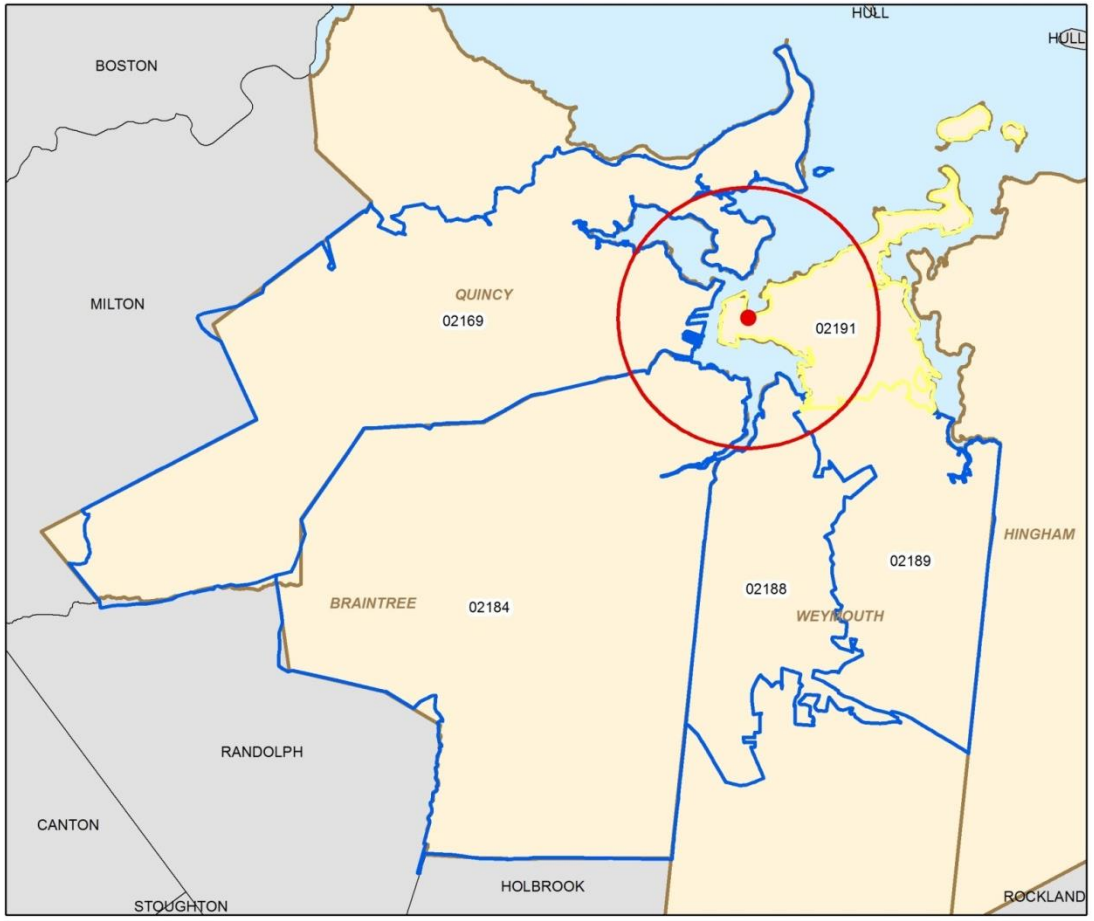
Health Data: New Data

Health Outcome	Health Measure	Geography	Source
Cancer	Standardized Incidence Ratios (SIRs) for lung & bronchus, acute myeloid leukemia (AML), and nasal	CT	Massachusetts Cancer Registry
Cardiovascular Disease	Rates of hospital admissions for myocardial infarction (heart attack)	Zip code	Center for Health Information and Analysis (CHIA)
Respiratory Conditions	Rates of hospital admissions for asthma	Zip code	CHIA
	Rates of ED visits for asthma	Zip code	CHIA
	Rates of hospital admissions for COPD	Zip code	CHIA
	Rates of ED visits for COPD	Zip code	CHIA
Reproductive Outcomes	Percent low birth weight	CT	MA Registry of Vital Records and Statistics

Health Data: New Data

Legend

- Proposed Compressor Station
- 2 km Buffer
- Census Tracts with >40%population within 2km buffer area
- Census Tracts
- Communities



Legend

- Proposed Compressor Station
- 2 km Buffer
- Zip Codes with >40% population within 2km buffer area
- Zip Codes

Health Data: Previous HIA Team Observations

Statistical Significance of Age-Adjusted Rates of Respiratory Conditions Compared to Statewide				
	Braintree	**Hingham**	**Quincy**	**Weymouth**
Asthma Hospital Admissions 2000-2015	Lower	Lower	Lower	**Higher**
Asthma Emergency Department Visits 2002-2015	Lower	Lower	Lower	Lower
COPD Hospital Admissions 2000-2015	**Higher**	Lower	**Higher**	**Higher**
COPD Emergency Department Visits 2002-2015	Lower	Lower	**Higher**	**Higher**

Note that one additional year of data has been added.

New Health Data: HIA Team Observations

Statistical Significance of Age-Adjusted Rates of Respiratory Conditions Compared to Statewide	
	Zip Code 02191
Asthma Hospital Admissions 2010-2015	No Difference
Asthma Emergency Department Visits 2010-2015	No Difference
COPD Hospital Admissions 2010-2015	No Difference
COPD Emergency Department Visits 2010-2015	No Difference

Health Data: Previous HIA Team Observations

Statistical Significance of Rates of Cardiovascular Conditions Compared to Statewide	
	Heart Attack Hospital Admissions 2000-2015
Braintree	**Higher**
Hingham	Lower
Quincy	**Higher**
Weymouth	**Higher**

Note that one additional year of data has been added.

New Health Data: HIA Team Observations

Statistical Significance of Rates of Cardiovascular Conditions Compared to Statewide	
	Heart Attack Hospital Admissions 2010-2015
Zip Code 02191	NS

Rates for individual years were either statistically significantly lower than the state or not statistically different from the statewide rate.

Health Data: Previous HIA Team Observations

Cancer types that are consistently statistically significantly elevated during both time periods are in **Bold.**

Statistically Significantly Elevated Cancer Types		
Community	**2006-2010**	**2011-2015***
Braintree	Lung & Bronchus (females) Melanoma (females) All sites (males & females)	Colon/Rectum (females)
Hingham	**Melanoma (males & females)** NHL (females)	Esophagus (females) **Melanoma (males & females)**
Quincy	**Colon/Rectum (males)** **Liver & IBD (males)** **Lung & Bronchus (females)** **Oral Cavity & Pharynx (males)**	Cervical (females) **Colon/Rectum (males)** **Liver & IBD (males)** **Lung & Bronchus** (males & **females**) **Oral Cavity & Pharynx (males)** All sites (males & females)
Weymouth	Lung & Bronchus (females)	Bladder (females) Larynx (males) Lung & Bronchus (males) Melanoma (females)

*** Provisional Data: The 2011-2015 Massachusetts cancer incidence data for cities and towns are provisional and subject to revision until they have been thoroughly reviewed for final approval.**

Health Data: New HIA Team Observations

Statistically significantly elevations at the community level:

- Ages at the time of diagnosis follow what would be expected for each cancer type.
- Subtypes/histology (cell types) follow what would be expected for each cancer type.
- Spatial distribution of diagnoses for each cancer type generally follows population density patterns.

Health Data: New HIA Team Observations

Statistically significantly elevations at the community level (continued):

- Occupational exposures
  - Occupational exposures are possible risk factors for cancers of the bladder, esophagus, liver & IBD, and lung & bronchus as well as melanoma and NHL.
  - Of those diagnosed with a cancer type for which occupational exposures are a possible risk factor and for whom a specific occupation was reported at the time of diagnosis (n=1,066), approximately 10% had a possible occupational exposure.
- Tobacco use
  - Tobacco use is an established risk factor for cancers of the bladder, cervix, colon/rectum, esophagus, larynx, liver & IBD, lung and bronchus, and oral cavity & pharynx.
  - Of those diagnosed with a cancer type for which tobacco use is an established risk factor and for whom a tobacco use history was reported at the time of diagnosis (n=1,478), 80% were current or former smokers.

Health Data: Updated HIA Team Observations

Cancer types for which tobacco use is an established risk factor are in **Bold.**

Statistically Significantly Elevated Cancer Types		
Community	**2006-2010**	**2011-2015***
Braintree	**Lung & Bronchus** (females) Melanoma (females) All sites (males & females)	**Colon/Rectum** (females)
Hingham	Melanoma (males & females) NHL (females)	**Esophagus** (females) Melanoma (males & females)
Quincy	**Colon/Rectum** (males) **Liver & IBD** (males) **Lung & Bronchus** (females) **Oral Cavity & Pharynx** (males)	**Cervical** (females) **Colon/Rectum** (males) **Liver & IBD** (males) **Lung & Bronchus** (males & females) **Oral Cavity & Pharynx** (males) All sites (males & females)
Weymouth	**Lung & Bronchus** (females)	**Bladder** (females) **Larynx** (males) **Lung & Bronchus** (males) Melanoma (females)

*** Provisional Data: The 2011-2015 Massachusetts cancer incidence data for cities and towns are provisional and subject to revision until they have been thoroughly reviewed for final approval.**

New Health Data: HIA Team Observations

- Evaluation of 3 cancer types associated with projected air emissions in 5 census tracts (CTs) in focus area
  - Acute Myeloid Leukemia
    - Small numbers
  - Lung and Bronchus
    - Statistically significantly elevated among males in CT 4178.02 during 2006-2010 and 2011-2015 and among males in CT 4179.01 during 2011-2015
      - Of those who had a tobacco use history reported at the time of diagnosis (n=44), 80% were current or former smokers.
      - Of those who had a specific occupation reported at the time of diagnosis (n=33), approximately 1/3rd had a possible occupational exposure.
  - Nasal/Nasopharynx
    - Small numbers

Health Data: Previous HIA Team Observations

Statistical Significance of Rates of Reproductive Outcomes Compared to Statewide	
	Low Birth Weight 2000-2015
Braintree	No Difference
Hingham	Lower
Quincy	No Difference
Weymouth	No Difference

New Health Data: HIA Team Observations

Statistical Significance of Rates of Reproductive Outcomes Compared to Statewide	
	Low Birth Weight 2000-2015
CT 4178.02	No Difference
CT 4179.01	No Difference
CT 4194	No Difference
CT 4227	No Difference
CT 4228	No Difference

Air Quality Data – Previous HIA Team Observations

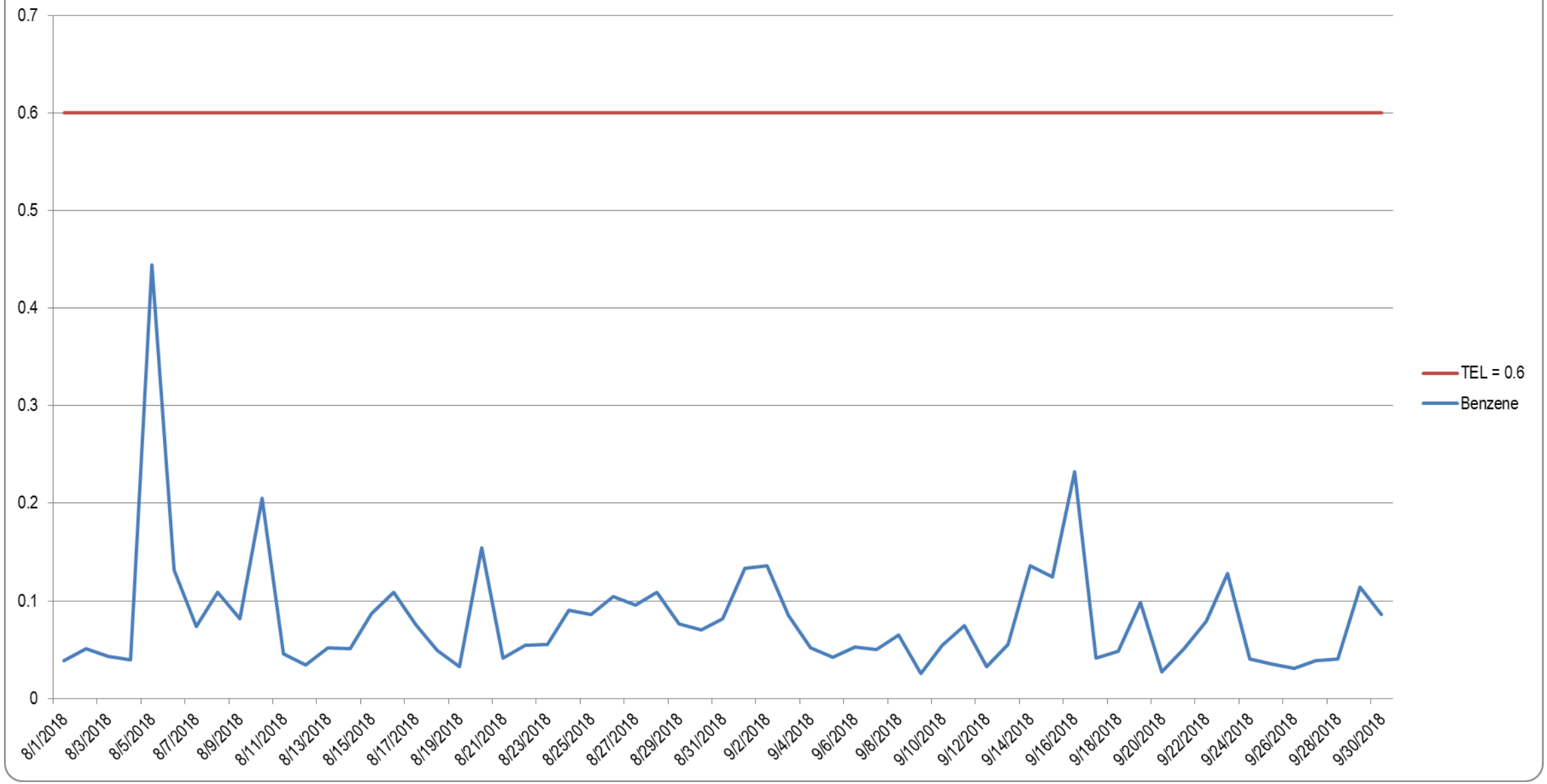
- VOC levels in Fore River area are similar to levels in other urban areas (e.g., Boston, Lynn, and Chicopee)
- VOC levels are consistent with urban background levels
- Some formaldehyde levels exceed the TEL; these levels are consistent with urban background levels
- While not directly comparable, some VOC levels exceed the AALs (e.g., formaldehyde, benzene, carbon tetrachloride); these levels are consistent with urban background levels

Air Quality Data – New Data

- Addition of September monitoring results from mini-station at Weymouth MWRA Pump Station
  - Continuous monitoring of benzene, toluene, ethylbenzene, xylenes
  - Every sixth day Carbonyl 24-hour composite monitoring (i.e., formaldehyde and acetaldehyde)
- $PM_{2.5}$ and NO_2 Boston Metro Area monitoring trends

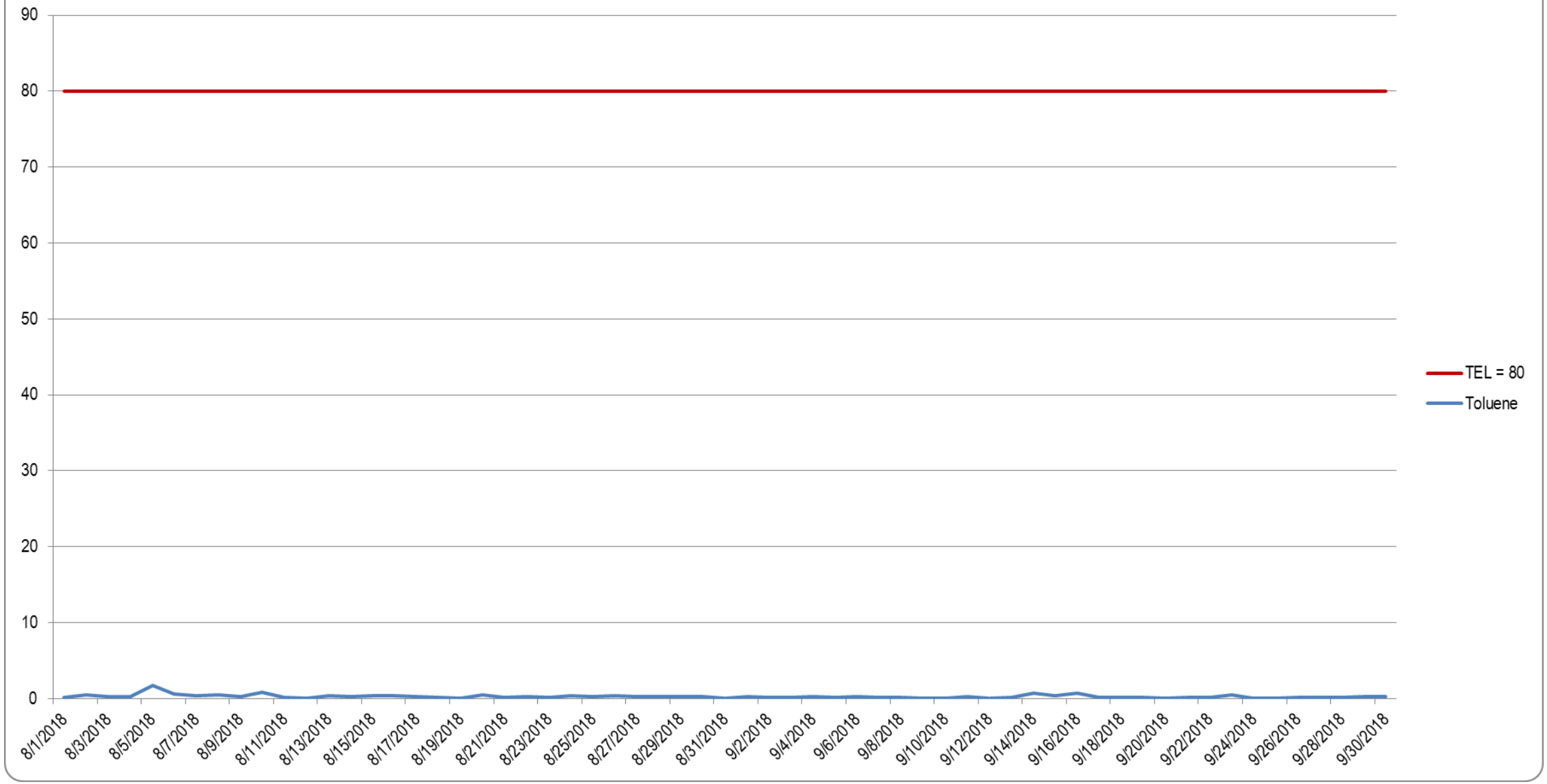
Benzene Concentrations Relative to TEL

Gas Chromatorgraph Hourly Monitoring Reported as 24-hr Average Concentrations for August -September 2018 (µg/m3)
Weymouth MWRA Pump Station



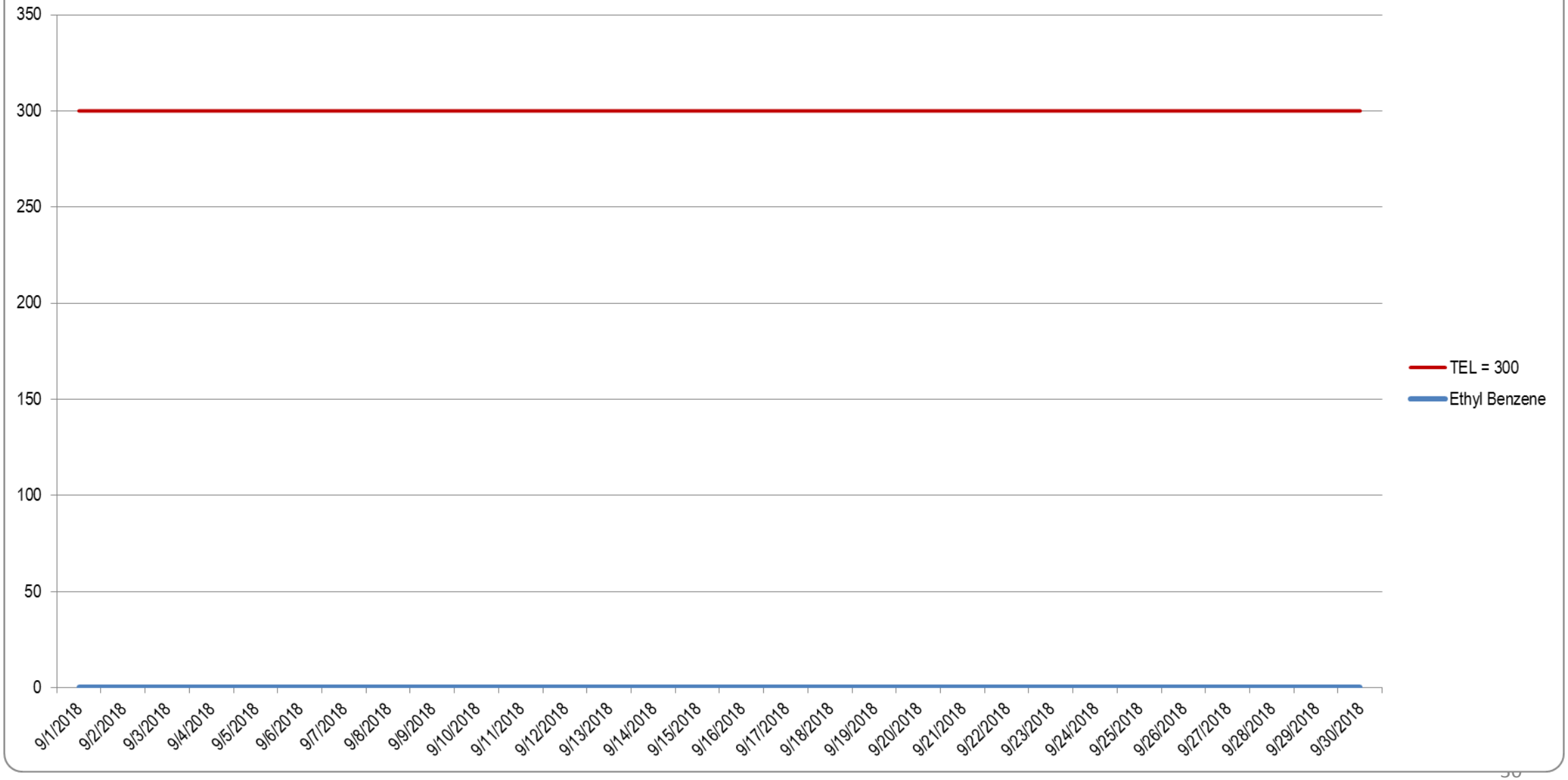
Toluene Concentrations Relative to TEL

Gas Chromatorgraph Hourly Monitoring Reported as 24-hr Average Concentrations for August-September 2018 (µg/m^3)
Weymouth MWRA Pump Station



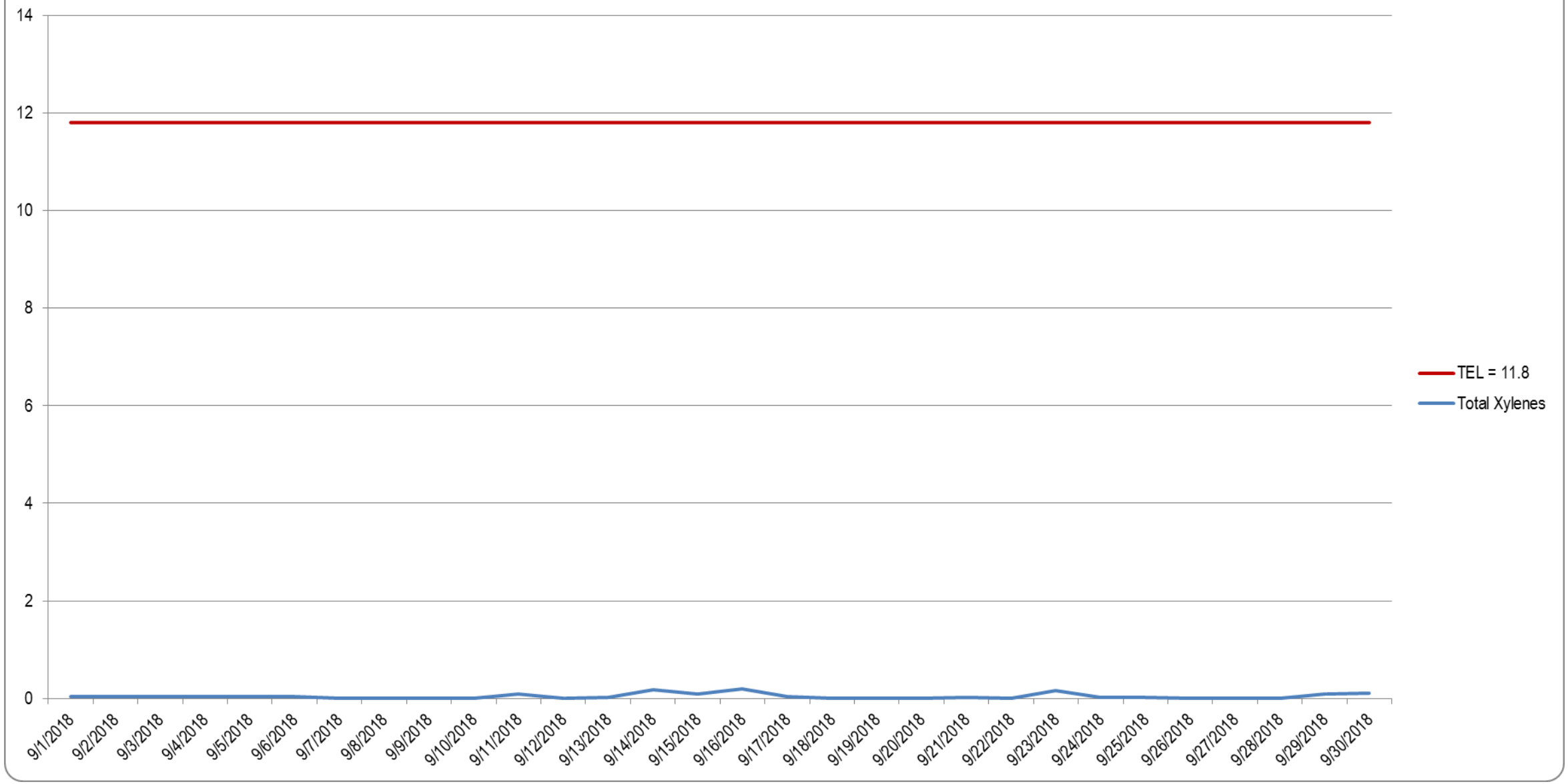
Ethylbenzene Concentrations Relative to TEL

Gas Chromatorgraph Hourly Monitoring Reported as 24-hr Average Concentrations for September 2018 (µg/m³)
Weymouth MWRA Pump Station



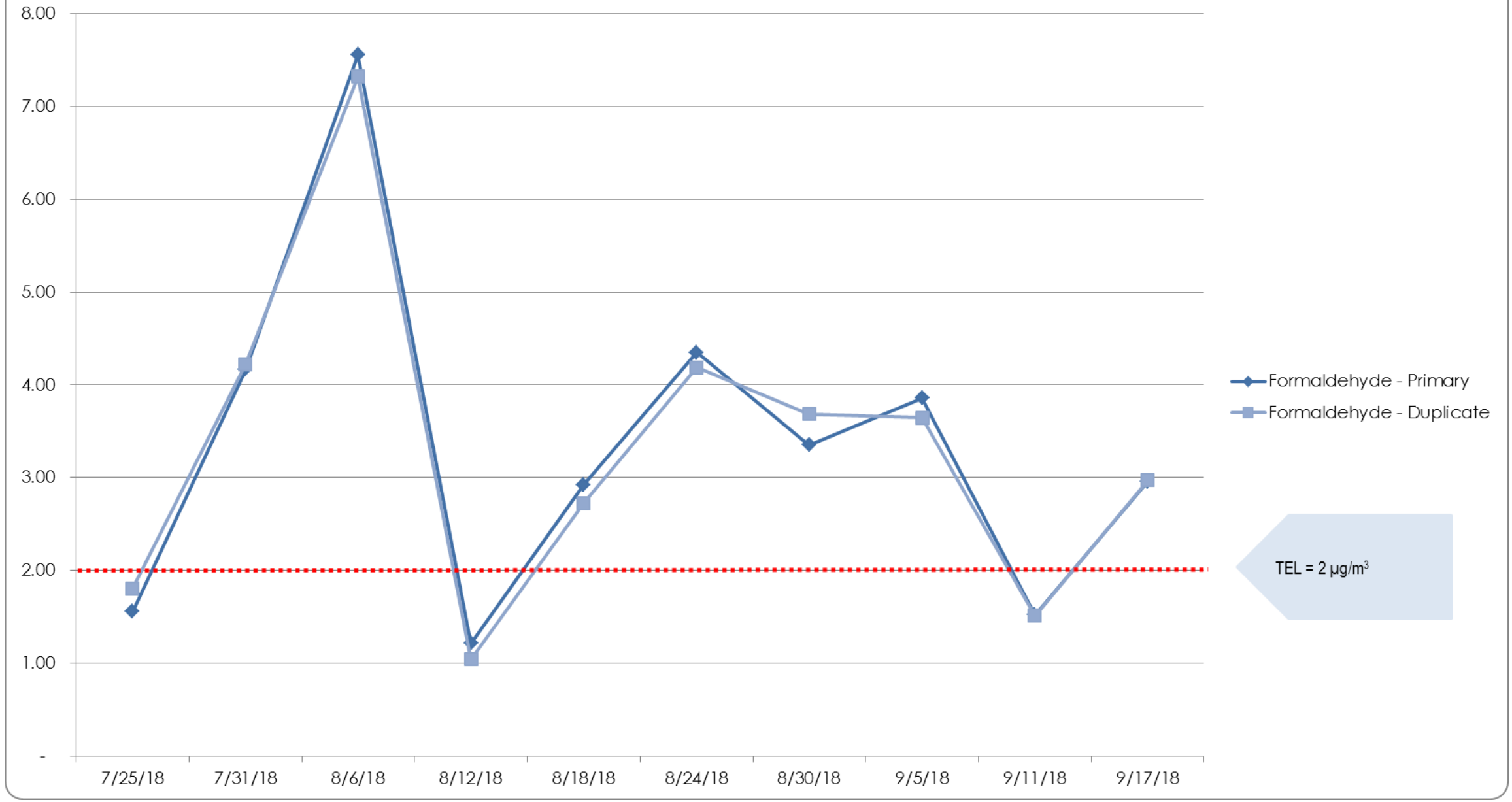
Total Xylene Concentrations Relative to TEL

Gas Chromatorgraph Hourly Monitoring Reported as 24-hr Average Concentrations for September 2018 (µg/m³)
Weymouth MWRA Pump Station



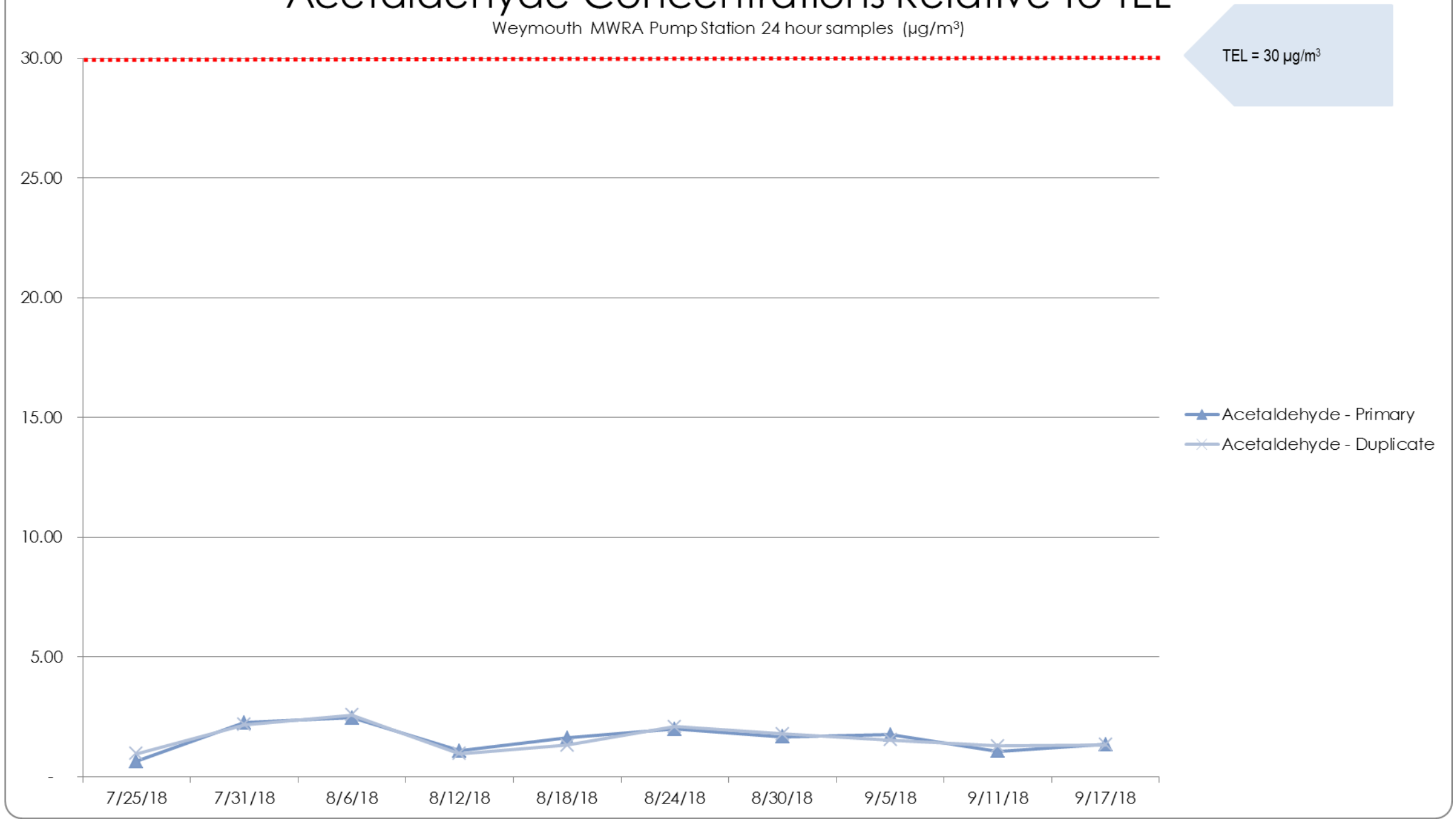
Formaldehyde Concentrations Relative to TEL

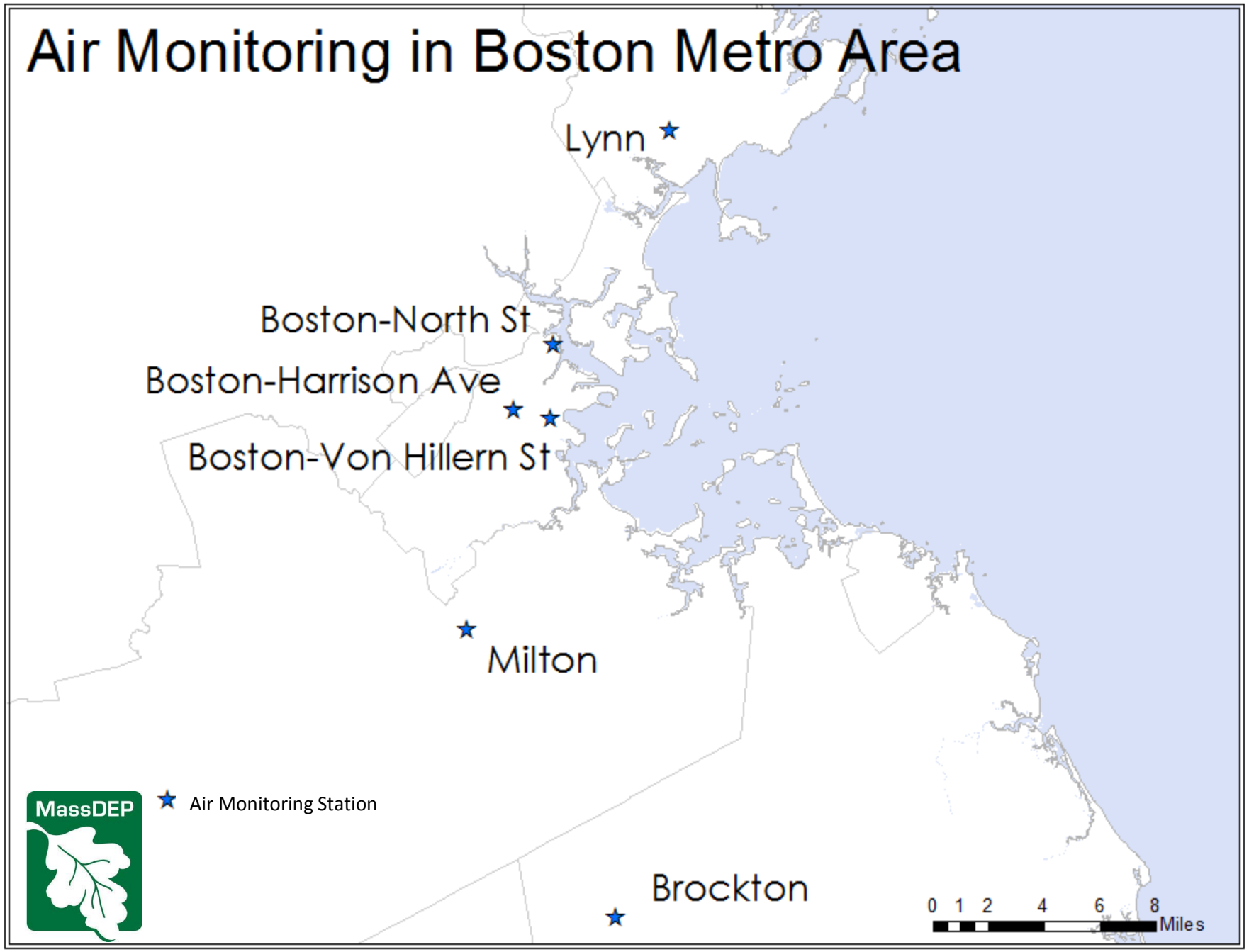
Weymouth MWRA Pump Station 24 hour samples (µg/m³)



Acetaldehyde Concentrations Relative to TEL

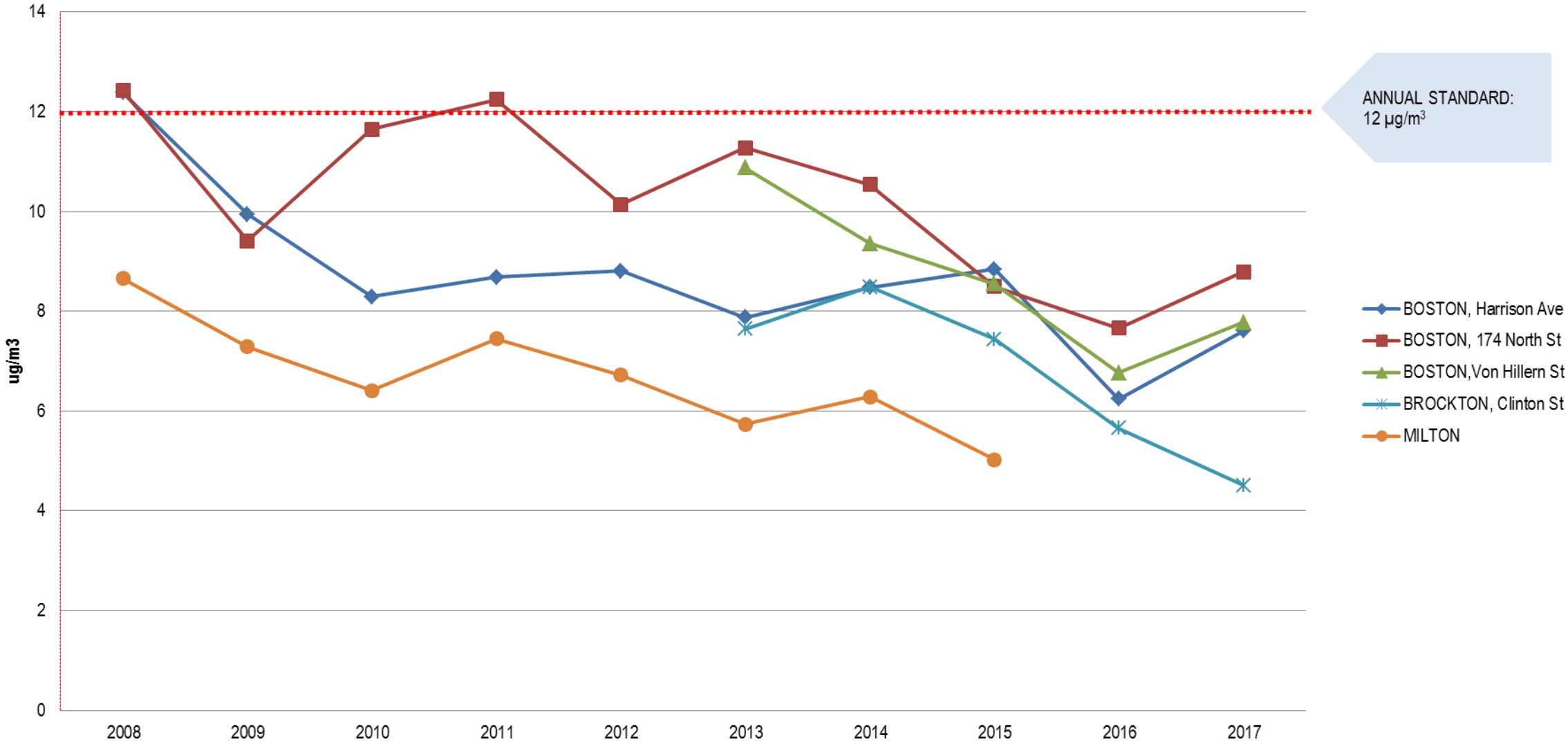
Weymouth MWRA Pump Station 24 hour samples (µg/m³)




Air Monitoring in Boston Metro Area
Lynn
Boston-North St
Boston-Harrison Ave
Boston-Von Hillern St
Milton
Brockton
MassDEP
Air Monitoring Station
0 1 2 4 6 8
Miles

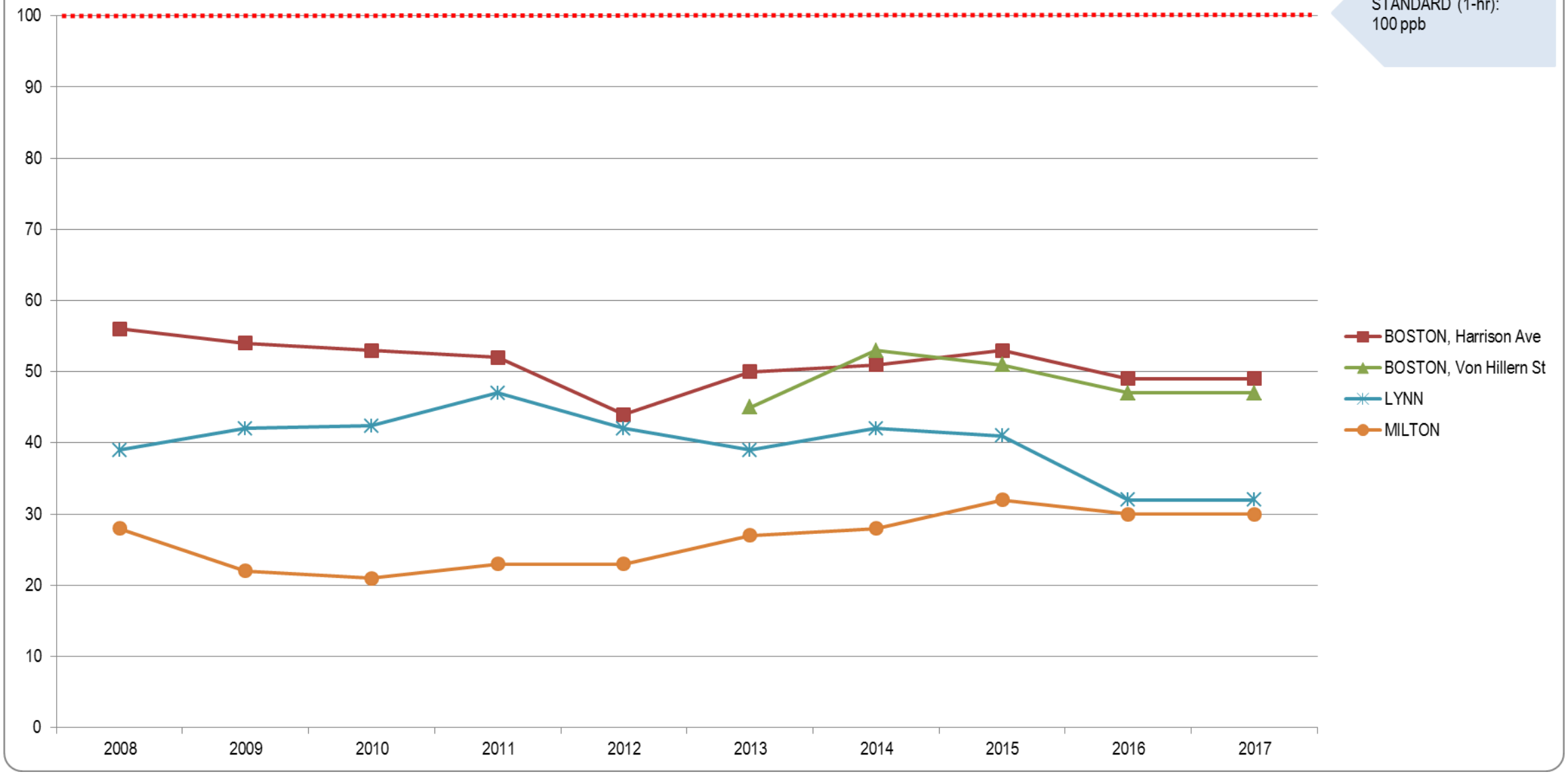
$PM_{2.5}$ Annual Average Concentration 2008-2017

MassDEP air monitoring (µg/m³)



NO_2 Annual Average of 1-hr 98th Percentile Concentration 2008-2017

MassDEP air monitoring (ppb)



Noise

Potential effects of noise on health and existing conditions

Background: Noise Effects on Health

The traditional **definition of noise is "unwanted or disturbing sound".** Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life.

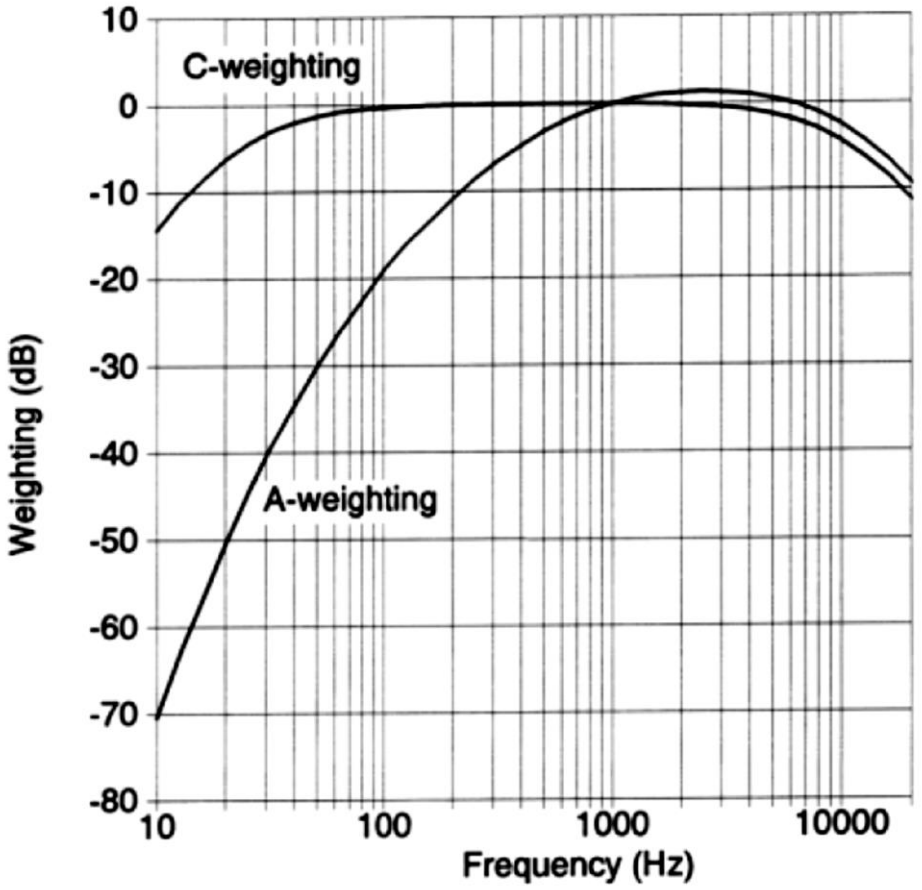
- Noise annoyance may increase the risk for **chronic stress.**
- Night-time noise exposure may disturb sleep, which has **short-term effects on mood and focus** and **longer-term effects such as high blood pressure and increased risk for diabetes.**
- Extended exposure to very high noise may lead to inflammation or swelling; long-term inflammation may increase your risk for **heart disease** (e.g., hypertension, hardening of arteries).

Background: Low Frequency Noise and Health

LFN is generally defined as noise with dominated sound energy in the frequency range from 10 Hz - 20 Hz to 200 Hz - 250 Hz.

There are associations between exposure to LFN and health:

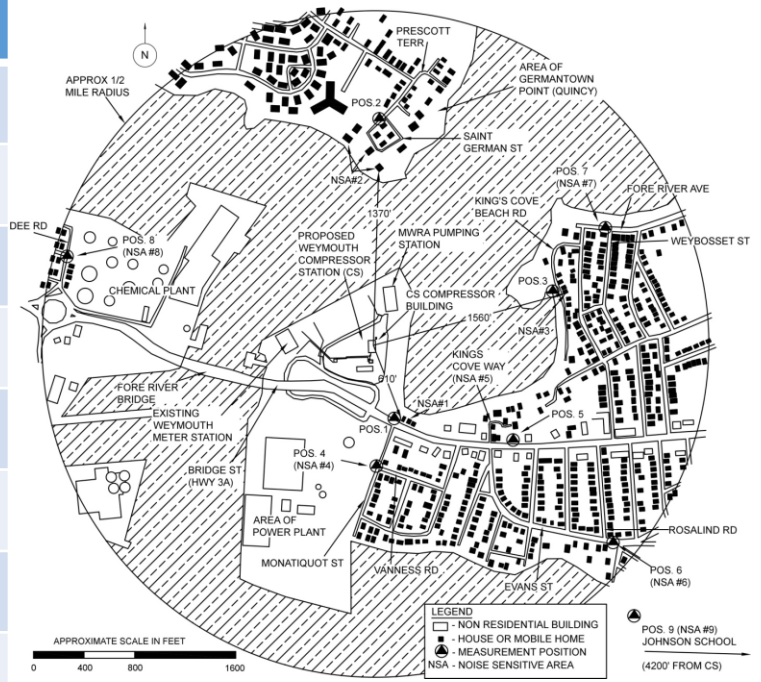
- Annoyance has been found to be **higher in populations exposed to steady-state LFN** as compared to steady-state flat-frequency noise.
- Evidence that LFN **may affects sleep quality,** especially in terms of the time taken to fall asleep and tiredness in the morning.
- LFN **may negatively affect performance** at moderate levels, in office and control room environments. The effects are shown most clearly in work situations with high demands and for tasks with high cognitive loading.



Existing Conditions: Noise

Acoustical analysis conducted by Hoover & Keith, Inc. on behalf of the Algonquin company estimated that:

Identified Receptors/NSAs and Description of Sound Measurement Location near the Respective NSA	Measured Daytime L90 (dBA)	Measured Nighttime L90 (dBA)
NSA #1: Residences approx. 610 ft. SSE of the Station site center	66.4	44.8
NSA #2: Residences approx. 1,370 ft. north of Station site center	46.8	46.8
NSA #3: Residences approx. 1,560 ft. east of the Station site center	48.4	44.0
NSA #4: Residences approx. 900 ft. south of the Station site center	49.3	48.5
NSA #5: Residences approx. 1,030 ft. SE of the Station site center	55.1	41.3
NSA #6: Residences approx. 2,300 ft. SE of the Station site center	42.6	41.4
NSA #7: Residences approx. 1,970 ft. ENE of the Station site center	44.5	39.3
NSA #8: Residences approx. 2,400 ft. west of the Station site center	46.1	44.5
NSA #9: Johnson School approx. 4,200 ft. ESE of Station site center	43.3	41.0



L_{90} is the level exceeded for 90% of the time. It is generally considered to represent the background or ambient level of a noise environment (i.e., representing the quietest 10% of the time).

Existing Conditions: Reference Data from Another Noise Study

Town of Weymouth (through RSG) conducted ambient sound level monitoring for one week in April 2017

Location	Lowest Daytime Ambient Sound Level ($L^{90\ 1hr}$, dBA)
Monitor 1	41
Monitor 2	44
Monitor 3	36
Monitor 4	31

FIGURE 1: RSG'S AMBIENT MONITOR LOCATIONS WITH DAYTIME & NIGHTTIME LOWEST AMBIENT HOURLY L90

Existing Conditions: Reference Data from Another Noise Study

Fore River Bridge Noise Assessment

Fore River Bridge – Noise Technical Report September 23, 2010

Table 3: Existing Peak-hour Noise Levels Measured at the Closest Sites in the Vicinity of the Fore River Bridge (in dBA)

ID	Receptor Description	Location	Land-Use Category	Existing Noise, $L_{eq}(h)$
M1	53 St. Germaine Street	Quincy	B (Residential)	58
M2	75 Kings Cove Beach Road	Weymouth	B (Residential)	55
M3	101 Bridge Street (Route 3A)	Weymouth	B (Residential)	67
M4	21 Dee Road	Quincy	B (Residential)	55
M5	50 Monatiquot Street	Weymouth	B (Residential)	54

1 Existing baseline noise levels were measured during various periods of the day to document the worst-case noise hour.
Source: AECOM, Boston, MA, September 2010.

L_{eq} is the average of all sound pressure levels over a period of time.

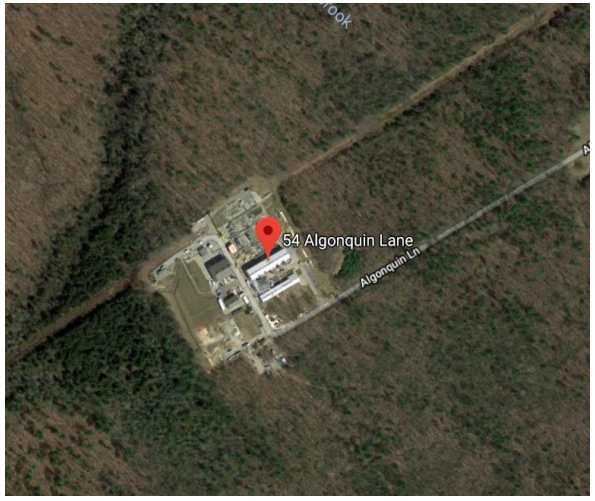
$L_{eq(h)}$ characterizes the noisiest hour over a period of time and is typically used for traffic noise studies (account for changing noise levels and include all existing noise sources).

Note: $L_{eq(h)}$ and L_{90} are not directly comparable

Noise: Reference Data from Another Compressor Location

Burrillville, RI

- A **one week monitoring survey of community sound levels** at nearest residences surrounding the Enbridge Burrillville Compressor Station
- **Carried out to independently and objectively** evaluate the sound emissions from the station after improvements



- **Survey results demonstrate that the findings valid** in the sense that identical day-night average (Ldn) sound levels of 44 dBA were found at test points
  - Does not account for background/ attributes all sound to compressor
- **Frequency analysis shows that each of the units has a distinctive low frequency sound signature,** some of which are generally perceptible in the community
- One unit generates noise peaks at **50 and 100 Hz** that can be prominent relative to the ambient background level when it is relatively low, such as at night

Land Use/ Natural Resources

Potential effects of changes to land use and natural resources on health and existing conditions

Land Use/Natural Resources: Effects on Health

Exposure and access to **green spaces** is associated with improved mental well-being and reduced stress as well as higher levels of outdoor physical activity.

The quality, availability and accessibility of **outdoor public spaces** is correlated with residents reporting positive social interactions among themselves and neighbors.

In relation to the items above, **feelings of ownership of neighborhood streets and outdoor spaces** is associated with improved perceptions of safety and security. Residents who feel safer are more likely to meet daily physical activity recommendations.

Proximity to **brownfields** sites have relationship with population having poorer health outcomes; remediation to acceptable health can reduce the health risks associated with the contamination and mitigate negative impacts

William Newell Park

Source: Town of Weymouth, Planning & Community Development website

Land Use/Natural Resources: Effects on Health

Health impacts associated with **brownfields and contaminated sites** include:

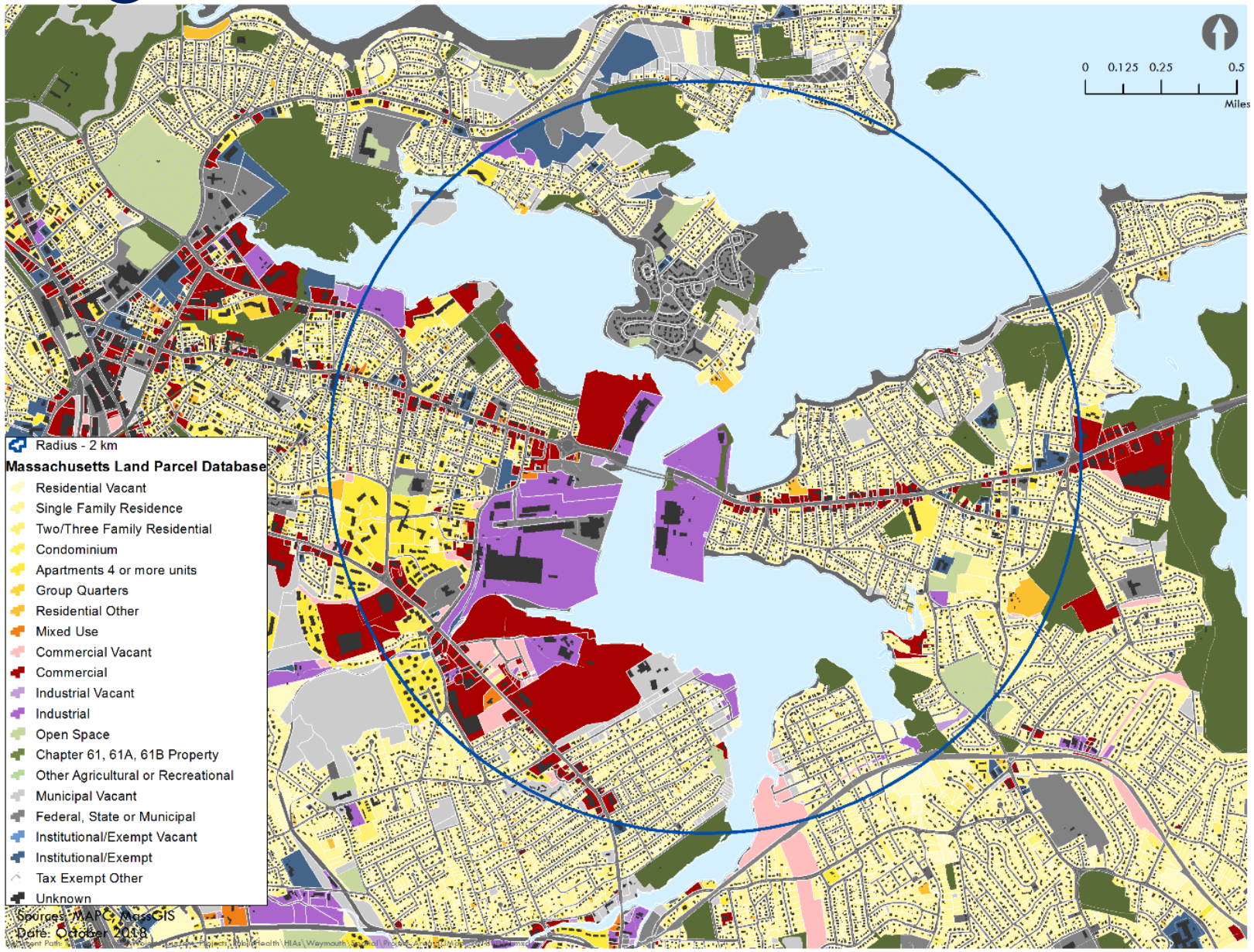
- **Safety** due to abandoned structures, open foundations, other infrastructure or equipment that may be compromised due to lack of maintenance, vandalism or deterioration, controlled substance contaminated sites (i.e., methamphetamine labs) and abandoned mine sites;
- **Social and economic concerns** due to blight, crime, reduced social capital, reductions in the local government tax base and private property values that may reduce social services; and,
- **Environmental issues** due to biological, physical and chemical site contamination, groundwater impacts, surface runoff or migration of contaminants as well as wastes dumped on site.

Residential **proximity to industrial activity** has been found to have a negative impact on mental health (primarily as stressor). This impact is both direct and mediated by individuals' perceptions.

Different groups of people in the general population **perceive hazards differently**

Air pollution contributes to **physical and psychosocial conditions** that act as community-level social stressors.

Existing Conditions: LU/NR



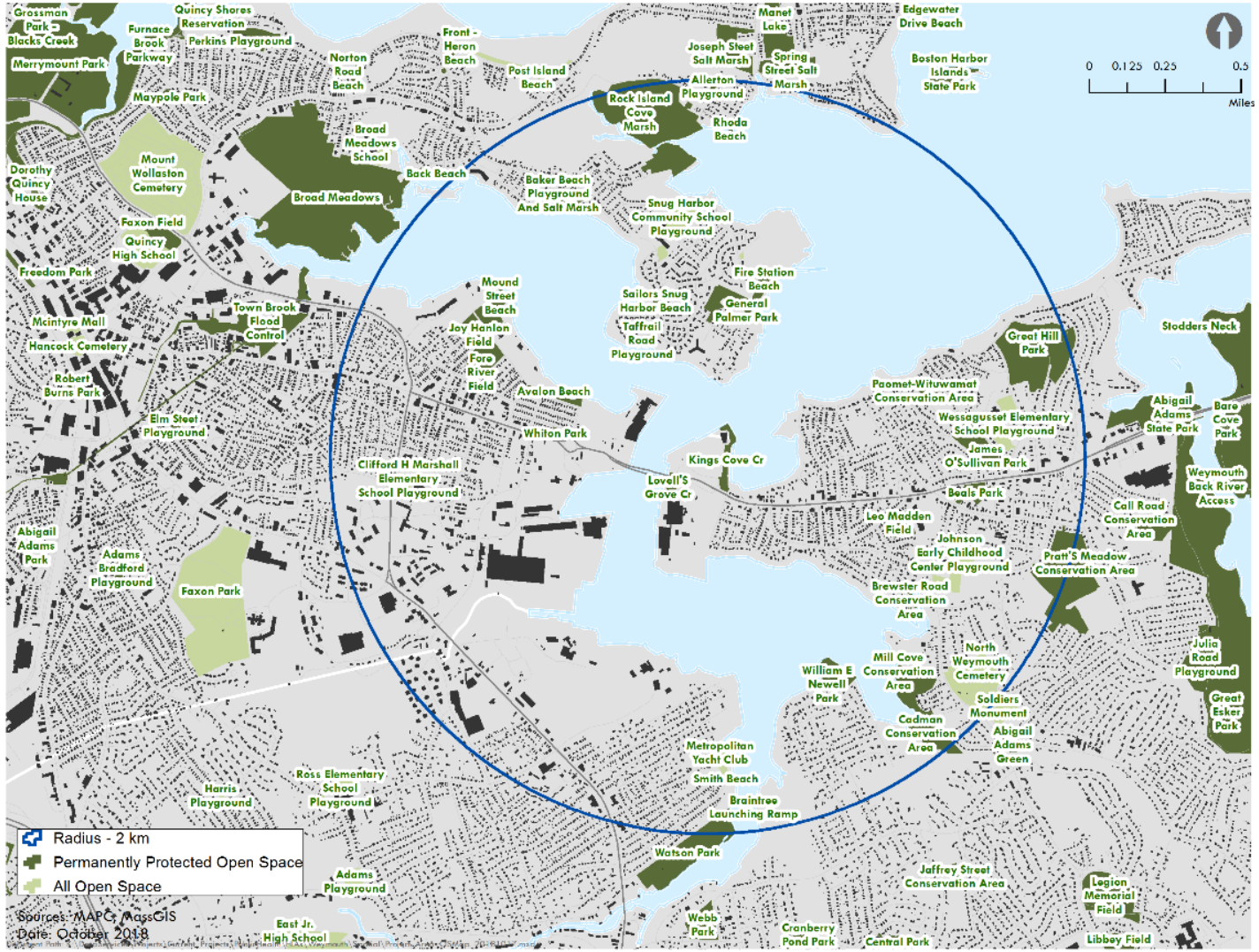
Existing Conditions: Land Use and Natural Resources

- Former electrical generation station
- Site included above ground storage tanks (AST) for No. #2 fuel oil and fuel additive AST; one AST removed likely in 2005, other AST moved to energy facility site in 1997.
- Historic Fill present at the Property (based on filling of the Property almost 100 years ago) contains coal, clinkers, and coal ash.
- For groundwater, no volatile (including acetone), semi-volatile or petroleum-related compounds were detected.
- Evidence of a release of fuel oil was discovered in April 2016: contaminated soils within the subsurface from approximately 14 to 19 feet below ground surface within the approximate footprint of the former tank
- Current Activity and Use Limitation (AUL) for the site

Existing Conditions: Land Use and Natural Resources

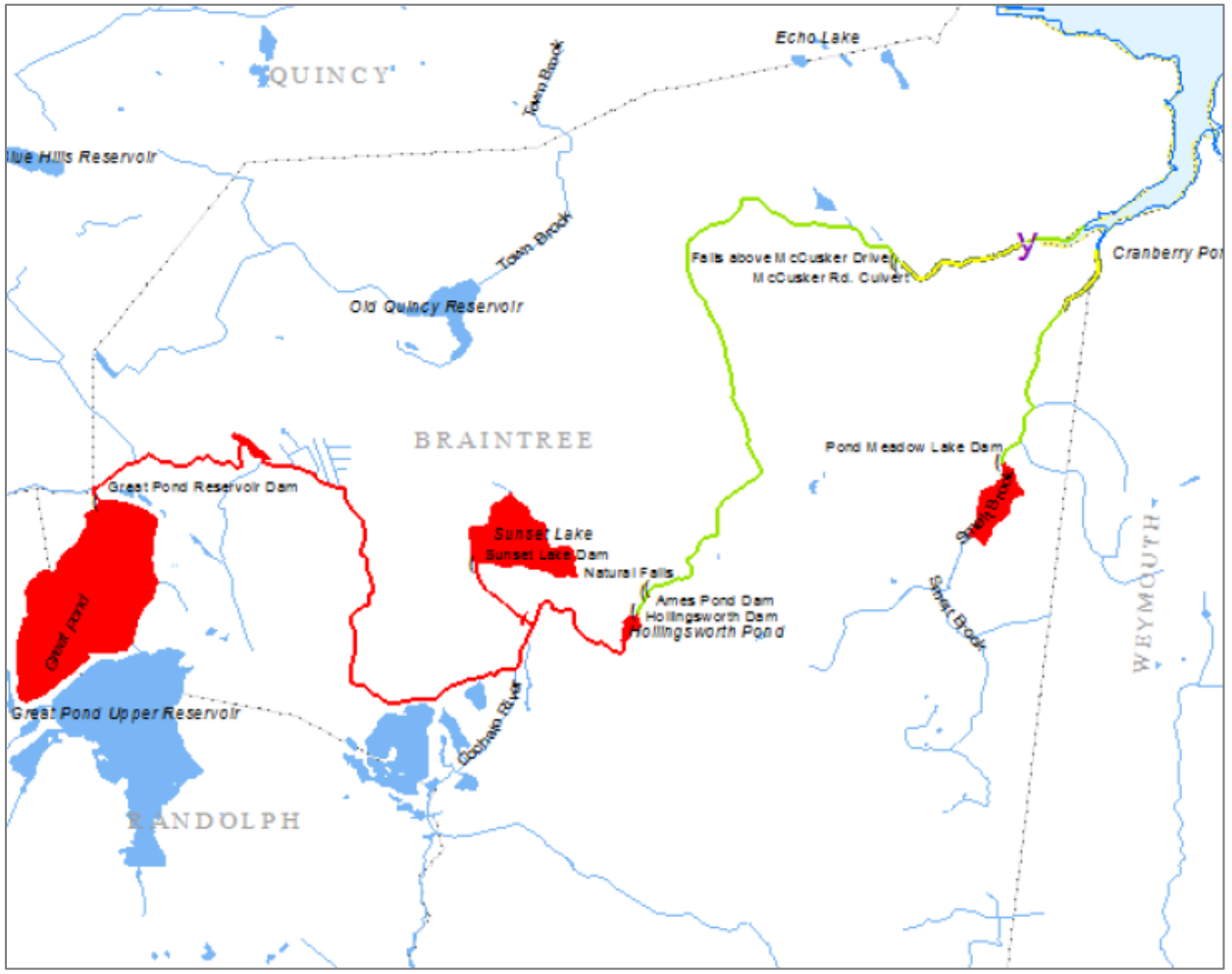
King's Cove / Lovells Grove

Open Space and Conservation Land



Existing Conditions: Land Use and Natural Resources

- Proposed compressor station is not within a state-designated area of critical environmental concern (ACEC)
- Projects underway to extend herring run farther up Fore River (Great Pond Reservoir)
- Shoreline around the proposed station does not appear to provide suitable habitat for piping plover, red knot, or roseate tern
- Fore River is noted as Core Habitat featuring Aquatic Core in BioMAP2



Source: River Herring Spawning and Nursery Habitat Assessment: Fore River Watershed 2008-2010

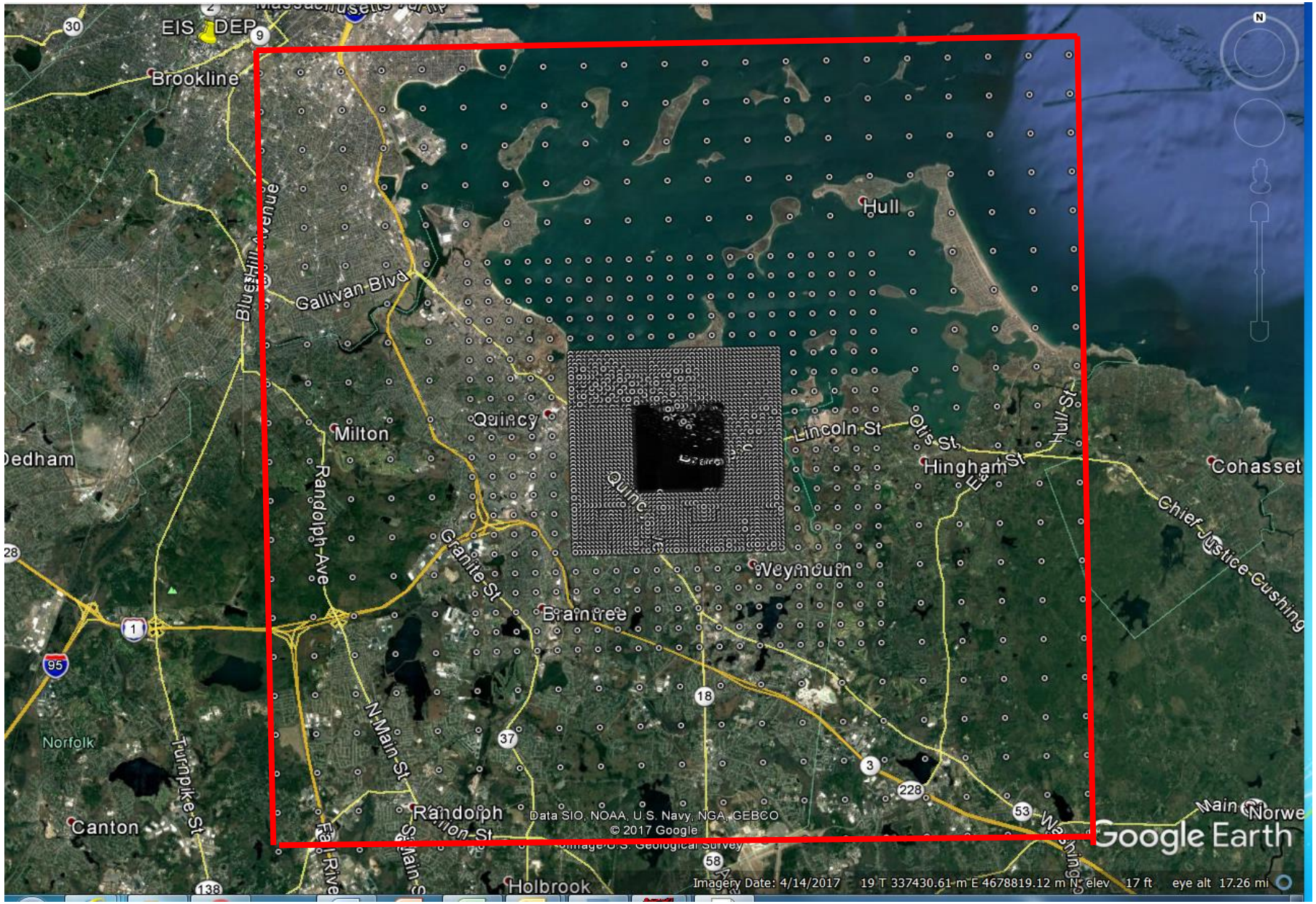
Potential Impacts: Changes in Air Quality

Participatory discussion and preliminary assessment of potential effects of projected changes in air quality due to the proposed compressor station

How Projected Changes are Estimated – Air Quality Modeling

- EPA AERMOD air quality dispersion modeling uses emissions and meteorological inputs to predict concentrations of pollutants at downwind receptor locations
- Modeling is worst-case analysis
- Maximum potential emission rate for each pollutant from each emissions unit
- 5 years of representative meteorological data
- Calculate concentrations at receptor grid locations
- Compare concentrations to standards and guidelines

Modeling Receptor Grid



Criteria Pollutant Modeling

- Maximum emission rates from existing metering & regulation facility and proposed compressor station
- Maximum emission rates from nearby sources
  - Fore River Energy Center Turbines and Black Start Engines
  - Braintree Electric Light Department
  - Twin Rivers Technologies
  - New England Fertilizer Company (MWRA sludge processing)
- Addition of background
- Calculate concentrations based on form of standard; e.g., annual average, 24-hour (98^{th} percentile), 1-hour (98^{th} percentile)
- Compare to national standard set to be protective of health, including sensitive receptors, with an adequate margin of safety

Toxics Modeling

- Maximum emission rates from existing M&R and proposed compressor
- Calculate highest annual and 24-hour concentrations
- Compare to TELs and AALs
- In air permitting, TELs and AALs represent screening-level guidelines that indicate the maximum ambient air concentration of a toxic that may be contributed by a single source
- Toxics modeling does not take into account background concentration levels

MassDEP Ambient Air Toxics Guidelines

TEL	AAL
• Compare to 24-hour average concentration • Non-cancer health effects • Decreased by a factor of 5 to account for exposure from other sources	• Compare to annual average concentration • Cancer health effects • 1 in 1 million cancer risk Note: If no cancer effects, AAL set at TEL level

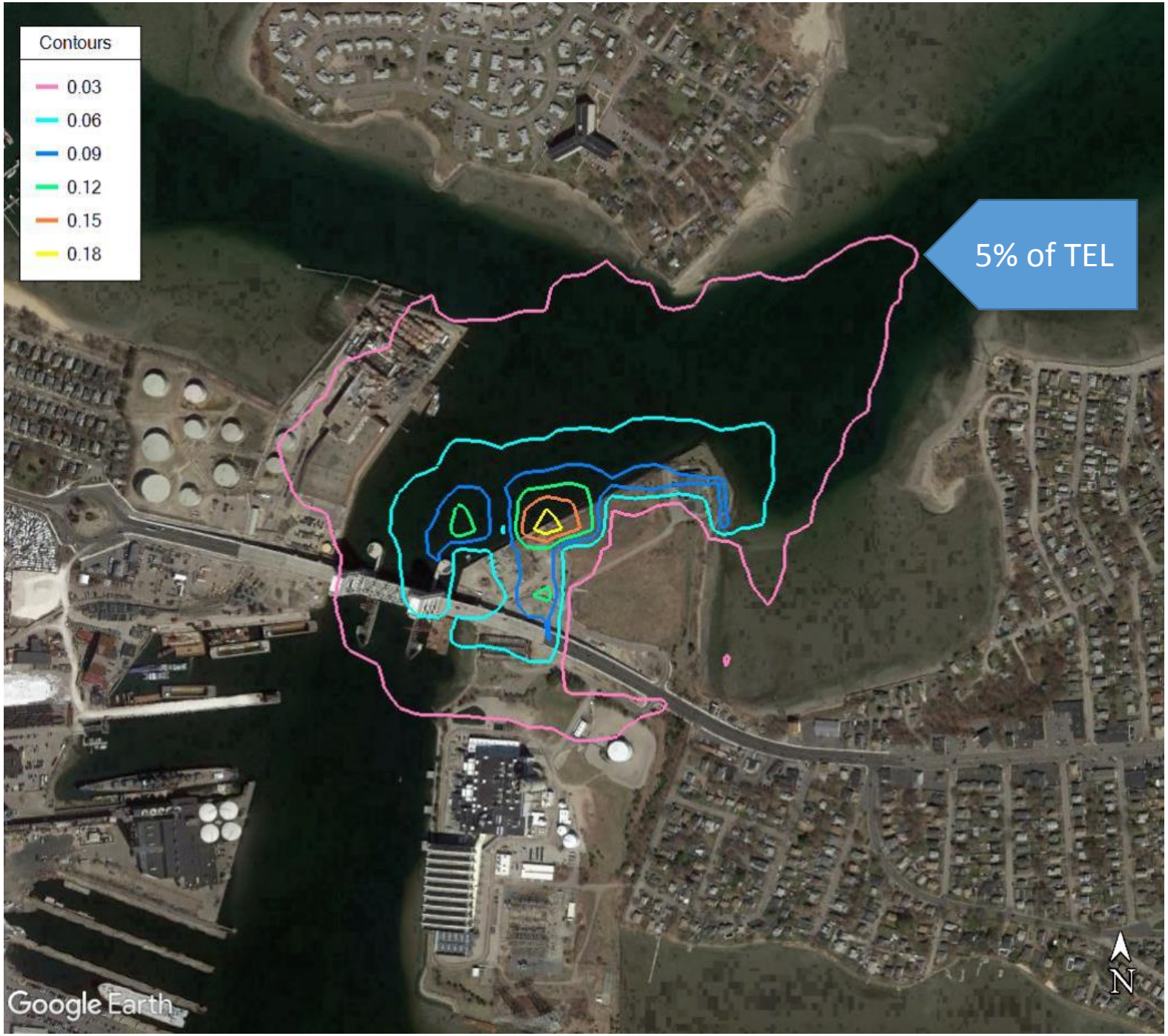
TEL and AAL are intended to protect sensitive members of the population from harmful effects assuming exposure to the same average concentration 24 hours each day for 70 years.
More information https://www.mass.gov/service-details/massdep-ambient-air-toxics-guidelines

Algonquin Modeling – Toxics Closest to AAL/TEL

All values in µg/m^3

Compound	Maximum Annual Modeled Concentration	AAL	Maximum 24-hour Modeled Concentration	TEL
Benzene	0.0426	0.1	0.217	0.6
Acrolein	0.0049	0.07	0.0371	0.07
Formaldehyde	0.0554	0.08	0.386	2

TEL = Threshold Effects Exposure Limit (24-Hour Average)
AAL = Allowable Ambient Limit (Annual Average)
µg/m^3 = micrograms per cubic meter



Modeled Benzene 24-hr Concentration

Countours in µg/m^3

Max = 0.217 µg/m^3

TEL = 0.60 µg/m^3

Modeled Benzene Annual Concentration

Countours in µg/m^3

Max = 0.0426 µg/m^3

AAL = 0.10 µg/m^3

Modeled Acrolein 24-hr Concentration

Countours in µg/m^3

Max = 0.037 µg/m^3

TEL = 0.07 µg/m^3

Modeled Acrolein Annual Concentration

Countours in µg/m^3

Max = 0.0049 µg/m^3

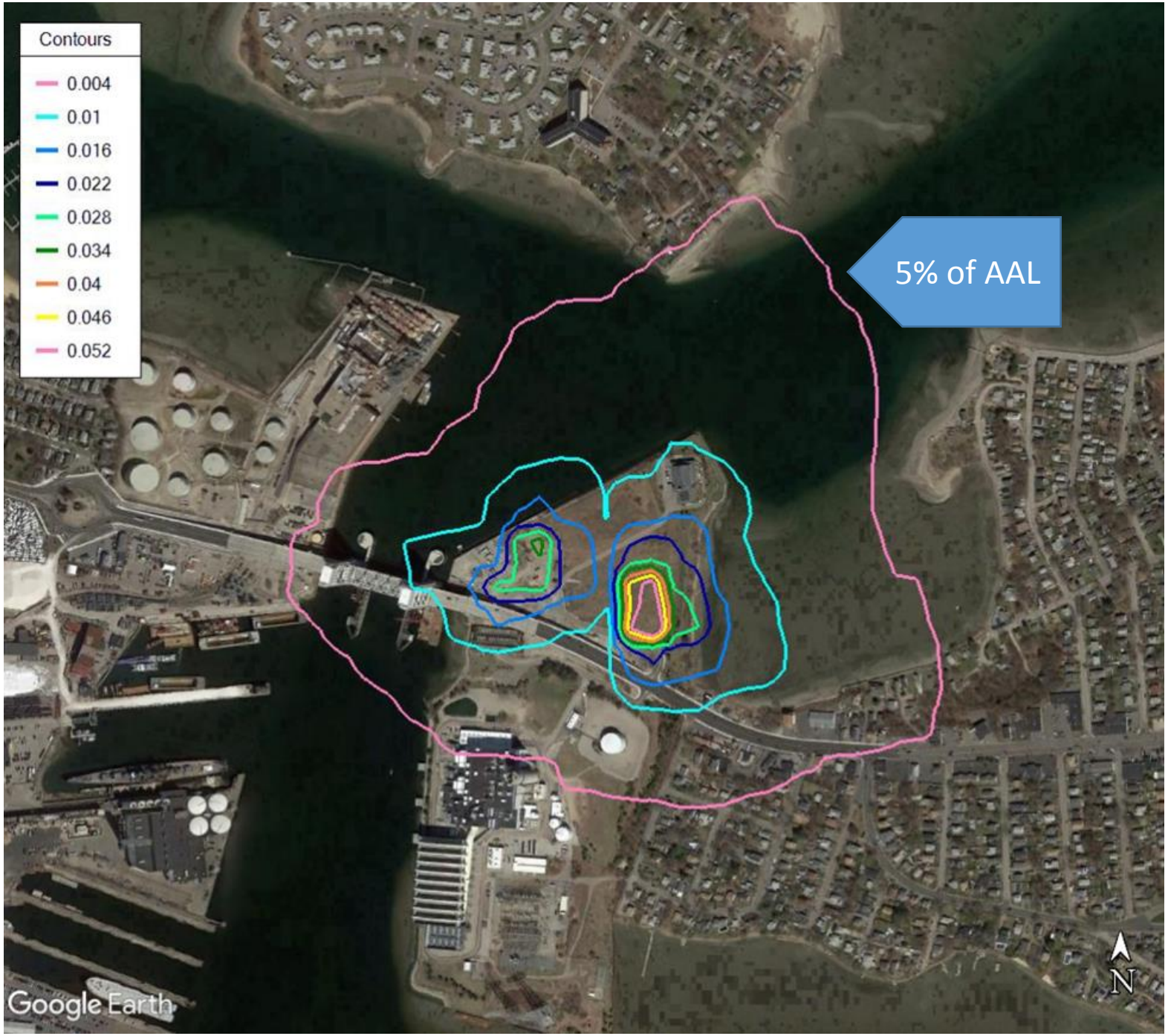
AAL = 0.07 µg/m^3

Modeled Formaldehyde 24-hr Concentration

Countours in $\mu g/m^3$

Max = 0.386 $\mu g/m^3$

TEL = 2 $\mu g/m^3$



Modeled Formaldehyde Annual Concentration

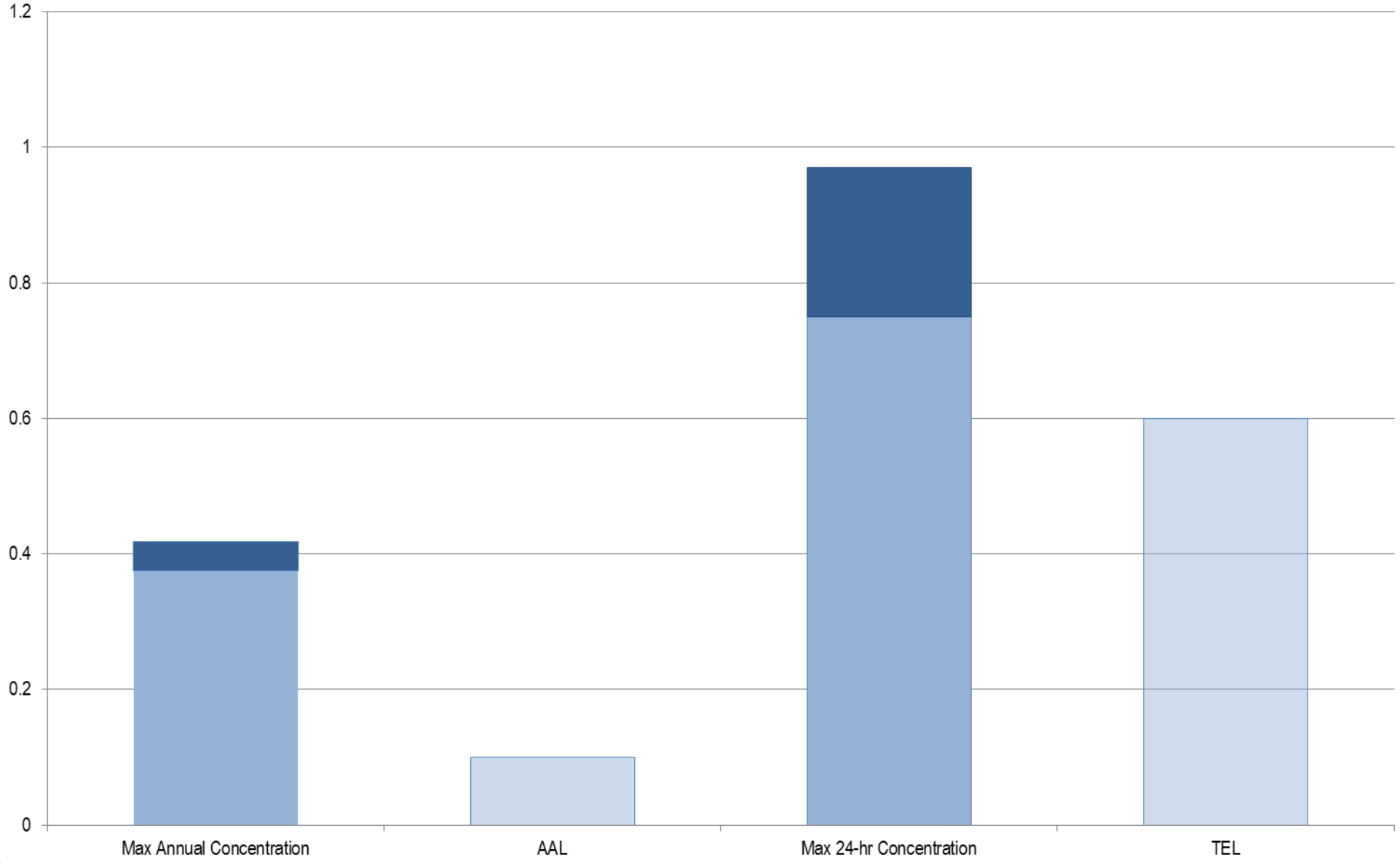
Countours in µg/m^3

Max = 0.0554 µg/m^3

AAL = 0.08 µg/m^3

Benzene – Background Plus Modeled Maximum

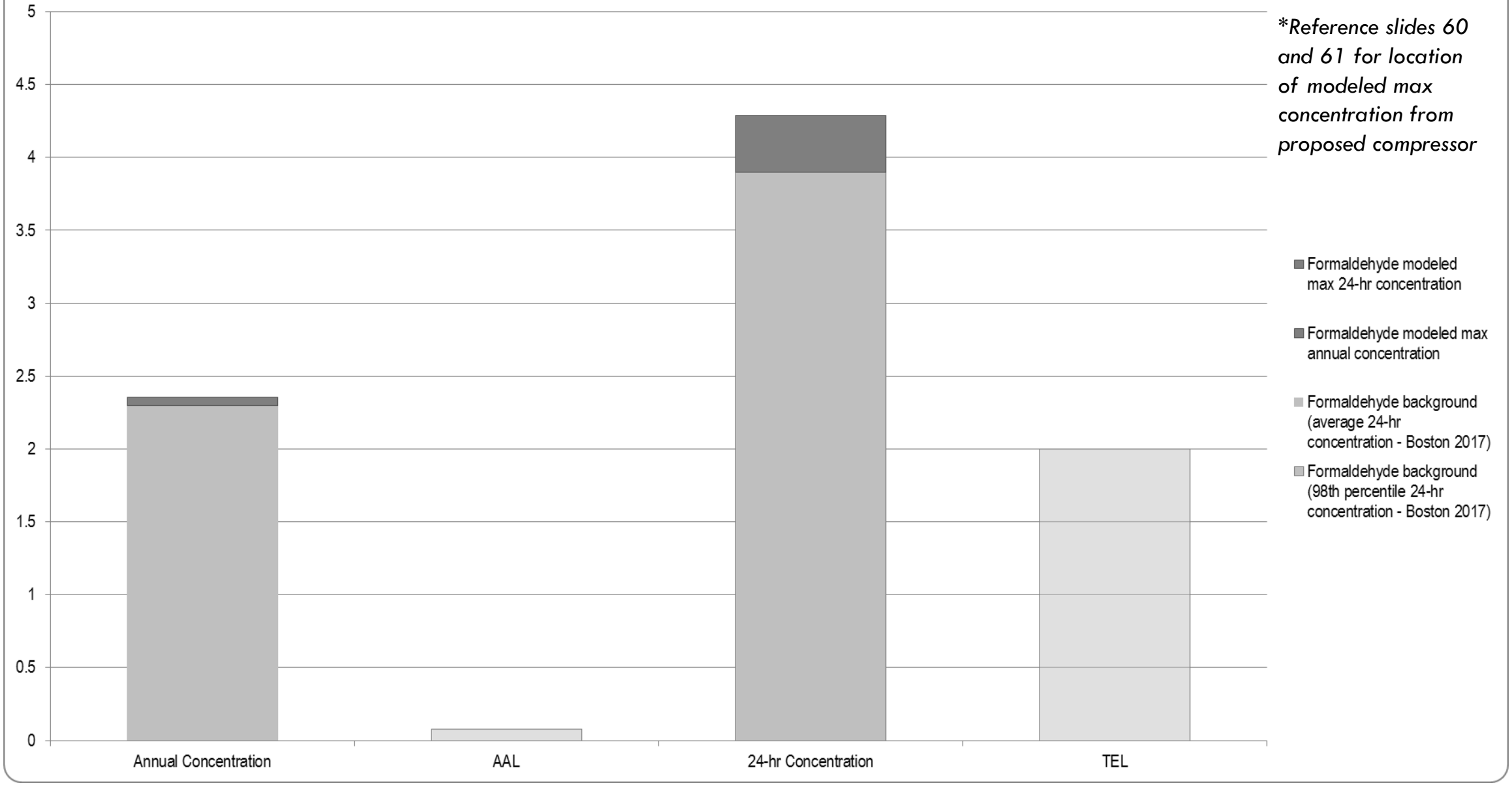
(µg/m³)



**Reference slides 58 and 59 for location of modeled max concentration from proposed compressor*

Formaldehyde – Background Plus Modeled Maximum

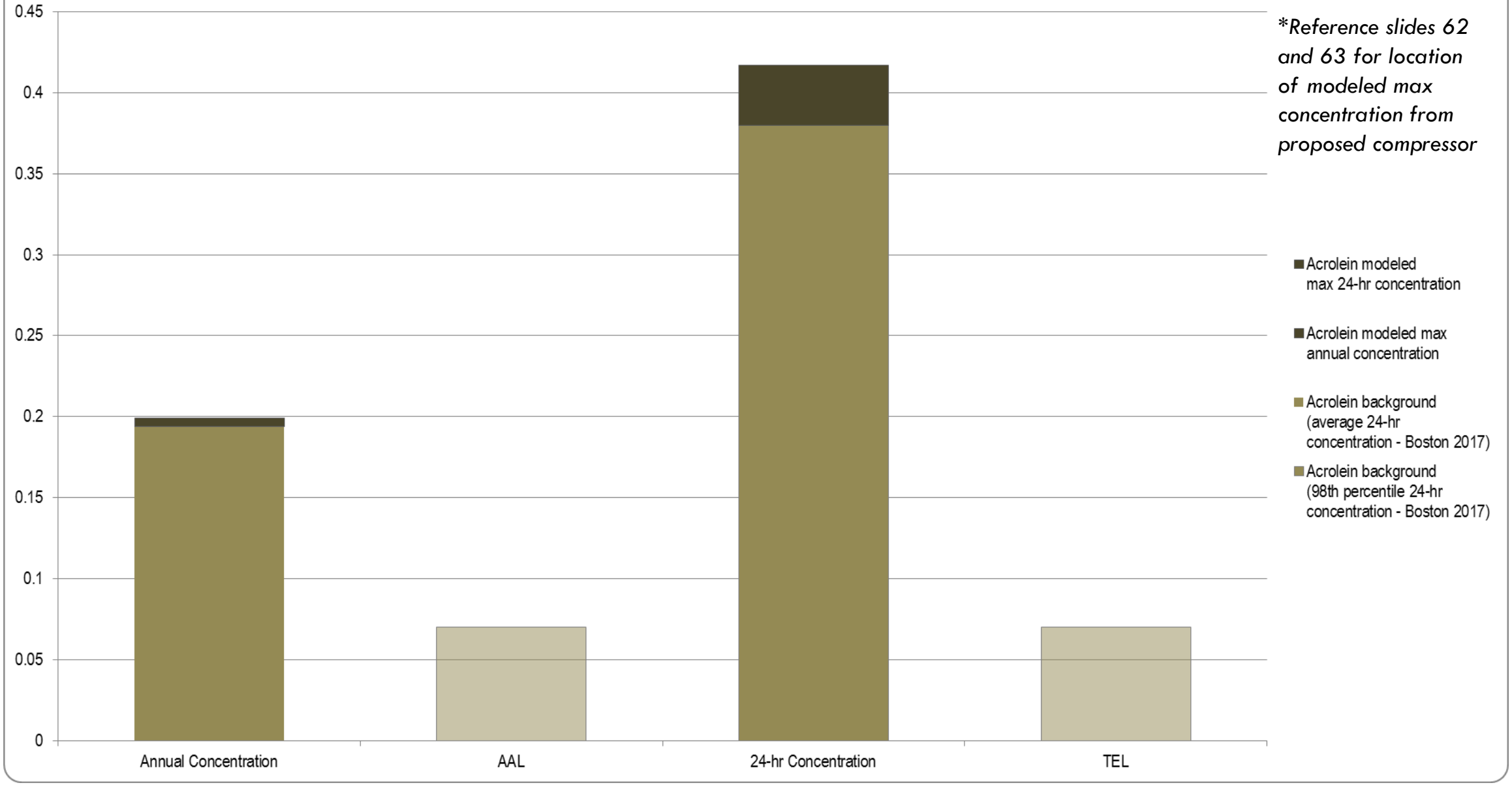
(µg/m3)



**Reference slides 60 and 61 for location of modeled max concentration from proposed compressor*

Acrolein – Background Plus Modeled Maximum

(µg/m3)



**Reference slides 62 and 63 for location of modeled max concentration from proposed compressor*

Characterization of Potential Impacts

- Impact assessment estimates changes by characterizing:
  - Type of Health Effects
  - Geographic Extent of Exposure
  - Direction of Health Effects
  - Likelihood of Health Effects
  - Relative Magnitude of Health Effects
  - Vulnerable Populations

Characterization of Potential Impacts

Proposed characterization

Type of Health Effects	Direct: the change occurs through physical exposures	Other: the change occurs through other mechanisms (e.g., perception)		
Geographic extent of health impacts	Local: Effects felt within the focus area	Community-wide: Effects felt in focus and surrounding areas		
Direction of Health Effects	~/Neutral No Meaningful Change Predicted	+/Positive = Change that is predicted to positively impact associated health conditions	-/Negative Change that is predicted to negatively impact associated health conditions	
Likelihood of health effects	Uncertain = it is unclear if impacts will occur as a result of the proposal	Unlikely = it is unlikely that impacts will occur as a result of the proposal	Possible = it is possible that impacts will occur as a result of the proposal	Likely = it is likely that impacts will occur as a result of the proposal
Relative Magnitude of Effect	Low: Individual cases	Medium: Local, small limited impact to households	High: Entire communities affected	
Vulnerable Populations	Yes = Disproportionately affects vulnerable populations	No = Affects populations evenly		

Overview: Characterization of Potential Impacts

Assessment Pathway	Type of Health Effects	Geographical Extent of Exposure	Direction of Health Effects	Likelihood of Health Effects	Relative Magnitude of Effect	Vulnerable Populations
Air Quality						

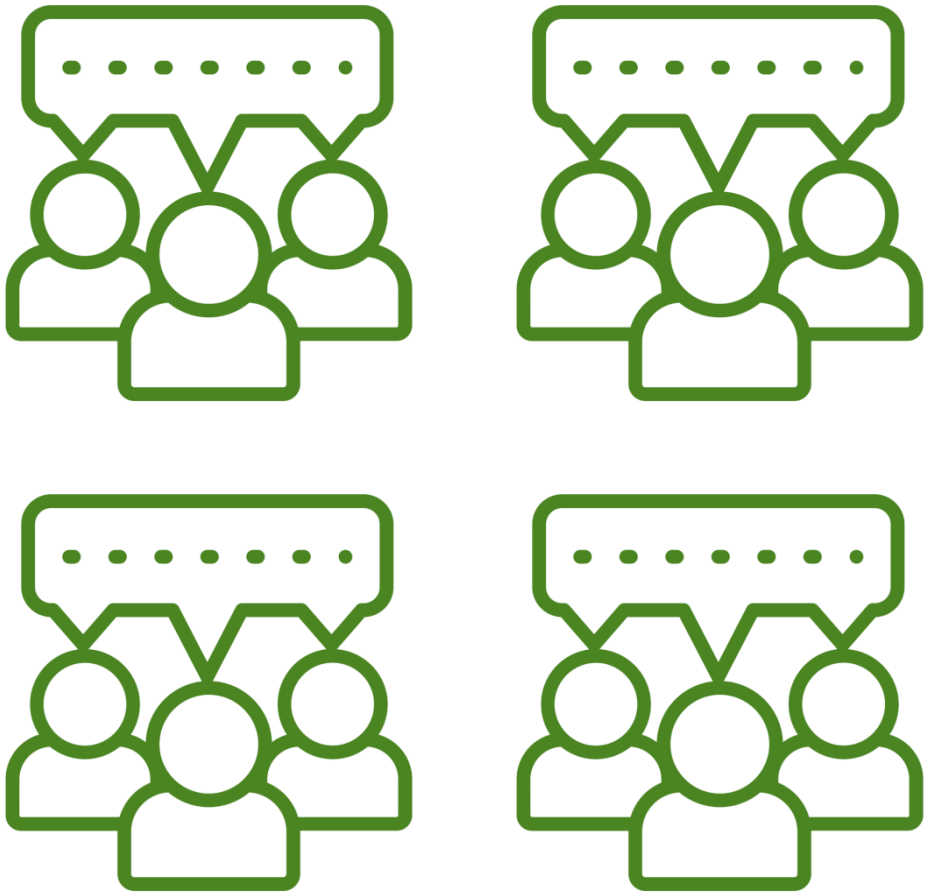
Small Group Characterization of Potential Air Quality Impacts

As a group, provide your perspective on potential impacts of projected changes.

Consider:

- Demographics
- Health Data
- Ambient Air Quality
- Estimated Changes in Air Quality
- Definitions of Table Elements

Group Discussion of Potential Impact Characterization Tables



Assessment Pathway	Type of Health Effects	Geographical Extent of Exposure	Direction of Health Effects	Likelihood of Health Effects	Relative Magnitude of Effect	Vulnerable Populations
Air Quality						

Wrap Up and Next Steps

Upcoming meetings, action items, and meeting evaluation

HIA Timeline