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June 20, 2023

Mr. Connor Downey
Bluewater Property Group
22 Boston Wharf Road, 7th Floor
Boston, MA 02210

Re: Air Quality Assessment for 11 Randolph Road, Randolph, MA **Ref. 4868**

Dear Connor:

Tech Environmental, Inc. (Tech) has conducted a qualitative assessment of the potential air quality impacts of a warehouse building located at 11 Randolph Road in Randolph, MA (here in referred to as the Project). It is our understanding that the primary sources of air pollution from the Project are diesel burning trucks coming to and from the facility and gas-fired mechanical rooftop equipment. Presented below is a qualitative evaluation of diesel truck activities and gas-fired rooftop equipment associated with the Project, focusing on fine particulate matter ($PM_{2.5}$).

Diesel Exhaust Emissions

Particulate matter (PM) is a widespread air pollutant, consisting of a mixture of solid and liquid particles suspended in the air. Commonly used indicators describing PM that are relevant to health refer to the mass concentration of particles with a diameter of less than 10 µm (PM_{10}) and of particles with a diameter of less than 2.5 µm ($PM_{2.5}$). $PM_{2.5}$, often called fine PM, also comprises ultrafine particles having a diameter of less than 0.1 µm.

PM is a mixture with physical and chemical characteristics varying by location. Common chemical constituents of PM include sulfates, nitrates, ammonium, other inorganic ions such as ions of sodium, potassium, calcium, magnesium and chloride, organic and elemental carbon, crustal material, particle-bound water, metals (including cadmium, copper, nickel, vanadium, and zinc) and polycyclic aromatic hydrocarbons (PAH). In addition, biological components such as allergens and microbial compounds are found in PM.

Primary PM and the precursor gases can have both man-made (anthropogenic) and natural (non-anthropogenic) sources. Anthropogenic sources include combustion engines (both diesel and gasoline), solid-fuel (coal, lignite, heavy oil, and biomass) combustion for energy production in households and industry, other industrial activities (building, mining, manufacture of cement, ceramic and bricks, and smelting), and erosion of the pavement by road traffic and abrasion of brakes and tires. Secondary particles are formed in the air through chemical reactions of gaseous pollutants. They are products of atmospheric transformation of nitrogen oxides (emitted by traffic and some industrial processes) and sulfur dioxide resulting from the combustion of sulfur-containing fuels. Secondary particles are mostly found in $PM_{2.5}$.[1]

[1] World Health Organization Regional Office of Europe, Health Effects of Particulate Matter, 2013.

Diesel engine exhaust is emitted from a broad range of diesel engines; the on-road diesel engines of trucks, buses and cars and the off-road diesel engines that include locomotives, marine vessels, and heavy-duty equipment. Diesel engine exhaust is composed of two phases: either gas or particle. The gas phase is composed of many urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine (i.e., $PM_{2.5}$), and ultra fine particles. The composition of these fine and ultra fine particles may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals, and other trace elements.

Applicable Air Quality Regulations

Under the authority of the Clean Air Act, as amended, the U.S. Environmental Protection Agency (EPA) established a set of National Ambient Air Quality Standards (NAAQS) for various 'criteria' air pollutants. These standards are intended to protect public health and welfare. Primary NAAQS are established at levels intended to protect public health, including sensitive population groups, with an adequate margin of safety. Secondary NAAQS are set at levels designed to protect the public by accounting for the effects of air pollution on vegetation, soil, materials, and other aspects of the general welfare. Currently, there are NAAQS for seven criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), coarse and fine particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). The NAAQS are summarized in the attached Table 1. States can develop ambient standards if they are at least as stringent as the federal standards. The Massachusetts ambient air quality standards (MAAQS) are identical to the NAAQS.

In 2007, EPA promulgated multiple new vehicle emissions standards, including heavy-duty diesel trucks, that reduced particulate matter emissions by up to 90%.[2] These standards have been in place since the 2010 model year for heavy-duty diesel trucks. And, just recently, on April 12, 2023, EPA announced new, more ambitious proposed standards to further reduce emissions from light- and medium-duty vehicles starting with model year 2027, and phased in through model year 2032. Those standards signify a rapidly growing shift away from a focus on internal-combustion engine (ICE) technology and toward zero-emission technologies, including electrification.[3] This shift would result in a widespread reduction in air pollution in the United States, including the further lessening of particulate matter concentrations.

Furthermore, the NAAQS set by EPA are designed to protect public health and the environment. The standards are developed based on a variety of scientific studies, including the results of epidemiologic studies that evaluate how human health has been affected by pollutant concentrations in the past. These standards are periodically reviewed and updated based on recent scientific developments. On December 14, 2012, EPA revised the NAAQS for $PM_{2.5}$ and for the first time included near-roadway monitoring requirements for $PM_{2.5}$. The annual standard was reduced from 15.0 micrograms per cubic meter (ug/m^3) to 12.0 ug/m^3. EPA has confirmed that most of the U.S. already meets the new standard, including all of Massachusetts.

[2] https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-heavy-duty-highway-engines-and-vehicles.

[3] https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-multi-pollutant-emissions-standards-model.

As described above, EPA has taken steps in reducing overall particulate matter emissions and improving $PM_{2.5}$ ambient air quality standards. These regulatory standards have significantly reduced PM emissions, including from diesel trucks, in the past decade and will continue to do so in the future for the Project site. This means that emissions from these Project sources will continue to reduce in the future.

Existing Air Quality

The Massachusetts Department of Environmental Protection (MassDEP) currently operates air monitors in various locations throughout the Commonwealth. The closest, most representative, MassDEP monitors to the Project for NO_2 and O_3 are located at Canton Avenue in Milton. The closest, most representative, MassDEP monitor to the Project for $PM_{2.5}$ is at Monatiquot Street in Weymouth. The closest, most representative, MassDEP monitors for PM_{10} and SO_2 are located at Harrison Avenue in Boston. And, the closest, most representative, MassDEP monitor for CO is located at Von Hillern Street in Boston.

Table 2 summarizes the MassDEP air monitoring data, for the most recent available, complete, three-year period (2019-2021), that are representative of the Project area. The attached Table 2 shows that the existing air quality in the Project area is much better than the NAAQS. For example, the current 24-hour and annual average concentrations of PM_{10} and $PM_{2.5}$ are all well below the NAAQS and range from 19% to 49% of each applicable standard. The highest monitored impact relative to a NAAQS is for ozone (80% of NAAQS). Although, ozone is a regional air pollutant, the small amount of additional traffic generated by this Project will not have a significant impact.

Potential Impacts from the Project

As part of this qualitative analysis a comparison of the size and operations of the proposed Project to the MBTA Dudley Station[4], and its air quality impacts, was performed. Dudley Station is a ground-level bus station located in Dudley Square, Roxbury, Boston that processes up to 200 buses per hour during peak times.[5] And the Dudley Station neighborhood contains many commercial and industrial uses that utilize gas-fired rooftop equipment in far greater quantities than the proposed Project. Dudley Station is also adjacent to, and just a few hundred feet from, the MassDEP Harrison Avenue long-term air monitoring station.[6]

The 2021 annual average $PM_{2.5}$ air concentration at the Harrison Avenue monitoring station was 7.94 ug/m^3 and the 2021 24-hour average $PM_{2.5}$ air concentration was 18.2 ug/m^3, which are 66% and 52% of the applicable NAAQS, respectively. More stringent EPA emissions standards for diesel trucks will reduce future concentrations as older diesel vehicles are replaced with newer and cleaner emitting ones.

With much fewer number of diesel truck trips (72 truck trips per day) at the Project in Randolph, $PM_{2.5}$ concentrations in the areas surrounding the Project should logically be much lower than those historically measured near Dudley Station in Roxbury, Boston. Therefore, the $PM_{2.5}$ concentrations in the areas surrounding the Project would also comply with the applicable NAAQS and will continue to trend lower due to more stringent EPA emissions standards for diesel trucks.

[4] MBTA renamed Dudley Station to Nubian Station in 2020.
[5] City of Boston, Dudley Square Vision Initiative Transportation Action Plan Draft Report, 2009.
[6] 1157 Harrison Avenue, Boston, MA.

Furthermore, the corporations of many potential tenants for the Project have signed onto *The Climate Pledge*[7] with a commitment to be net-zero carbon across their businesses by 2040. A potential tenant with such a commitment would need to implement electric delivery vehicles into their fleet in the near future to demonstrate that commitment. And the electrification of the delivery fleet by the tenant would continue to decrease emissions produced by the Project.

Idling Trucks

Lastly, it is our understanding that the Project will comply with the Massachusetts anti-idling law which will minimize air quality impacts from truck exhaust associated with the Project. The goal of the anti-idling law is to improve air quality by reducing unnecessary air pollution from idling vehicles. MGL 90 s16A and 310 CMR 7.11 state that all motor vehicles shall not idle in excess of five (5) minutes, unless:

1) The vehicle is being serviced, provided that operation of the engine is essential to the repair; or
2) The vehicle delivering or accepting goods for which engine assisted power is necessary; or
3) The vehicle is engaged in an operation for which the engine power is necessary for an associated power need.

Rooftop Mechanical Equipment

Rooftop HVAC equipment will use natural gas during the heating season. Natural gas is a cleaner burning fuel than diesel. Combustion of natural gas emits particulate matter emissions are 90% lower than diesel fuel combustion[8], and thus, particulate matter emissions from rooftop equipment will be negligible compared to diesel truck emissions.

Please call me at (781) 890-2220 x30 if you have any questions.

Sincerely yours,

TECH ENVIRONMENTAL, INC.

Marc C. Wallace, QEP, INCE
Vice President
4868/Report/11 Randolph Road Air Quality Letter

[7] 417 Signatories as of 6/19/2023: https://www.theclimatepledge.com/us/en/Signatories
[8]http://naturalgas.org/environment/naturalgas/#:~:text=Natural%20gas%20emits%20virtually%20no,percent%20lower%20than%20burning%20coal.

TABLE 1

MASSACHUSETTS AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	NAAQS (µg/m^3)
SO_2	1-hour^P 3-hour^S Annual^P (Arithmetic Mean)	196[a] 1,300[b] 80
CO	1-hour^P 8-hour^P	40,000[b] 10,000[b]
NO_2	1-hour^P Annual$^{P/S}$ (Arithmetic Mean)	188[c] 100
PM_{10}	24-hour$^{P/S}$	150
$PM_{2.5}$	24-hour$^{P/S}$ Annual^P (Arithmetic Mean) Annual^S (Arithmetic Mean)	35[d] 12[e,f] 15
O_3	8-hour$^{P/S}$	137[g]
Pb	Rolling 3-Month Avg.$^{P/S}$	0.15

P = primary standard; S = secondary standard.
[a] 99th percentile 1-hour concentrations in a year (average over three years).
[b] One exceedance per year is allowed.
[c] 98th percentile 1-hour concentrations in a year (average over three years).
[d] 98th percentile 24-hour concentrations in a year (average over three years).
[e] Three-year average of annual arithmetic means.
[f] As of January 15, 2013, the U.S. EPA lowered the $PM_{2.5}$ annual primary standard from 15 ug/m^3 to 12 ug/m^3.
[g] Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (137 ug/m^3) (effective December 28, 2015) and the annual PM^{10} standard was revoked in 2006.

TABLE 2

REPRESENTATIVE EXISTING AIR QUALITY IN THE PROJECT AREA

Pollutant, Averaging Period	Monitor Location	Value ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
CO, 1-hour	Von Hillern Street, Boston	1,806	40,000	5%
CO, 8-hour		1,145	10,000	11%
NO_2, 1-hour	Canton Avenue, Milton	47.7	188	25%
NO_2, Annual		6.5	100	7%
Ozone, 8-hour	Canton Avenue, Milton	110	137	80%
PM_{10}, 24-hour	Harrison Avenue, Boston	29	150	19%
$PM_{2.5}$, 24-hour	Von Hillern St, Boston (2019), Bridge St, Weymouth (2020) & Monatiquot St, Weymouth (2021)	14.5	35	41%
$PM_{2.5}$, Annual		5.9	12	49%
Lead, Quarterly	Harrison Avenue, Boston	0.007	0.15	5%
SO_2, 1-hour	Harrison Avenue, Boston	5.1	196	3%

Source: MassDEP, https://www.mass.gov/lists/massdep-air-monitoring-plans-reports-studies, downloaded June 19, 2023

Notes:

(1) Annual averages are highest measured during the most recent three-year period for which data are available (2019 - 2021). Values for periods of 24-hours or less are highest, second-highest over the three-year period unless otherwise noted.

(2) The eight-hour ozone value is the 3-year average of the annual fourth-highest values, the 24-hour $PM_{2.5}$ value is the 3-year average of the 98th percentile values, the annual $PM_{2.5}$ value is the 3-year average of the annual values – these are the values used to determine compliance with the NAAQS for these air pollutants.

(3) The one-hour NO_2 value is the 3-year average of the 98th percentile values and the one-hour SO_2 value is the 3-year average of the 99th percentile values

(4) The one-hour ozone standard was revoked by the US EPA in 2005; the annual PM_{10} standard was revoked in 2006 and the 3-hour SO_2 standard was revoked by the US EPA in 2010.