Environmental Protection

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April 3, 2014

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Dear Phillip,

In response to your January 10, 2014 letter regarding your concerns about the Department of Environmental Protection's (DEP) Newtown Creek aeration project, please see below for a summary of the issues and responses that we discussed during our phone call on January 13 and subsequent meeting on February 7, 2014. DEP's mission is to protect public health and the environment by supplying clean drinking water, collecting and treating wastewater, and reducing air, noise, and hazardous substances pollution. In line with this mission, the Newtown Creek aeration project is a near-term effort to improve the dissolved oxygen (DO) level of the Creek in order to attain water quality standards and improve the baseline conditions in the Creek for future remediation efforts. The aeration project is mandated by the New York State Department of Environmental Conservation under the Newtown Creek Waterbody/Watershed Facility Plan. The Newtown Creek Long Term Control Plan to manage combined sewer overflows (CSO) is due in 2017, and will propose measures to reduce CSOs and improve water quality. DEP acknowledges your concern that aeration would increase the public's exposure to airborne bacteria and could pose a public health threat. However, DEP has reviewed your concerns and consulted with the Department of Health and Mental Hygiene, and as described below, we do not interpret results of sampling aerosols or surface water during aeration to suggest a health risk to the public.

Aeration system operation

The aeration system is designed to operate continuously from late May through early September (generally from Memorial Day through Labor Day), with periodic operation throughout the offseason to exercise the system. We heard from you that Riverkeeper, as a policy matter, is not interested in having DEP remove the aeration system, but is interested in the possibility to adjust aeration parameters based on the assumption that larger bubbles eject more bacteria than smaller bubbles because they release more energy when they burst. This is not an unreasonable assumption, but the opposite is actually the case. Smaller bubbles have a higher surface area-to-volume ratio, which leads to a larger air transfer surface area per volume of supplied air. Coarse bubble systems have a lower ratio of surface area-to-volume, which leads to a lower aersolization potential.[1] We believe it is also worth noting that the volume of air injected into the system would remain fixed regardless of the bubbler; the aeration system runs along the bottom of the Creek and is more than a mile long; and the depth of the Creek varies, which causes the interaction between bubbles to vary as they make their way to the surface. The ultimate effect of these variables is that it would be infeasible to add active control to the existing system.

Bacterial fallout rate and composition

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[1] See attached *Response to Inquiry by the United States Army Corps of Engineers Regarding Health Issues Potentially Associated with Aeration*, page 4 ("Dose").

1. While the aeration system is in operation, the amount of coarse aerosols released into the air increases. The bacterial fallout rate is slightly higher when the aerator is operating, but the difference is not statistically significant.

The study by Dueker et al. (2012)[2] demonstrates proof of concept that bacteria present in the water may aerosolize and enter the air. However, the study did not demonstrate an increased risk of illness due to exposure, nor did it assess infectivity of the bacteria. An increase in bacteria aerosols from aeration does not inherently worsen the air quality and/or increase the bacterial exposure to the nearby community.

Furthermore, the Dueker et al. study does not provide data to support the conclusion that the aeration would significantly increase the public's bacterial exposure in general because the study did not show an increase in bacterial fallout with aeration on; it did not differentiate land sources (e.g., bacteria from animal feces, such as dogs, pigeons, squirrels, etc.) from Newtown Creek; and did not account for seasonal differences in the timing of sample collection in the locally collected data or in comparisons with other studies. Other studies, including some of those cited in the Dueker et al. study, have shown that bacteria are common in urban and rural aerosols from various sources, including soils, and that the abundance and composition have strong daily and seasonal variation. Finally, samples from Louis Valentino Pier (LVP), the other New York City location, were collected at 2.5 to 5 meters above the water, as opposed to 2.5 meters above the water at Newtown Creek. Coarse particle concentrations would be expected to decay significantly with distance from source; therefore it is not clear whether bacteria aerosols would have been measured in higher concentrations at LVP if the sampling methods were consistent.

2. The bacterial taxonomy of the surface water was different with and without aerator operation, but there are no monitored data to determine if levels of human pathogens would increase.

The statistical methods used to compare the types of bacteria present in Newtown Creek aerosols with other urban and coastal areas appear to be inappropriate since the percentage of any individual phyla is a function of others present in the sample.[3] Based on the Newtown Creek data, the concentration of surface water bacteria was significantly lower while the aerator was in operation. Given that aeration would improve the water quality, it would be logical to assume the level of human exposure to pathogens would also be reduced with aeration; or would at least remain consistent.

3. Transfer of viable bacteria.

The types of human pathogens that were detected in water are not detected in air based on limited sampling. Some human pathogens that were found in the surface water were not detected in the aerosols, which seems to indicate that aeration does not transfer certain human pathogens into the air. Aeration may also put dead bacterial cells into the air; however, the health impacts associated with this parameter are unknown.

Health risks and future considerations

Based on DEP's review of publically available data and our experience with in-stream aeration at our 14 wastewater treatment plants (WWTPs), there is no evidence that the bacteria aerosols cause illness. The WWTPs treat water that has significantly higher pathogen concentrations than Newtown Creek, and the aeration systems at the plants use much more air per unit volume than the aeration system in the Creek. Based on the records maintained by DEP in accordance with State Department of Labor Public Employee Safety and Health (PESH)

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[2] M. Elias Dueker, Gregory D. O'Mullan, Andrew R. Juhl, Kathleen C. Weathers and Maria Uriarte, *Local Environmental Pollution Strongly Influences Culturable Bacterial Aerosols at an Urban Aquatic Superfund Site*, Environmental Science and Technology, September 6, 2012, appended as Attachment A in the January 14, 2014 letter.

[3] See Figure 1 in Dueker et al. (2012).

requirements, there have been no incidents of illness or work-related complaints associated with airborne pathogens.[4, 5] In addition, there is no established airborne exposure limit for bacteria, which means that there is no epidemiologically supported level of bacteria exposure that can be attributed to illness.

4. Route of exposure: ingestion versus inhalation.

Health risk to boaters is mainly due to accidental ingestion of water that contains elevated pathogen levels. But because risk to recreational water users would be related to both surface and airborne bacteria, it is not clear that inhalation of bacteria at the levels measured poses the same, greater, or less health risk than ingestion. Route of exposure is also related to the lack of exposure limit for bacteria in that it is unclear how changes in bacterial levels would translate into added health risk. It is also worth noting that the State has not established data-supported secondary contact water quality standards for pathogens.

5. Transfer of sediments and other materials with aeration.

The study did not measure the interaction between bacteria aerosols and particulate matter (PM), which are associated with health concerns such as lung infections. Other types of pollutants such as polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), radioactive materials and heavy metals may also be cause for concern. However, with continuous aeration, most of the creek sediments would settle outside the mixing zone of the aerator, and would have negligible effect on contaminated sediment emissions from aeration. In addition, wet sediments are too heavy to be carried far by wind or water.

6. Health risks versus long term benefits of aeration.

Aeration has proven benefits for water quality such as improved dissolved oxygen levels which supports aquatic life and helps decompose organic matter, whereas concerns about changes in exposure to bacteria in aerosols due to aeration have not been substantiated and their relevance to human health is speculative.

If you have any other questions, please feel free to contact Max Litt at 718-595-5160.

Sincerely,

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Enclosure

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[4] See attached *Response to Inquiry by the United States Army Corps of Engineers Regarding Health Issues Potentially Associated with Aeration*, pages 4 and 5 ("Response").

[5] See attached *Responsiveness Summary to Questions and Comments Presented to the New York State Department of Environmental Conservation (DEC) and the New York City Department of Environmental Protection (DEP) on the Newtown Creek Waterbody/Watershed Facility Plan*, pages 6 and 7 ("Aeration System").

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Response to Inquiry by the United States Army Corps of Engineers Regarding Health Issues Potentially Associated with Aeration

Summary

On October 3, 2012, the New York City Department of Environmental Protection (DEP) attended a meeting with the United States Army Corps of Engineers (ACE), to discuss DEP's application for a permit to install the second phase of an aeration system in Newtown Creek, specifically in Lower English Kills (LEK). During our meeting, ACE indicated that there is public concern for potential health risks associated with this project. This document is submitted in response to that discussion, and includes findings resulting from DEP's review of existing literature as described in further detail below. DEP's review of existing literature was undertaken as a qualitative assessment of the potential health risks associated with the operation of the LEK aeration system. The assessment reviewed the four accepted criteria for evaluating human health risk: the existence of a trigger/agent; receptors; dose; and response. The operation of the proposed LEK system was compared with that of larger aeration systems at municipal wastewater treatment plants (WWTPs) where aeration systems treat full strength wastewater and health risk studies of workers at these facilities are well documented.

DEP has identified studies, highlighted below, which indicate that there are no significant health risks associated with the operation of the large WWTP aeration systems. By comparison, the Newtown Creek combined sewer overflows that occur during episodic weather events consist of wastewater highly diluted by stormwater. Furthermore, the proposed LEK aeration system will use 100 times less air per unit volume than is typically used in WWTP aeration systems. These factors combined reduce the trigger/agent and the exposure dose to potential receptors. For reasons set forth below, our review of the literature does not support the contention that aeration presents significant health impacts to workers at WWTPs processing raw municipal wastewater; thus it is reasonable to deduce that the LEK system with its low aeration rate and significantly diluted microbe concentrations will not likely pose a public health risk.

The issue of bacteria becoming aerosolized due to the proposed aeration system and causing a public health concern was previously raised and addressed as part of the New York State Department of Environmental Conservation's (DEC) review of the Newtown Creek Waterbody Watershed Facility Plan (WWFP)[1]. These concerns were brought to DEC's attention both during a public meeting held on February 22, 2012 and in a letter from the Riverkeeper to DEC dated March 9, 2012. DEP's Newtown Creek WWFP Responsiveness Summary was found by DEC to sufficiently address the concerns, and DEC subsequently approved the Newtown Creek WWFP (DEC's approval of the WWFP, which contains the Responsiveness Summary, is attached).

Technical Discussion

Pilot Study

As part of its evaluation of aeration, DEP conducted habitat monitoring in Newtown Creek. The first phase of the project was the pilot project to provide aeration at Upper English Kills, which was completed in 2008. The data in the pre- and post-operational reports[2, 3, 4, 5] from the pilot project demonstrate that the Newtown Creek aeration project has been largely beneficial to the

environment. The Upper English Kills pilot study included a three-year sampling program which ran from 2009 to 2011, and which was undertaken to evaluate the effectiveness of the aeration system and identify potential environmental concerns. The sampling program involved the collection of sediment and water column samples along with the conduction of ecological and benthic studies. Some of the key parameters analyzed in the water column included target analyte metals, suspended solids, and dissolved oxygen. The water column sampling identified no indication of metals or suspended solids being transferred into the water column as a result of this aeration system. Air sampling for hydrogen sulfide showed an initial spike in hydrogen sulfide when the system was first activated in the summer of 2009. However, hydrogen sulfide has not been detected in the subsequent years since DEP has been activating the system just prior to the start of summer to prevent the waterbody from becoming hypoxic, thus eliminating any potential for hydrogen sulfide formation.

Review of Existing Literature

DEP's review of existing literature indicates that numerous studies have been conducted by various agencies (USEPA, CDC, local health departments and other public and private institutions in the United States as well as overseas, see Attachment 1) to assess the health risks associated with aeration at WWTPs. These studies were conducted to identify health risks to WWTP workers and to quantify exposures to airborne bioaerosols. Generally, these studies are of exposures that are of much greater magnitude than the potential for microbial concentrations from the processes proposed for Newtown Creek. Such studies have largely indicated that there is little health risk to being near aeration tanks at WWTPs and even when concentrations for the indoor levels of bioaerosols are elevated within closed buildings at WWTPs, adverse health effects are insignificant for potentially exposed workers.

Following is a list of studies addressing these points.

- Sanchez-Monedero et al (2008)[14] showed the levels of airborne bacteria generated by air diffuser aerators at WWTPs (between 22 and 57 CFU/m3) to be very similar to those registered at background locations (lower than 50 CFU/m3). This study concludes that while mechanical aeration may cause airborne microorganisms, diffused aeration creates a minimal impact, with some samples they collected showing no more than background concentrations of microorganisms.

- Another study conducted by Brandi et al. (2000)[9], evaluated the environmental impact of bacterial and fungal aerosols generated by municipal WWTPs operating with different methods of sludge oxygenation. Results showed that plants operating with a bubble diffused air system generate rather low concentrations of bacteria and fungi; moreover, staphylococci and indicator micro-organisms were almost absent. Accordingly, this study determined that "aerobic digestion with a submerged micro bubble system seems to pose little risk from airborne transmission of pathogenic bacteria and fungi to wastewater treatment workers or local residents" (Brandi et al 2000).

- Brenner et el (1988)[18] investigated a spray irrigation site in Muskegon County, Michigan. The investigation did find coliphages and bacteria in increased concentrations downwind as compared to upwind, but did not find increased levels of viruses. It also concluded that epidemiological studies showed no clinical increase in illnesses to

workers in WWTPs, and there was no statistical difference in increased risk of infection of workers in WWTPs.

- Survivability and viability differ widely among microorganisms in sprayed bioaerosols. The most frequently monitored coliform bacteria in wastewater generally have an extremely short life span in aerosol form (Poon 1966). Sorber and Guter (1975)[21] reported that atmospheric bacterial die-off is geometric in nature with the majority of the organisms dying within 3 seconds. The remaining resistant bacteria continue to die at a decreasing rate with time.

- A study by the United States Environmental Protection Agency (EPA, 1981)[7,8] showed that the median viability decay rates (λ) for total coliform and fecal coliform in aerosols from spray irrigation of wastewater are very rapid (e.g. -0.0332 sec-1 and -0.023 sec-1), posing low health risk. Furthermore, it showed that, *gram-negative* bacteria, such as salmonella, which play an important role in human disease causation, do not survive well in an aerosolized state. In fact, the USEPA symposim[8] concluded that WWTP workers' hazard, if any, is small from infectious disease agents and hazards to nearby residents is almost non-existent. The Columbia University study (2012)[10] conducted at Newtown Creek showed that the bacterial fallout rate is higher at Newtown Creek, compared to background samples collected at Louis Valentino Pier (LVP). A review of the sample collection methods reveal that the background samples from LVP were collected at the Pier at a distance of 2.5 to 5m above the water level, as opposed to the Newtown Creek samples collected on the water surface at a distance of 2.5m. The sampling durations were also different for the Newtown Creek samples versus the background samples at LVP. These differences call into question the comparative values of the data and the results. This study also showed that the concentration of gram negative bacteria in the aerosols was lower than the gram positive bacteria. In terms of pathogenicity, gram-negative bacteria generally tend to be of greater concern for human health effects than gram-positive bacteria.

Site Specific Factors Associated With English Kills Aeration Project

DEP has conducted an independent literature search to identify research that has shown what the potential effects from aeration of LEK will have on air quality. We have conducted an evaluation of human health risk taking into account the four accepted factors that are critical in determining human health risk:

1. Existence of trigger/agent;
2. Receptor;
3. Dose;
4. Response.

Trigger / agent: If and when untreated wastewater is released into LEK, it is discharged as combined sewer overflow. This occurs only when the rain event is of sufficient size for the combination of rainwater and wastewater to exceed the capacity of the WWTP. Thus, the flow into LEK has a significantly diluted microbial concentration due to mixing with rainwater.

Additionally, further dilution of the contaminants takes place due to mixing with river water. The in-situ aeration occurs in the combined, mixed river and diluted wastewater rather than concentrated sewage, which is a more favorable situation compared to several studies that concluded there is no negative public health impact even at higher concentrations. It should also be noted that combined sewer overflow effluent is released only during certain rain events. Therefore, this release is not a continuous scenario but rather a series of sporadic, periodic episodes. These features weaken the trigger/agent factor contribution and associated potential negative health impacts.

Receptor: A cursory review of the zoning, property use and type of occupancy in the surrounding neighborhoods indicates that the area is predominantly industrial/manufacturing, followed by commercial use and mixed residential & commercial use. The lack of concentrated nearby receptors also lessens the potential impact. It should be noted that Newtown Creek is currently a designated Superfund site and a class SD waterbody, and as such, this waterbody is not designated for recreational use and it is currently not suitable for primary or secondary contact recreation.

Dose: The aerosolization associated with the implemented design will likely produce a minimal amount of aerosols due to the fact that the submerged piping system is installed at approximately 9 to 20 feet below the surface of the water at low tide on the river bed. The low level of water movement from the coarse bubble diffuser system constructed in LEK is unlike either a spray system or centrifuge system because it results in air bubbles rising to the surface of the water rather than violent eruptions into the air. Typically, the aeration tanks at large WWTPs utilize fine bubble diffuser systems rather than coarse bubble diffuser systems. The fine bubble systems provide a larger air transfer surface area per unit volume of supplied air. The smaller surface area of the coarse bubble systems translates to reduced aerosolization potential versus fine bubble systems. This is supported by the United States Environmental Protection Agency Study (EPA, 1981)[8] which states that smaller aeration bubble size (i.e. fine bubble systems) has been shown to increase emission of viable aerosols. The channel is also wide - greater than 150 feet, abutted on both sides by generally open space with industrial development allowing for the dissipation and dilution of any aerosols. This situation poses a very low exposure risk to the public. Transient traffic from barges and recreational boating may also encounter little or no exposure to bioaerosols, depending on their dwell time near the source.

Response: There are numerous studies indicating that there is no evidence that WWTP workers have significant health risks due to their occupation. (See Attachment 1)

During the Upper EK three-year sampling program, sampling for biological pathogens was not conducted because, based on existing publically available data and on DEP's experience with in-stream aeration at its 14 WWTPs, the release of significant levels of pathogens into the atmosphere is not anticipated. The WWTPs treat sanitary wastewater that contains significantly higher levels of pathogens than in Newtown Creek, and the WWTPs aerate wastewater using 100 times more air per unit volume than the amount that would be used in the Newtown Creek aeration system. Based on records maintained by the DEP staff and contractors working at the WWTPs in accordance with the NYS Department of Labor Public Employee Safety and Health (PESH) requirements, no incidents of illness or work-related complaints associated with

exposure to airborne pathogens have been reported over the last five years. The PESH Recording and Reporting Public Employee's Occupational Injuries and Illnesses Standard (12 NYCRR Part 801) meets or exceeds all requirements of the equivalent federal standard (OSHA 29 CFR 1904). In addition, there are no OSHA- or PESH-related requirements for the Sewage Treatment Workers or Contractors to wear respiratory Personal Protective Equipment in the vicinity of the aeration tanks.

Conclusion

In conclusion, existing data from Newtown Creek and historical data demonstrate that exposure to the aeration of undiluted WWTPs has had no significant adverse impacts to the health of workers exposed on a continual basis (see Attachment 1). Therefore, since the potential trigger, receptor, and dose for this project are significantly reduced over that from a treatment plant, it is reasonably assumed that any potential health risks from this project are minimal.

Enclosure: Attachment 1

Attachment 1

References:

1. New York State Department of Environmental Conservation June 21, 2012 approval letter for the Newtown Creek Waterbody / Watershed Facility Plan Report.

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May 22, 2012

Responsiveness Summary

to Questions and Comments Presented to the

New York State Department of Environmental Conservation (DEC) and the

New York City Department of Environmental Protection (DEP)

on the Newtown Creek Waterbody/Watershed Facility Plan

KEY CONCERNS RAISED BY ATTENDEES AT PUBLIC MEETING ON FEBRUARY 22, 2012 AT THE NEWTOWN CREEK VISITOR CENTER, NEWTOWN CREEK WASTEWATER TREATMENT PLANT, BROOKLYN, NY AND QUESTIONS AND COMMENTS RECEIVED DURING THE COMMENT PERIOD

Planning Goals and Approach

1) The goals of the WWFP should not merely be defined in terms of some improvements in some indicators. The measures that it proposes should not be just some superficial facelifts. The goals for a long-term plan should be strategic. The measures should have a profound impact.

The goal of the watershed/waterbody facility plans (WWFPs) is to achieve existing water quality standards for a particular waterbody. At present, Newtown Creek is a class SD waterbody but does not attain the standards for floatables and dissolved oxygen (DO). The alternative selected for the Newtown Creek WWFP includes the construction of an in-stream aeration system to increase DO levels and floatable controls at the largest outfalls. These projects will improve attainment levels with existing water quality standards. By contrast, the projects required under the 2005 CSO Order, in particular the nine (9) million gallon combined sewer overflow (CSO) storage tank, would not have had a measurable impact on the water quality in Newtown Creek. Based on additional analyses, the DEC and DEP determined that the alternative selected in the WWFP was most cost-effective for achieving existing water quality standards, which justified deletion of the storage tank.

While developing the Long-Term Control Plan (LTCP), DEP will evaluate additional CSO controls for Newtown Creek to identify controls sufficient to achieve the goals of the Clean Water Act, consistent with the United States Environmental Protection Agency's (EPA) 1994 Federal CSO Control Policy and subsequent guidance. These CSO controls may include green infrastructure (GI) as well as gray infrastructure projects.

The 2011 Consent Order includes a substantial 20-year citywide commitment to implement GI as well as cost-effective gray infrastructure, conservation and other

programmatic CSO reduction measures designed to lessen the burden on the combined sewer system.

2) A reduction of 14% combined sewer overflow (CSO) is inadequate because it doesn't meet EPA CSO policy and won't adequately improve water quality or the ecology of Newtown Creek. The community desires increased CSO reduction, and the current negotiated consent order between DEC and DEP allows for more GI and less actual CSO reduction, a worse situation than in the prior negotiated consent order.

The Newtown Creek WWFP is considered an interim step toward development of a LTCP as required under EPA's 1994 Federal CSO Control Policy. The overall purpose of the WWFP is to identify alternatives that would result in attainment of existing water quality standards in Newtown Creek. (see response to Question 1). The 2005 Consent Order called for the implementation of several projects that are not in included in the 2012 Consent Order, including a 9 million gallon (MG) CSO storage tank. The tank was deleted because it was determined that, during a reevaluation of potential water quality benefits to Newtown Creek from these projects, other alternatives would result in greater water quality benefits, reduction in floatables and CSO reductions. Therefore, these alternatives were incorporated into the 2012 Consent Order.

By June 2017, DEP will develop a LTCP for Newtown Creek in accordance with EPA's Federal CSO Control Policy. As outlined In Appendix D of the 2012 Consent Order, LTCPs are intended to assess the feasibility of attaining the goals of the Clean Water Act (CWA) for all tributary waterbodies in the New York Harbor. For any waterbody not projected to meet the fishable/swimmable goals of the CWA, a Water Quality Standards Use and Attainability Analysis (UAA) must be completed to assess the "highest attainable use" of the waterbody pursuant to EPA criteria, regardless of the current classification and related water quality standards. This process ultimately selects the water quality planning end point for the development of the LTCP; therefore, a range of water quality strategies will be evaluated.

DEP will be implementing a GI demonstration project in the Newtown Creek sewershed, which will be used to determine the effectiveness of GI for reducing CSOs. Data from this and other projects will be incorporated into refined CSO and water quality models to better reflect the water quality benefits from GI to inform the development of the LTCP.

3) Since the favored alternative only reduces volume by 14%, is the water pollution control plant upgrade included in the baseline or in addition to the WWFP reduction?

The 14% CSO reduction from baseline conditions includes both the improvements at the Newtown Creek wastewater treatment plant (WWTP) and bending weirs at the two locations proposed in the WWFP.

4) 94% of CSO comes from four large outfalls. Why will the two biggest CSO outfalls achieve little to no CSO reduction under the WWFP? Can more stormwater be conveyed into existing stormwater outfalls, further diluting the pollution?

During the development of the Newtown Creek WWFP, DEP evaluated the feasibility of installing bending weirs at numerous locations within the sewershed and determined that the two locations selected, at regulators B1 and Q1, were the most cost-effective sites and thus were included under the WWFP. As a result, CSOs will be reduced at the two outfalls, NCQ-077 and NCB-015, associated with these regulators; CSOs will not be reduced at the other two outfalls. DEP will continue to evaluate the feasibility of bending weirs or regulator modifications at other locations. Most recently, as part of its evaluation of floatables control at four major Newtown Creek outfalls; DEP identified a potentially viable bending weir location upstream of CSO outfall NC-083 that could provide significant CSO capture in conjunction with floatables control. If deemed viable, DEP will include this additional project as an element of the Newtown Creek LTCP.

Water Quality and Best Uses

5) There are debris and rats in Newtown Creek but the community wants to swim, kayak and fish in the Creek. Newtown Creek designation should be upgraded to recreational use, which is already in practice. WWFP does not recommend a higher recreational classification.

Newtown Creek is currently a designated Superfund site and a Class SD waterbody, and as such, this waterbody is not designated for recreational use and is not currently suitable for primary or secondary contact recreation. As part of the LTCP process and a subsequent post-construction monitoring (PCM) program, a UAA will be undertaken to determine highest attainable use for Newtown Creek, in accordance with State and Federal criteria.

6) Health effects from a polluted Newtown Creek must be taken more seriously since the community alleges that health problems have been caused by living near poorly managed sewage discharges. Water quality must be improved for the well-being of the community. The community does not support making water quality improvements secondary to costs.

Newtown Creek is currently a designated Superfund site and EPA's Superfund Program will address potential health effects associated with Newtown Creek. Under the WWFP, CSOs to Newtown Creek are being reduced by approximately 14 % and additional CSO reduction alternatives will be considered under the LTCP.

7) Post construction monitoring for ten years is needed before beginning a review of Use Attainability Analyses. However, DEP says that UAAs can be reviewed and revised concurrent with the LTCP, but the LTCP is scheduled for 2017, well ahead of when the 10 years will be up. Clarify this inconsistency.

PCM durations will vary among the waterbodies and will be used to help support variances and UAAs. PCM will consist of actual ambient water quality modeling, estimating and/or monitoring CSO discharges, and side by side landside and water quality modeling to verify and/or recalibrate previous CSO and water quality projections.

All LTCPs will evaluate attaining higher water quality standards, but the process of revising the water quality standards or issuing a variance will be done as part of a separate regulatory process. PCM will help support this process and in some cases may be concurrent with this process. Both UAA and variances will need to be renewed periodically in accordance with existing regulations.

8) The consumption and use of contaminated fish is an especially pressing concern for many communities within the Newtown Creek watershed.

Newtown Creek is currently a designated Superfund site and a Class SD waterbody, and as such, this waterbody is not designated for recreational use and is not currently suitable for primary or secondary contact, including recreational fishing.

Alternatives Evaluation

9) Describe the Green Infrastructure (GI) Chart. Describe DEP's criteria for locating GI on private property and why GI isn't located on public property.

The graph refers to the goals stated in the GI Plan: managing one inch of stormwater from 10% of impervious surfaces in combined sewer areas citywide between now and 2030. Under the 2011 Consent Order, DEP committed to managing one inch of stormwater on 1.5% of impervious surfaces in combined sewer areas by 2015. To accomplish this, DEP has allocated $187 million for GI projects on publicly-owned properties, such as schools, public housing, streets and sidewalks, and other city-owned properties through fiscal year 2015. For implementation on private properties, DEP's Office of Green Infrastructure has established a Green Infrastructure Grant Program. To date, DEP has awarded $8.2 million in grant funding. Additional information on awarded grants and projects is available on DEP's website.

10) Wetlands, GI and biodiversity (e.g., suspension feeders like mussels) can filter pollutants in and around Newtown Creek and should be maximized instead of playing such a minor role in the WWFP. The use of mussels, for example, would actually remove contaminants and increase the quality of the new fish that will be introduced to the Creek and make them safer for human consumption.

Working with DEC, DEP plans on evaluating alternatives during development of the LTCP beyond the CSO reduction projects selected in the WWFP and will consider ecological improvement projects to determine relative impacts on water quality.

11) Describe the locations and purpose of bending weirs, whether they are new technology. If they are used in other places, are they cost effective? Can other sites be found for installing bending weirs?

The proposed bending weir locations are currently proposed for regulators upstream of CSO outfalls NCQ-077 and NCB-015 and an additional location is being considered upstream of CSO outfall NCB-083. Bending weirs help increase the height at regulators to store more CSO in the sewer system and convey more wet weather flow to WWTPs.

The intent of this technology is to capture smaller and medium-sized wet weather events and reduce the frequency of CSO discharges. However, during intense rainfall events, bending weirs tip back to a hydraulically neutral position to prevent any flooding or surcharging of upstream sewers.

12) Describe how in-line storage works and if its use will cause backups.

In-line storage is the term for maximizing storage and increasing flow capture within a combined sewer system thereby reducing CSO discharges into waterbodies during wet weather conditions. In-line storage can be achieved through a variety of techniques. For Newtown Creek, in-line storage was achieved by installing inflatable dams in existing regulators. Regulators control the amount of flow to a downstream point and provide an outlet for flows in excess of the sewer capacity. Adjustment of regulator settings, such as installing inflatable dams, is a control measure that can ensure optimal system performance and maximize in-line storage. Inflatable dams, while more expensive and complicated to construct and maintain than other technologies, have a built-in system that allows the dams to deflate when water levels rise beyond a pre-set level, thereby preventing flooding and sewer back-ups.

13) Describe where sewer separation is taking place. Are separate sewers required for future development? If so, will more stormwater outfalls be considered?

Sewer separation is taking place citywide, is required for new construction and is typically pursued in low lying areas with poor drainage as a flood mitigation strategy. In the Newtown Creek drainage area, a project is being planned to install sanitary and storm sewers in a 60-acre area bounded by Meeker Avenue, Morgan Avenue, Lombardy Street and Scott Avenue. This project would include two new storm outfalls, located at Meeker and Scott Avenues, which would discharge into Newtown Creek.

14) Why not build a flushing tunnel in Newtown Creek?

A flushing tunnel was considered for Newtown Creek but due to engineering logistics, this strategy was not deemed to be a cost-effective solution, compared to Gowanus Canal. For the Gowanus Canal, there was an existing tunnel that was constructed over one hundred years ago and was utilized for the flushing tunnel, which greatly increased the feasibility of this alternative for Gowanus Canal. Newtown Creek is about four times longer than the Gowanus Canal and has four major tributaries that the tunnel would need to be directed toward, thus a flushing tunnel would be significant larger and more complex for this waterbody. Under the LTCP, however, a flushing tunnel alternative could be considered.

15) Do the cemeteries located in Queens near Newtown Creek have internal drainage?

For cemeteries located within the Newtown Creek drainage area, stormwater is either infiltrated or conveyed to receiving waterbodies via an internal separate drainage system.

Aeration System

16) The aeration plan won't improve water quality on a long term basis and polluted air will go into the waterbody. Aeration re-suspends and disseminates bacterial contamination from Newtown Creek into the air. Expanding aeration as primary way to meet federal and state water quality standards is inadequate because all other reasonable alternatives were not considered. Describe the air quality impact associated with aeration, in particular, affecting a person in a canoe on the water.

The existing aeration system, which aerates the Upper English Kills (Zone 1), and the second phase which will aerate the Lower English Kills (Zone 2) are located in tributaries of Newtown Creek with the least amount of tidal influence and the lowest rates of dissolved oxygen (DO). Aeration is provided via suspended pipes placed above the Creek's bottom and at the edge of the navigation channel. Studies have shown that aeration will not cause sediment re-suspension and it should not interfere with navigation. Although some gases such as H2S were measured when the aeration system commenced operations, these disappeared. The increase of dissolved oxygen decreases H2S and associated odors while the aeration system is in operation. As a class SD waterbody, Newtown Creek is not suitable for recreational activities such as canoeing, particularly after certain rainfall events as they may affect water quality. See below for additional information about pathogens and potential air quality impacts.

17) In the [February 22, 2012] presentation, DEP explained that it conducted air quality monitoring for hydrogen sulfide, [volatile organic compounds] VOCs and benzene, and detected only initial spikes in hydrogen sulfide when the system first started up, which apparently dissipated. Several members of the public at the meeting asked if DEP had conducted [similar] air sampling for bacterial pathogens, and DEP answered that they did not believe so, but were unsure. DEP did not provide any information suggesting that such air sampling had taken place, and the Plan does not include any information describing air sampling for pathogens.

There has been no sampling for biological pathogens but DEP doesn't anticipate pathogens being released into the atmosphere from this in-stream aeration facility based on its experience at its fourteen (14) wastewater treatment plants (WWTPs). The WWTPs treat sanitary wastewater with significantly higher levels of pathogens and it aerates this stream using almost 1,000 times more air per unit volume that would be used in Newtown Creek. Based on records maintained by DEP staff and contractors working, in accordance with the NYS Department of Labor Public Employee Safety and Health (PESH) requirements, there have been no incidents of illness or work related complaints associated with exposure to airborne pathogens reported over the last five (5) years. The PESH Recording and Reporting Public Employee's Occupational Injuries and Illnesses Standard (12 NYCRR Part 801) meets or exceeds all requirements of the equivalent federal standard (OSHA 29 CFR 1904). In addition, there is no OSHA or PESH related requirements for the Sewage Treatment Workers or Contractors to wear respiratory PPE in the vicinity of the aeration tanks.

In general, all the studies that are cited in the Riverkeeper's letter of March 9, 2012, fail to establish any cause-effect relationship of direct or indirect risk of exposures or infections from aerosols of sewage or other sources (freshwater and sea water) that may contain pathogens. Most of the study results were limited to the evaluation of the presence of pathogens at certain concentrations in various parts of several sewage treatment plants or other aquatic environments (Haas et al., 2010; Heinonen-Tanski et al., 2009; Fracchia et al., 2006; Fannin et al., 1985; Blanchard et al., 1982). Others, including one study from Smit et al. (2005) were specifically designed and conducted to measure the levels of endotoxins and investigate work related symptoms in wastewater treatment workers that could be exposed to biological and chemical agents. However, none of the studies attempted to evaluate the risks to wastewater treatment workers or to the general public specifically from the aerosolization of viable pathogenic bacteria and endotoxins as a result of aeration conducted in sewage treatment plants.

Some of these studies stated the conclusion have concluded that symptoms from workers exposures to pathogens may have been work related. However, in all cases they were not able to show any direct or indirect risks of exposure to pathogens from specific sources. They were also not able to establish any clear pathways of pathogens exposure from specific tasks or operations conducted at wastewater treatment facilities. Yet, several other studies have shown no higher infection rates (i.e. diagnosed diseases) for sewage treatment workers compared to the general population of workers not exposed to sewage (Garvey, 2005).

18) At English Kills, if aeration is shut off, there must be alternatives to address low dissolved oxygen. Is there a backup redundancy for the pumps? When pumps are off, water quality returns to unacceptable levels, so what are the benefits to aeration? Aeration is only being proposed for use on a seasonal basis which does not appear to be cost effective at all.

Large blowers are used to artificially push air into the waterbody to increase oxygen levels and the DO levels would drop if the blowers were shut down. There will be standby blowers installed for each aeration system to provide redundancy. The blowers will be turned off during the winter season as the DO level in the waterbody during this time are naturally above 3mg/L. Aeration is required to achieve fish survival standards in Newtown Creek (SD classification). Raising dissolved oxygen levels is also a necessary first step towards improving the ecology of the Creek. Data indicate that Newtown Creek water quality would not meet higher standards even if all CSO events were eliminated. DEP has evaluated and will continue to evaluate numerous alternatives to address low DO in Newtown Creek.

19) Energy requirements of blowers are significant. Are these blowers on public property? Since aeration won't improve water quality on a long term basis but will cost $115.3 million, DEP should employ lower cost alternatives, such as marsh grass, mussels, and other natural filters. Did DEP investigate alternatives? Who will build and operate the new aeration system?

Costs for the aeration facilities are currently being revised based on actual costs associated with facilities constructed in the Upper and Lower Portion of English Kills. The current estimate for an aeration facility for the East Branch, Maspeth Creek, Dutch Kills and a limited portion of the open waters is about $25 million. The annual operating cost to run these facilities would be approximately $150,000/year assuming four months of operation during warmer weather. These facilities would be maintained and operated by DEP staff. As part of the LTCP process, DEP will also consider other types of green solutions, including an ecological solution for Dutch Kills: a passive DO technology, such as a cascade aeration system.

20) What's the bid process for the next [aeration] system? And who provides maintenance?

The contracting for construction of future phases of the aeration system will adhere to the city's standard procurement process. The maintenance will be conducted by DEP staff, similar to DEP's WWTPs.

Facilities and Operations

21) Describe the location and purpose of the Brooklyn pumping station.

Wastewater pumping stations are used to convey sewage to a WWTP in parts of the sewer system where the sewage cannot flow by gravity due to the topography of the area.

The Brooklyn pumping station is located on Newtown Creek WWTP property, where it receives wastewater from the sewershed which is located in Brooklyn. During wet weather conditions, this pumping station conveys up to 400 million gallons daily (MGD) of combined stormwater and sanitary flow to the headworks of the WWTP for treatment, and some of these flows would have otherwise entered Newtown Creek as CSO. Together with the Manhattan pumping station, up to 700 MGD of combined sewage flow can be pumped and treated at the Newtown Creek WWTP.

22) The WWFP Executive Summary says floatables plan, skimmer vessels and floatables booms have benefitted Newtown Creek, but this is not so. Floatables are everywhere. Instead of spending $90 million on floatables control, why not enforce litter laws and increase fines for littering?

The objectives of the Floatables Plan are to provide substantial control of floatables discharges from CSOs throughout the city and to comply with appropriate DEC and Interstate Environmental Commission (IEC) requirements pertaining to floatables. Overall, implementation of the Floatables Plan is expected to control roughly 96% of street litter generated in New York City through several elements, including but not limited to the following: monitoring street litter levels; maintaining catch basin hooding through hood inspection/replacement programs; engaging the public to increase public awareness of the consequences of littering; continuing to investigate the applicability, performance and cost-effectiveness of new floatables-control technologies; developing monitoring programs to track floatables levels in the New York Harbor to inform short-

and long-term floatables-control requirements; and capturing floatables at end-of-pipe and in-water facilities, including the Interim Floatables Containment Program (IFCP) booms and nets. As part of this effort, booms are installed in Newtown Creek tributaries: Maspeth Creek, East Branch and English Kills.

The Floatables Plan is a living program that will undergo various changes over time in response to an ongoing assessment of the program as well as changing facility plans associated with other ongoing programs. A floatables monitoring program was implemented to provide a metric for LTCP performance. Short-term and long-term remediation activities may also be conducted, if appropriate, based on monitoring data and investigations. Evidence of increasing floatables levels that impede uses could require the addition of new floatables controls, expansion of BMPs and the modifications of the WWFP and/or drainage-basin specific LTCPs, as appropriate.

DEP has installed booms or floating barriers at 24 locations to capture floatables discharged from combined sewers, which handle sanitary and stormwater. DEP skimmer vessels are used to remove floatables from boomed sites. As part of the CSO control program, DEP has transferred $15 million to NYC Department of Sanitation to reduce litter, but these funds are not likely to be used for enforcement personnel. Residents can call 311 to report problems at catch basins or outfalls related to litter.

23) Use "Don't flush me remote system" for real time visualizations of the sewer system.

Remote sensors that monitor CSOs in real time will be installed and tested at five CSO outfall locations throughout the city, including Dutch Kills, as part of a pilot testing program. The goal of the new system is to measure both wastewater elevation and the flow rate, allowing DEP to calculate CSO volumes released at that outfall. Improved monitoring is essential to better understanding the effects of CSOs and to enhance the public notification system when CSO events occur. Goals of the study include the following: identification of the processes for data compilation, quality assurance/control, and interpretation, and determination of the level of analysis needed to produce reliable flow rate information that can be used to improve CSO advisory and notification systems.

Superfund and EPA Coordination

24) The design and implementation processes should be given high priority, in light of the Creek's dire condition and these phases of the project to be accomplished as expeditiously and effectively as possible. DEC and DEP should consult with the EPA and jointly issue a public schedule detailing the work to be done and an expected timetable for its start and expected completion dates. DEP should also make public whether the WWFP plan is acceptable to the EPA or whether it will, for example, require CSO reductions beyond those called for in the current proposal.

Phase 1 work is underway to sample the creek sediments and water and will continue through the end of 2012. Phase II sampling is scheduled to be completed in 2013. The

feasibility study, which is a study of engineering options for remediation of the Creek, will begin following the completion of this investigation. This schedule was issued by the potentially responsible parties (PRPs) (Exxon, BP, Texaco, Phelps Dodge, National Grid and DEP) and approved by EPA. CSOs will be studied in the next phase of sampling. Once that information is available, it will be possible to determine whether additional CSO controls will be needed.

25) Will the Superfund program help reduce CSO volumes? Specifically, how is this addressed in the Superfund Work Plan?

The Superfund program is designed to address toxic chemicals. If the data show that toxic chemicals are found in CSO solids at unacceptable levels, then CSO controls will be required under Superfund. These controls could include CSO volume reductions if that would adequately address the problem. Applicable data have not yet been collected so it is not possible to know what CSO controls, if any, will be required.

26) Have CSO flows been sampled for toxins?

CSO flows have not yet been sampled. The first phase of sampling of Newtown Creek sediment and water column sampling is underway. The CSO sampling will begin when this first phase of sampling is complete.

27) Will DEP look at toxin concentrations of CSOs to determine their contribution to the Newtown Creek contamination?

Yes, there are plans to sample CSOs for toxic chemicals to determine what concentrations are present in CSOs and to determine the contribution to Newtown Creek.

28) Will the CSO contaminant reports be made public?

All data collected will be made public and published on the EPA website and DEP's website.

29) EPA should require DEP to perform CSO sampling during the first flushes of a CSO event. Sampling three to six hours later is not sufficient. EPA and DEP should work together to determine CSO frequency and volume at Newtown Creek.

The CSO sampling plans have not been finalized, but will include extended sampling events in order to understand the discharges under different conditions. The sampling plans will be reviewed and approved by EPA prior to any CSO sampling.

Public Participation

30) Will there be extensive public participation in the LTCP?

The LTCP goal statement developed by DEP and DEC is predicated on a robust public process and recreational use information. One of the nine elements of a LTCP is a public

participation and agency interaction process that actively involves the affected public and regulators in decision-making to select long-term CSO controls.

The LTCP public participation plan is currently being drafted and DEP will ensure all information provided to the public is user-friendly and made readily available. The purpose of the public participation plan is to create a roadmap for communicating with and inviting input from interested stakeholders on CSOs and the challenges and opportunities to control them. Public outreach efforts will also highlight DEP's historical and continuing commitment to protect water quality in the city. Further, the public participation plan is designed to keep important stakeholder issues associated with the CSO program before the public and ratepayers throughout the life of the project.

31) Send Responsiveness Summary by email to all persons who attended the public meeting.

DEP is interested in expanding methods of information sharing and will provide the Responsiveness Summary to all public attendees, in addition to posting on DEP's website.

32) DEP should conduct a media campaign to educate the public about CSOs and promote source reductions, such as dry composting and low flow toilets and give more incentives to the public for source controls. Will water conservation reduce sanitary sewage flows?

DEP conducted public outreach on CSOs during development of the WWFPs and its GI Plan, and will continue to conduct robust public outreach and educational activities during development of the LTCPs. With respect to promoting source reduction, DEP has implemented a water conservation program in the past which has reduced base wastewater flows across the city. More recently, DEP is advancing a major water conservation program called "Water for the Future", which will include implementation of low-flow fixtures as well as other strategies. This conservation program is especially important as DEP prepares to temporarily shut down the Catskill Aqueduct for repairs. The program will have some CSO reduction benefits however it is important to note that CSOs are mainly comprised of stormwater, as opposed to sanitary flows, and thus water conservation would not have a significant impact on CSOs.

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