Executive Summary – The Draft RI Report is Both Materially Incomplete and Inaccurate

The Draft Remedial Investigation (Draft RI) report submitted to US Environmental Protection Agency (EPA) by Anchor QEA (AQ) on behalf of the Newton Creek Group (NCG) for the Newtown Creek Superfund Site (the Site or the Creek) is fundamentally flawed and is not approvable in its current form. The Draft RI suffers from four major flaws: failure to adequately consider the impact of upland sites; a misplaced focus on CSOs and MS4s; mischaracterization of NAPL and groundwater; and, as a result, a deeply flawed Conceptual Site Model. Due to these significant deficiencies, the NCG cannot complete a successful Feasibility Study (FS) and EPA will have an insufficient record to select a proper remedy based on that record. To address these flaws, EPA should allow the City to undertake this work as a respondent and/or implement plans separately and independently to supplement the Draft RI prior to the initiation of the FS in 2019.

Before agreeing to participate in the Remedial Investigation (RI), the City voiced concerns that NCG's draft of the RI Work Plan (Work Plan) would not be capable of generating data sufficient to complete the FS and support the selection of a remedy (Letter of Daniel C. Walsh to Walter Mugdan, Dec. 23, 2009). Specifically, the City objected to the proposed CSM set forth in the Work Plan because of its singular focus on municipal discharges into the Creek and its failure to acknowledge or appropriately incorporate any past or current contaminant discharges from industries or industrial properties in the vicinity of the Site, including most notably discharges from the NCG facilities. The City demonstrated that the Work Plan required a broader scope of work to characterize the nature and extent of ongoing discharges from upland sites, and that the CSM needed to be revised to reflect these discharges. The Phase I Work Plan ultimately approved by EPA required a more balanced investigation and CSM.

During the course of the remedial investigation, EPA repeatedly had to direct NCG to properly evaluate sources other than CSOs and MS4s and properly evaluate contaminant transport within the Creek. Among other examples, EPA had to prepare a groundwater Work Plan and eventually direct the NCG to implement the groundwater investigation. As detailed in these comments, the groundwater assessment in the Draft RI remains woefully inadequate. In addition, EPA determined that the NCG's ebullition study was inadequate in comparison to the thorough ebullition study performed by the City. As a result, EPA directed the NCG to perform additional ebullition studies, which have not yet been completed and therefore the evaluation of ebullition in the Draft RI remains incomplete and inadequate. These are just two examples of NCG's pattern of deficient work plan submittal, unsuccessful field implementation and incomplete, biased and incorrect analysis.

As set forth in these comments, the concerns voiced by the City before the RI remain valid.

NCG's Draft RI continues to narrowly focus on CSO and MS4 discharges. The Draft RI lacks a proper description, investigation and evaluation of upland sites and of their ongoing impacts on the Creek, and the CSM does not depict the nature and full extent of contamination in the Creek. In addition to these fundamental flaws, the report is largely descriptive in its presentation of information, and fails to provide the quantitative analysis needed to support NCG's assertions. The failure of the Draft RI to provide supporting calculations renders the report materially incomplete.

The work of NCG has been deficient throughout the development and implementation of the Draft RI, as demonstrated by the material and numerous technical deficiencies detailed in the comments provided by the City here. To ensure that these flaws are remedied, and an approvable Draft RI is timely produced, EPA should direct the City to undertake this work as a respondent or implement plans separately and independently to supplement the Draft RI prior to the initiation of the FS in 2019. Without addressing data gaps the FS cannot effectively evaluate remedies, and any remedy will not address ongoing sources and ultimately fail to protect the Creek.

The attached comments describe in detail the City's concerns with the Draft RI. These concerns are briefly summarized here to provide an overview of major shortcomings of the report:

NYC Comment 1) The CSM needs to be revised and updated to properly incorporate all missing sources of contamination and correctly represent the fate and transport of site contaminants. The Draft RI underestimates, dismisses, or excludes multiple contaminant sources and fate and transport processes. The NCG's failure to account for each of these sources and processes, notably excluding its own sites from the analysis, has resulted in a CSM that grossly underestimates these inputs to the Creek. Instead, the Draft RI maintains a flawed CSM that is focused on municipal discharges and is therefore incapable of demonstrating the magnitude and spatial distribution of contaminant concentrations present in the Creek. The acceptance of the NCG CSM will likely result in the failure of the ultimate remedy, as any decision based on the CSM and its flawed construct will result in remedial actions that are not based on the totality of factors responsible for current conditions in the Creek. The following points underscore the lack of a valid CSM the additional studies and actions that are necessary for the RI/FS to be completed.

NYC Comment 2) The Draft RI fails to properly measure, document and integrate significant ongoing upland sources that are impacting the Site. In designing its investigation, NCG committed an inordinate amount of resources and placed an inordinate focus on combined sewer overflow (CSO) and stormwater outfalls, while failing to recognize the potential of significant upland sources with long histories of discharges to the Creek. In fact, there is a data

set (which NCG continues to interpret incorrectly) that clearly demonstrates that current municipal discharges cannot be responsible for the extensive contamination found at the Site. The City provides a clear analysis of this data set to reach these conclusions, as opposed to NCG's inaccurate interpretation of the data, which leads to incorrect conclusions.

One of the main goals of an RI is to document the nature and extent of contamination at a site. Understanding and quantifying the relationship between external sources and the Site itself is a necessary element for achieving that goal. In placing so much emphasis on the municipal discharges, the NCG failed to study these upland sources in a comprehensive manner. Therefore, to properly evaluate the nature and extent of contamination, the Draft RI needs to include an evaluation of all likely impacting upland sites. EPA should allow the City to undertake this work as a respondent or implement plans separately and independently to properly complete the RI.

Further, the limited discussions of the upland sites provided in the Draft RI describes only the historical use of these sites and fails to identify the likely contaminants arising from each site, the quantity and timing of direct discharges of contaminants to the Creek and the likely pathways and contributions under current conditions. While EPA's schedule target date is approximately 2027 for having interim remedial measures (IRMs) in place for upland sites, there is no formal mechanism for considering the impacts of these IRMs in meeting the goals of the RI/FS. Recently EPA identified four "likely" impacting sites that are not characterized or included in the Draft RI including: the former Paragon Oil Terminal, the former Pratt Oil Works site, the Scholes Street Holder Station/National Grid Greenpoint Energy Center (GPEC) and the Manhattan Poly Bag site. There are an additional 22 "unknown" sites whose contributions to the Creek are uncharacterized. While some of these sites are under investigation as part of New York State-led program, responsibilities and coordination between the EPA and New York State Department of Environmental Conservation (NYSDEC) on the impacts of these sites to the Creek, and their successful remediation, are unclear. Further complicating the issue of upland site impacts is the observation that at least two such upland sites (the Frito-Lay facility and Former Pratt Oil Works) continue to impact the Creek after the upland remediation was considered completed. Given all of these outstanding upland site-related issues, the Draft RI's failure to quantitatively integrate the upland sites' historical and ongoing contributions represents a fatal flaw in the document that must be corrected before the report can be considered complete.

NYC Comment 3) The CSM and the associated data analysis fail to consider the impacts of non-aqueous phase liquid (NAPL) on the Site. The Draft RI incorrectly dismisses NAPL as an important source of contamination in the Creek. Contrary to the Draft RI's assertion that most NAPL is "residual", there is significant evidence that NAPL is one of the primary sources, both historical and ongoing, of contamination in the Creek. The processes relating to NAPL as a contaminant source and its impacts on the Creek must be understood before any consideration of remedial measures can be undertaken. The lines of evidence that NAPL is one of the most important factors in the system are numerous and significant:

a. NAPL is present in significant quantities in upland sites along the bank of the Creek. NAPL has entered the Creek from these upland sites for decades. NAPL seeping from the banks has been documented as recently as December 2016 at several location such as at the Former Pratt Oil site, National Grid Greenpoint Energy Site, the eastern fork of East Branch, and at multiple locations in English Kills. The documented NAPL seepage through the banks into the Creek remains uncharacterized.
b. NAPL has been documented throughout the sediments at the Site (surface and subsurface) through both visual observation such as the EPA 2009 Expanded Site Investigation (ESI) study of the Creek, NYSDEC-led programs, (Weston Solutions, Inc., 2009; Anchor Environmental, LLC, 2007), NCG's Phase 1 and Phase 2 RI field programs (which document the presence of NAPL, but not the extent), and through the City's laser-induced fluorescence (LIF) NAPL survey. NYC Figures 39a and 39b show the extent of tar-like LIF signatures and oil-like LIF signatures in the Creek. The LIF signatures are strongly linked to NAPL observations in adjacent sediment cores at many locations in the Creek, so likely show the extensive area where NAPL exists.
c. Ebullition-facilitated NAPL migration has been extensively documented in the Creek, but is not quantified in the Draft RI, so its importance to the Creek cannot be understood. NCG fails to quantify the nature, contaminant mass loading and magnitude of the ebullition-facilitated NAPL migration. This process extensively affects the surface of the Creek during low tide and is an important on-going source of COPCs to both the water column and the sediment bed. Given the persistent nature of these releases and their ability to deliver NAPL from depth within the sediments, ebullition-facilitated NAPL migration represents a flux with the potential to be larger by orders of magnitude than any of the measured fluxes reported by the NCG. NCG only references the limited 2015 survey to inform the Draft RI and ignores more recent releases documented by NYCDEP, NYSDEC, EPA and the community. This inadequacy of the Draft RI is a significant data gap that requires additional investigation.
d. The majority of sediment traps deployed by NCG had observable sheens, confirming these observations of NAPL transport processes in the water column. Notably, TPAH

concentrations in the sediment trap materials were significantly higher than TPAH concentrations on solids collected directly from point source discharges.

This evidence clearly shows that NAPL is being, and has been, released to the Creek; that NAPL exists as a source in the Creek; and that NAPL is being transported throughout the Creek. Following these lines of evidence, it is clear that the Draft RI's focus on point sources and failure to evaluate NAPL has resulted in a significant lack of understanding around the sources of contaminants and contaminant transport in the Creek, leaving significant data gaps in the CSM, making the selection of a successful remedy an impossibility.

NYC Comment 4) The Draft RI fails to properly account for geochemical transport mechanisms that likely deliver significant contaminant loads to the Creek. The Draft RI's analyses are not bound by standard geochemical principles; rather NCG applies selective use of those principles to explain observations in an anecdotal sense. Only a small part of the Draft RI's presentations are quantitative. In addition, the Draft RI often calls upon contradictory geochemical conditions to explain different observations and does not recognize that if one mechanism is occurring as suggested, the other cannot simultaneously occur. The incorrect application of geochemical transport mechanisms and the failure to quantitatively estimate contaminant transport to the Creek by these mechanisms represent fatal flaws in the document that must be corrected before the report can be considered accurate or complete. The Draft RI also fails to properly characterize major contaminant transport mechanisms to the Creek such as groundwater transport and ebullition-assisted NAPL transport. These concerns are further described below.

NYC Comment 5) The role of groundwater transport of contaminants is incorrectly characterized and significantly underestimated. Groundwater movement through the overburden and fill layers that underlie the upland sites adjoining the Creek is responsible for the delivery of significant loads of contaminants to the surface waters of the Creek. The data obtained for the Draft RI clearly document the presence of contamination in groundwater near the site. While the vertical flow of this groundwater may be restricted by the beds of fine sediment that underlie the deeper portions of the Creek, there is far less impediment to the horizontal transport through the fill layer that comprises the shallow areas of the Creek bed (i.e., the Creek's banks). Additionally, shallow groundwater from upland sites is able to reach the Creek through the various bulkheads that line the edges of the Creek. These porous and often failing bulkheads provide little to no restriction to the migration of groundwater and the contaminant burden it carries. The groundwater CSM/contaminant mass loading calculations need to be re-developed to include groundwater discharge from the banks and ongoing contaminant loads from upland sites. The EPA had requested that NCG develop cross-sectional models and hydrogeological flow sections to confirm NCG's proposed groundwater CSM;

however, NCG did not present the requested models and flow sections in the Draft RI. The results of the models would have very clearly documented the flow through the fill layer (further presented in comments on Attachment F). The cross sections that are presented in the Draft RI's groundwater discussion contain no groundwater head or groundwater flow/potentiometric information. Adding groundwater potentiometric head and hydraulic conductivity information to these cross sections reveals the importance of discharge through the banks and that NCG's CSM for groundwater is fatally flawed.

Part of the underlying problem with NCG's underestimated groundwater flow calculation stems from NCG's measurements and calculation of hydraulic conductivity in the soft sediments. As discussed extensively in the detailed comments, the techniques used by the NCG result in overestimates of the hydraulic transport through the soft sediments and thereby underestimates transport through the fill layer via the banks of the Creek. The existence of groundwater discharge through the banks is corroborated by the potentiometric head in the fill layer and direct observations of groundwater seeping into the Creek and its tributaries through the banks and bulkheads. Because the Draft RI ignores flow through the banks and does not include any upland site's water quality data in its analyses, the groundwater CSM and loading calculations are incomplete and inaccurate. The City estimates that the flow through the banks is at least 3 times greater than flow through the sediment bed. At several locations, the City has documented NAPL being transported in the groundwater into the creek. Since the groundwater is in direct contact with NAPL deposited in the fill and native materials at these locations, it also expected that the contaminant loads in the discharging groundwater are also high. Loads in the groundwater discharging through the banks will not be mitigated by the lower hydraulic conductivity sediment bed that lies across the deeper portions of the Creek (as asserted by NCG). Here again, the Draft RI is flawed because it fails to account for what is likely one of largest contaminant loads to the Creek (direct discharge of NAPL on groundwater and dissolved-phase COPCs through the bank materials).

NYC Comment 6) The NCG incorrectly characterizes sediment porewater-surface water exchange, thereby underestimating the loads and importance of this process in delivering contaminants to the Creek. Following from the flawed groundwater CSM, the Draft RI fails to correctly interpret the porewater salinity distribution as indicative of porewater migration out of the sediments, enhanced by tidal pumping, which dilutes the groundwater concentrations that are discharging as porewater. The Draft RI underestimates the groundwater/porewater loads by using the diluted porewater concentrations and the partitioned groundwater seepage (not the full water exchange) as the basis of their estimate. In addition to this misinterpretation, NCG compounds this basic error by using underestimates of the actual porewater contaminant concentration, failing to account for dissolved organic carbon (DOC)-complexed contaminants (discounting chemicals that may reach the sediments and benthic organisms), further

underestimating porewater-based (the extension of groundwater transport through the sediment bed) contaminant transport.

NYC Comment 7) The Draft RI inappropriately discusses possible remedial alternatives for the Creek which include reduction of CSOs and MS4s, monitored natural recovery and dredging and capping alternatives. This discussion of possible remedial alternatives is very premature, especially given the serious flaws and data gaps in the Draft RI. Any discussion of remedial measures should be left for the FS. Based on the data collected during the RI process, CSOs and MS4 contaminant concentrations are at or below background levels.

While the Draft RI states repeatedly that the Creek is recovering, NCG has not provided any quantitative evaluation to support this. It is very likely that although cleaner solids have been coming into the Creek for decades, NAPL migration from uncontrolled upland sites and from subsurface sediments is preventing any true recovery. Even the middle reach area dominated by deposition from East River solids has high toxicity (low survival rates for benthic organisms). Although there are upland sites in this reach where ongoing NAPL seeps have been documented, the NCG does not consider remediation of upland sites as essential for in-Creek remedy. Given the observations of ongoing impacts from uncontrolled sites, upland remediation is crucial for any remedy considered for the Creek to prevent recontamination.

NYC Comment 8) The Draft RI fails to include a discussion of data usability. A data usability report is a standard part of any RI under CERCLA. This is a major omission given that much of the data presented is either flawed or can be shown to have high uncertainty. The data used as the foundation to CSM must be evaluated and a discussion presented which identifies data gaps, variability, and uncertainty. The Draft RI uses several sets of data that are associated with high levels of uncertainty. The following are examples of data sets used in the Draft RI and their associated sources of uncertainty, none of which are discussed in the Draft RI:

a. The POC data from point source sampling have been shown to be biased low when compared with EPA split samples and NYC samples;
b. Grain size distribution data from point source sampling is highly uncertain. TSS data from point sources sampling is inconsistent for NCG category 1 outfalls.
c. Total PAH concentrations in sediment trap data is biased high when compared with split samples from USEPA and NYCDEP.
d. Slug test data had high displacements conducted in soft sediment, the results of which are contradicted by water withdrawal from the same sediments during groundwater sampling;
e. Anomalous seepage meter data: NC266 measured extreme fluctuations of inflow and outflow from the sediment bed, which is contradicted by the sediment type at the same location;
f. Sediment core data with low recovery used for NAPL delineation; and

g. Groundwater and porewater DOC data where most of the data was reduced to below the detection limit or significantly reduced by the data validators due to blank contamination.

It is imperative that the RI discuss the usability of the data and the uncertainty associated with the data. This is a significant omission from the Draft RI that must be addressed.

NYC Comment 9) The selection of COPCs is not well supported and is unduly narrow in focus. NCG identifies PAHs, PCBs, and copper (Cu) for consideration and the entire text of the Draft RI uses three parameters (TPAH- sum of 17, TPCB, and Cu) to draw conclusions regarding the sources of these contaminants to Newtown Creek and to support the flawed CSM. The process used by the NCG to identify these COPCs is inadequate. The patterns of individual chemicals included in TPAH and TPCB are not discussed at all. The text also inaccurately states that Cu is a representative metal, asserting that its distribution in sediments is similar to that of other metals, which it is not (see the City's comments on Chapter 6). Limiting the discussion in the Draft RI to these three chemicals does not provide an accurate characterization of PAHs, PCBs, other organic contaminants, or metals other than Cu that are present in the sediments of the Creek. The Draft RI should be revised to include discussions of patterns of specific individual PAHs, PCBs and metals in the Creek. Such discussions will establish that the patterns of contamination are different in different sections of the Creek - a strong indication of multiple, distinguishable sources of COPCs to the Creek. A first-order indicator of the significance of other contaminants in Creek sediments is provided in NYC Table 1.

Conclusions:

The issues listed above represent major deficiencies in the Draft RI, rendering the report fatally flawed; a complete discussion of all deficiencies in the Draft RI are provided to the EPA herein. While the City has expended a very substantial effort in reviewing the Draft RI, the extent of the report's inadequacies are numerous and it is expected that further in depth review will reveal other deficiencies. In addition, some information is still being provided by NCG, and any updates or revisions will require review. Accordingly, the City reserves the right to continue to provide additional comments as warranted. At this stage it is clear that the Draft RI is incomplete, inaccurate in many of its analyses and assertions, and cannot be approved until these inadequacies and inaccuracies are addressed, and missing information is collected (*e.g.,* NAPL properties) and/or provided (*e.g.,* upland site impacts).

Given the extensive inadequacies of the Draft RI, the current proposed review process requires modification. While the planned review of the models is an important step, in light of the serious flaws throughout the entire Draft RI, a peer review of the data and models, and approach in the RI is warranted. Specifically, the models, data and approach in the RI meet the

EPA Peer Review Guidance definitions of Influential Scientific Information and a Highly Influential Scientific Assessment (HISA) for, among other reasons, it has the potential to impact more than $500 million a year, establishes a significant precedent, model or methodology, and has significant cross-agency and/or interagency implications.

The City urges that EPA assemble a team of peer reviewers who would work together and meet often to assess the RI data and models, and approach- rather than individual reviewers working on their own in separate narrowly focused efforts that do not receive input from other experts. Further, because of the great potential costs and lengthy duration of any remedy, the qualification and credentials of the peer review panel members must be on the level of "nationally recognized expert".

The current schedule allows for approval of a combined RI/FS by 2019. It is the City's recommendation that work continue on the RI until 2019 in parallel with the FS effort, to yield a more thorough and accurate understanding of the Creek system. Finally, the City strongly recommends that EPA consider alternate methods of completing and revising the Draft RI report. The City is ready to accept responsibility for producing sections of the analysis and for writing the Draft RI in a manner that is transparent to the EPA, stakeholders and the public. The City has demonstrated to EPA an expert understanding of the scope and methods of technical work that are necessary to properly complete the RI. In this manner, EPA can provide a complete and accurate analysis of site conditions and ensure that the EPA can meet its project schedule. The City is ready and able to assist EPA with the revision of the Draft RI.

Based on the data gaps and inconsistencies, the following steps are recommended:

1. EPA should revise the Work Plan to include an evaluation of upland site data in the evaluation of the Site. Existing data on the nature and extent of potential upland contaminant sources and historical discharges from these upland sites to the Creek must be included in the RI with meaningful analyses of how these sources interact with the Site and assessing their impacts on the Site. For those sites that are poorly characterized or unknown (*e.g.*, Manhattan Poly Bag, Frito-Lay, National Grid sites), additional investigations must be conducted to characterize their contributions to the Creek.
2. EPA, the City and/or NCG must undertake a comprehensive evaluation of NAPL that evaluates all aspects of NAPL's impacts on the Site including:
   a. Delineating and identifying the types and COPC burden of NAPL from upland sites and identifying potential migration pathways from the upland sites to the Creek (including historical discharges of NAPL to the Creek);
   b. Delineating the extent of NAPL in the sediment bed and quantitatively assessing the size of NAPL bodies that are of consequence to the Site so that the appropriate scale of NAPL investigations can be determined. The City has data that can be used as a basis for this;

c. Identifying the types and chemical composition of NAPLs that are affecting the Site (both within the Creek itself and entering the Creek from seeps or ebullition);
d. Comprehensively quantifying NAPL migration from subsurface sediments via ebullition and from timber pilings that leak NAPL. This includes determining the importance of ebullition facilitated NAPL migration and sediment mixing in the sediment bed as well as the release of NAPL to the water column and its transport to other locations of the Site. The types and quantities of COPCs associated with NAPL being transported by ebullition facilitated NAPL migration must be determined; and
e. Comprehensively identifying the locations where NAPL seeps into the Creek through the banks and the types and quantities of COPCs associated with each NAPL seep.

3. EPA should require the collection and evaluation of upland groundwater data that is needed to characterize groundwater loads entering the Creek through banks and bulkheads. This work should include both hydrogeological/hydraulic and chemical data. This work should not simply consist of an evaluation of existing upland data. Rather, it should also consist of the collection and characterization of additional as groundwater data at the discharging areas, and the quantification of the COPC loads. In general, existing groundwater data were not collected for this purpose and do not provide sufficient detail for the needs of the RI.
4. EPA should convene a peer review panel comprised of nationally recognized experts to fully review the RI models, data and approach using a robust process.

Addressing the detailed comments presented in the remainder of this comment document present a significant challenge and includes numerous data gaps not discussed above. The City expects that these data gaps identified elsewhere in the comment document will also be addressed before the next draft of the RI report is reviewed. Addressing the comments presented will require extensive modification to this preliminary report, so will require at least another draft be reviewed before a final document is issued.

City Comments on NCG Draft RI Chapter 2 – Program Summary

Throughout the RI the NCG relies on many investigations and reports conducted outside the scope of the RI/FS process. This includes work done by other parties under different regulatory frameworks, and work and reports done by the City in the past (for example, an NYCDEP 1988 Infiltration and Inflow Report).

NYC Comment 10) The City has conducted many intensive field work programs that provide an important source of data that can help understand the processes in the Creek. The Quality Assurance Project Plans, Field Sampling Plans, and result of this work has been shared with EPA and should be used to help develop the RI/FS. Specific programs include:

- Groundwater sampling and seepage metering
- In-Creek surface water sampling
- Combined sewer overflow sampling and stormwater (including measurement of concentrations of contaminants on solids)
- Ecological studies on benthic toxicity at Newtown Creek and reference areas
- Laser-induced Fluorescence (NAPL) delineation

City Comments on NCG Draft RI Chapter 3 – Environmental Setting

The Draft RI's discussion of the "Environmental Setting" is incomplete because it does not adequately describe nor evaluate the decades of industrial contamination of the Creek from upland sources. The sections of Chapter 3 that discuss industrial operations along or near the Creek focus too much on smaller and less consequential operations along the Creek; in the sections that discuss the operations of the NCG, which were written by the NCG members themselves, the RI glosses over the impacts of these operations on the Creek. Moreover, Chapter 3 includes only a minimal discussion of the investigations of contamination at upland sites undertaken pursuant to the State's Inactive Hazardous Waste Disposal Sites program, particularly the extensive investigations and remedial actions at the NCG sites. Chapter 3 also contains an incomplete discussion of the City's sewer and stormwater systems: while it focuses on historical impacts from the City's sewers and stormwater outfalls, it ignores the substantial efforts of the City to reduce and treat wastewater that otherwise would have been discharged to the Creek, and the positive effects on the Creek associated with these efforts.

General Comments from the City on NCG Draft RI Chapter 3

NYC Comment 11) Chapter 3 fails to describe ongoing and historical industrial discharges in a detail level sufficient for developing a meaningful CSM. Industrial discharges are the main source of contamination in the Site (i.e., the extensive NAPL that is found in the sediment throughout the Creek) and are the reason that the Creek was listed on the National Priorities List (NPL). Lack of characterization of industrial inputs and focus on municipal point sources is a theme throughout the Draft RI, but is of particular concern in Chapter 3 where discussions of upland industrial sites describe manufacturing processes but fail to describe releases of COPCs to the environment, potential pathways of those COPCs to the Creek, and the state of investigations and remedial efforts undertaken to address these releases. Without this discussion the Draft RI is incomplete as all sources have not been identified, this is a significant data gap and a fatal flaw.

NYC Comment 12) Although the discussion of groundwater includes descriptions of the historical reversal groundwater flow and the ensuing salt water intrusion, the Draft RI fails to discuss any ramifications to the Creek and the remedial investigations caused by these conditions. Two significant aspects that need to be discussed are how the intrusion of salt water may be responsible for high salinity present in the groundwater now and how the lowering of the water table affected the distribution of NAPL and COPCs beneath and adjacent to the Creek. Also, the hydrogeologic cross-sections and flow nets that the EPA previously requested to help depict groundwater flow paths in the system are not provided in this chapter.

Specific Comments from the City on NCG Draft RI Chapter 3:

NYC Comment 15) Section 2. Environmental Setting: Overall, this section neglects the role of groundwater in the system at and upland of the Study Area. Groundwater is the second largest measured source to the creek, discharging up to 2.6 billion gallons per year. Greater detail about impacts to and the role of this medium at the Study Area (as well as in the Uplands) is required. For example on page 26, paragraph 1, 4th sentence, it is stated that *"…watershed drainage is dominated by CSO discharges…"* This statement is deficient and, therefore, inaccurate. No mention is made of groundwater, which is as significant a discharge as any discussed in the RI.

NYC Comment 16) Page 26, paragraph 2, 1st sentence, *"The Study Area is a highly engineered waterbody that was almost entirely bulkheaded by the early 1900s."*

The current shape of the Turning Basin area was not constructed until the 1930s.

NYC Comment 17) Page 26, paragraph 2, 4th and 5th sentences: The statements that the tributaries are not navigable is inaccurate. English Kills is still mostly navigable (over ¾). Large fuel oil barges and scrap metal barges are tugged in and out of English Kills daily, with a fuel terminal upstream of the Metropolitan Ave. Bridge. This means that vessel traffic occurs from the mouth of Newtown Creek to almost the entire length of English Kills. Only Dutch Kills, Maspeth Creek and most of East Branch are removed from navigation.

NYC Comment 18) Section 3.1.1.2 Hydrogeology, Page 28, paragraph 2, last sentence: *"While the UGA is continuous across the Study Area, the lateral extent of the post-glacial deposits and fill is limited to the areas that historically were channels or marshes."*

This information is incomplete as, given the urban environment, fill is present in the upland sites.

NYC Comment 19) Page 29, penultimate paragraph, penultimate sentence: *"The vertical hydraulic gradient within these units is generally downward, indicating potential for flow to the underlying UGA."*

This statement is inaccurate, as pertains to the Study Area. It completely neglects the fact that significant discharge occurs horizontally from the fill to the surface water. Downward heads, where they do occur, are associated with lower-conductivity post glacial deposits separating the fill from the underlying UGA. The post glacial deposits will limit the amount of water that flows downward and the majority of the groundwater will still discharge horizontally, following the path of least resistance.

NYC Comment 20) Page 32, last sentence: *"Groundwater inflow, where present, does not significantly affect hydrodynamic processes (i.e. circulation, stratification)".*

This statement is presented without backup provided in either Appendix G or in this document. There are many lines of evidence supporting the opposite conclusion, that groundwater has a significant effect on hydrodynamics, including the gravitational circulation existing in the Creek as evidenced by ADCP deployments in Phase 1 and 2 and salinity data collected during dry conditions. For example, in English Kills, NCG's hydrodynamic model was not able to reproduce observed salinity during dry periods. This calibration problem suggests that the model either includes an inadequate volume of groundwater and/or salinity associated with groundwater or has incorrectly specified horizontal mixing processes. The unsupported statement about the effect of groundwater on hydrodynamic processes should be removed and the hydrodynamic model calibration improved. The RI should include more hydrodynamic model calibration results during dry conditions.

NYC Comment 21) Page 32, Section 3.1.4, paragraph 1, 3rd sentence, *"Flows enter Newtown Creek from point source discharges (i.e., CSOs, WWTP effluent overflow, stormwater [including overland flow], and treated effluent from groundwater remediation and dewatering systems), and groundwater flow, with the annual volumetric flow being far greater from point sources than from groundwater (see Figure 3-4)."*

This statement is incorrect, groundwater discharge is approximately volumetrically equivalent to point sources. The underlying assumptions that are used to support this statement, as well as the CSM, are flawed and require careful re-evaluation.

NYC Comment 22) Page 32, Section 3.1.4, paragraph 1, last sentence, *"CSO and stormwater discharges including overland flow account for approximately 57% of the total freshwater flow to the system, which affects the hydrodynamics of the site during discharge events."*

Groundwater discharge is equal to or greater than stormwater/CSOs and, in turn, also affects salinity and hydrodynamics. The effects of groundwater on salinity and hydrodynamics, especially at low tide in shallow reaches, must be discussed.

NYC Comment 23) Page 32, paragraph 2, 2nd sentence, *"…with relatively stagnant conditions in the upper portions of the Study Area (e.g., English Kills), except during periods of storm events and CSO discharges."*

NCG needs to provide explanation for what is meant by "stagnant conditions". In the upper portions of the Study Area, there is a slow outward movement of water, even during dry weather.

NYC Comment 24) Page 32, paragraph 2, 3rd sentence, *"...the hydrodynamics in the creek are primarily affected by tidal circulation with minimal vertical stratification."*

The statement that there is minimal vertical stratification is incorrect. The City has documented dry weather stratification.

NYC Comment 25) Page 32, paragraph 2, 4th sentence, *"Groundwater inflow, where present, does not significantly affect hydrodynamic processes (i.e., circulation, stratification...)."*

This statement is incorrect and is based upon a critically flawed CSM. There are areas within the Study Area that become significantly fresh during low tide. The City has shown that including the freshwater signal of groundwater in the hydrodynamic model provides the best simulation of salinity (as compared to no or reduced groundwater input, which result in high modeled salinity compared with measured data).

NYC Comment 26) Page 33, last sentence in Section: Although residence time of point sources is mentioned, residence time calculations were not found in the document or appendices. NCG should remove the sentence or provide an indication of the specific document section containing residence time for point sources discharges to Newtown Creek.

NYC Comment 27) Section 3.1.5 Water Quality Page 33, paragraph 1, last sentence, *"TSS is included in these discussions in Sections 4 and 6 as well, and it was evaluated extensively as part of the sediment transport modeling effort described in the next subsection (with detailed evaluations in Section 5 of Appendix G)."*

Use of this model for drawing conclusions and making predictions about the Creek in this RI is premature. The model itself is poorly discussed and details about its construction, calibration, and verification are missing. Section 5 of Appendix G devotes 3 sentences to development and calibration of the model. Subsections bullet-list generalized refinements. This is inadequate and inappropriate reporting for a model that is being presented for the first time and used in the RI. Predictions from poorly documented and weakly presented models are inappropriate for inclusion this RI at this time.

NYC Comment 28) Page 34, paragraph 2, 2nd sentence, *"As discussed previously, freshwater flow to Newtown Creek is dominated by point source discharges (NYCDEP 2011a)."*

This statement does not consider groundwater. As stated, this comprises a major gap in assumptions/understandings about the Study Area.

NYC Comment 29) Page 34, paragraph 2, 3rd sentence, *"...and to a lesser extent, groundwater."*

This statement is inaccurate, the assumptions underlying it require further evaluation and investigation. Groundwater is as large a source of fresh water as those listed in paragraph 2.

NYC Comment 30) Section 3.1.6 Sediment Transport, Page 34, paragraph 1, 2nd sentence, *"Erosion due to currents is limited and localized (e.g., sediment mounds in the vicinity of CSO discharges in English Kills, East Branch, and Maspeth Creek) based on evaluation of data and modeling."*

This correlation is inconsistent. Erosive conditions would not favor the accumulation of sediment mounds, rather they would erode and carry them away with the currents. No evidence of erosion of mounds is presented in the RI, so this is speculation that should be removed.

NYC Comment 31) Page 35: The NCG's assertion that grain-size composition of point-source loads *"are composed of an approximately even mix of fine and coarse particles"* is based on a flawed sampling program, questionable sample analysis, and crude grain-size binning. The City has already presented to EPA and the NCG CSO and stormwater grain-size data from the City's extensive sampling program, which included optical grain-size binning from -2phi to 14.5phi at 0.5phi increments. The City's grain-size distributions for point-source loads consistently show that sand-sized particles ≥ 63 microns (< 4 phi) represent only 10–30% of the load and fine silt-clay particles represent the remaining 70–90%. The NCG Draft RI report needs to be modified to omit or clarify this contentious statement. Modeling sensitivity analyses are needed to examine model response to point-source grain-size distributions dominated by fines.

NYC Comment 32) Page 35: The NCG assertion that East River load *"is composed of fine sediment particles"* has no factual basis because the NCG never performed grain-size analyses of East River TSS samples. This represents a major flaw in the NCG's sampling program because there are no data from which to specify the grain-size distribution of the NCG's model's open-boundary at the East River. Instead, the NCG has specified a grain-size distribution at the East River open boundary at will to get a "correct" model solution within the Creek. As a result, it is impossible to assess whether the model solution in the Creek near the East River open boundary is actually "correct" because the model solution has been "fixed" by an arbitrary assignment of grain-size distribution at the boundary. In actuality, the lower East River is very energetic, and there is ample anecdotal evidence to suggest that sand is transported through that reach in suspension. The NCG must clarify their statement that the East River sediment load is composed primarily of fines by acknowledging that East River grain-size data have not been collected or analyzed. Furthermore, the RI/FS process requires a robust sampling program to actually measure the grain-size distribution of East River solids near their model's open boundary.

NYC Comment 33) Page 34 and Page 35 last paragraph: NCG states that prop-wash in Newtown Creek "can" scour the bed and "leads" to dispersal of sediment and sorbed contaminants. However, the likelihood or potential magnitude of prop-wash scour in the Creek has yet to be demonstrated with even a minimal degree of certainty. The NCG's statements regarding prop-wash scour cannot be expressed as fact. Prop-wash may at times lead to localized scour in some areas of Newtown Creek, but its potential importance to sediment and contaminant dispersal has not been ascertained. The NCG Draft RI must reflect this uncertainty in the text.

NYC Comment 34) Page 35, paragraph 1, 4th sentence: *"This temporal decrease in NSRs is due to decreases in CSO sediment load during the last 50 to 75 years."*

This statement is an unsubstantiated assumption and requires inclusion and appropriate reference of supporting documentation and data. There are several factors, including reduction in industrial discharges and lengthening time since last dredging that also influence NSR.

NYC Comment 35) Page 35, paragraph 2, 2nd sentence, *"Twice-daily tidal flows from the East River interact with storm-driven upstream freshwater inputs in a complex geometry to create dynamic local environments, each of which exhibits a unique combination of solids loads and depositional characteristics."*

This summary neglects the role of ebullition which occurs through the Creek in resuspension. Studies have shown ebullition re-suspends solids from the sediment bed, which additionally liberates solids to the water column. Furthermore, this statement contradicts the later discussions in Chapters 4 and 5, in which the tributaries are consolidated and treated as one area.

NYC Comment 36) Section 3.1.7 Habitat: This section fails to address the effect of NAPL in the sediment on habitat.

NYC Comment 37) Page 36, last paragraph, last sentence, *"Because much of the shoreline in the Study Area comprises vertical bulkhead material (99% of the shoreline)..."*

This is an inaccurate exaggeration. Maspeth Creek and the east side of the Turning Basing are not bulkheaded and comprise more than 1% of the shoreline. Visual inspection reveal that some bulkheads have typical stream embankments preserved behind them. Furthermore, broken down bulkheads and rip-rap (32% of the shoreline according to Figure 3-12) do not necessarily preclude growth of rooted emergent macrophytes. The statement cited above warrants reconsideration.

NYC Comment 38) Section 3.2.4 Navigation Channel and Dredging History: This section or the section on Fill must discuss "the Slip" at the ExxonMobil Site. The Slip is a filled in Creek/backwater, as shown by Sanborn Maps from the 1910's and 1920's (see NYC Figures 1 and 2). Aerial photos and USGS topographic maps show the slip in use until the 1990's. In aerial photographs it is clear that the slip is being used as an oil-water separator and discharges are entering the Creek. A 1981 report by Leggette, Brashears & Graham, Inc. indicated that there was too much oil sludge in the Slip for it to be removed and there were fears that if the sludge was removed, free oil would enter Newtown Creek. NYSDEC has indicated the Slip was simply filled in with the oil sludge still in place (personal communication with NYSDEC personnel during the City's December 2016 Ebullition Survey). The history of this feature must be discussed.

NYC Comment 39) Page 45, paragraph 1, 6th sentence, *"Two canals, present-day Whale Creek and the East Branch of Newtown Creek, were cut into the marshy edges of the waterway (NYSDOT and FHWA 2005)."*

This is not exactly true; there were tributaries at these locations that were modified (see Figures 3-7 and 3-8 of the NCG Draft RI).

NYC Comment 40) Page 46, bullet Item f, *"A channel in English Kills, 20 feet deep [relative to MLW] and 150 feet wide to the Metropolitan Avenue Bridge, including the easing of bends; and thence 12 feet deep [relative to MLW], 100 feet wide, to within 80 feet of the Montrose Avenue Bridge, suitably widened at bends and materially widened by the excavation of upland mounds at the second bend above the Metropolitan Avenue Bridge."*

This point needs to be revised to include the fact that English Kills is still open to upstream of the Metropolitan Avenue Bridge.

NYC Comment 41) Page 48, paragraph 1, 1st sentence, *"The majority of the tributaries are no longer navigable to their authorized depth based on damaged infrastructure..."*

This needs to be specific. Dutch Kills has not been dredged due to permanently closed railroad bridges. The bridges on East Brach and Maspeth Creek may be operable. English Kills is still navigated to upstream of the Metropolitan Bridge, and Whale Creek is maintained by the City.

NYC Comment 42) Section 3.2.6, Historical and Industrial Operations: The discussion of "Historical Industrial Operations" in Chapter 3 of the NCG Draft RI presents an unbalanced picture of historical impacts on the Creek by presenting damaging information relating to non-NCG sites, while omitting similar discussions of the extensive impacts from the NCG sites to the Creek. For example, for many operations, the NCG Draft RI mentions the potential COPCs that are associated with such operations. See, e.g. Section 3.2.6.14 (noting that paper products operations typically produce wastewater contaminated by PAHs). By contrast, the discussion of bulk petroleum storage operations (written by ExxonMobil, Texaco and BP) contains almost no mention of the by-products from these operations that contained contaminants – there is no mention of PAHs at all in this section – and primarily provides a history of the specific entities that conducted bulk petroleum storage operations along the Creek. See Section 3.2.6.15. Accordingly, the subsections of 3.2.6 should be revised to provide a more balanced and accurate view of the historical operations along the Creek.

Section 3.2.6 should also be revised to identify all sites along or near the Creek that have added to the State's Registry of Inactive Hazardous Waste Sites or which are RCRA-permitted hazardous waste storage facilities, and should include a discussion of all remedial investigations and/or corrective actions that have been undertaken at these sites.

NYC Comment 43) Section 3.2.6.2 Animal Rendering, Glue Factories, and Fertilizer Plants, Page 52, paragraph 4, *"As part of the original manufacturing of glue, a process of boiling animal bones and other connective tissue, wastewater rich in lime would be produced. Drainage from the liming tanks would pass through a paved basin in the Peter Cooper yard and then directly discharge to Newtown Creek (NYSBOH 1894)."*

Instead of discussing the process of manufacturing glue, the focus should be on the contaminants discharged to the creek that were associated with the processes from and activities conducted at those plants. In the case of glue manufacturing and other carcass processing industries, the discharge of total organic carbon (TOC) should be discussed.

NYC Comment 44) Page 53, last paragraph, *"Discharges from such operations would have included organic matter that would have a negative impact on the DO and total Kjeldahl nitrogen (the sum of organic nitrogen and ammonia) content of the creek. Oil and grease, fecal coliform, extreme temperatures, and variations in pH would have also been likely components of these discharges."*

The discussion of possible components of the discharges to the Creek does not include concentrations or volumes associated those components. Additional information is needed.

NYC Comment 45) Section 3.2.6.3 Asphalt Mixing, Mining, and Storage Operations Page

54, paragraph 2, 1st sentence, *"Pollutant outputs generated by asphalt industries include PAHs, metals, particulates, and other asphalt modifiers and additives."*

There is no mention of whether the asphalt industries cited (Morgan Oil Terminal and Review Avenue Development I) generated such outputs and the output concentrations. The metals associated with asphalt industries should be specified and their concentrations in the upland sites noted, as such information is available. From 2006 to 2010, the soil and groundwater by Morgan Oil Terminal was analyzed for various components including PAHs. Total detected PAHs ranged from 3 to 50 mg/kg.

NYC Comment 46) Section 3.2.6.4 Automobile Manufacture, Repair, and Service Page 55, only paragraph, *"Products and equipment used in automobile-related industries often contain or involve semivolatile organic compounds (SVOCs; including PAHs), volatile organic compounds (VOCs), PCBs, total petroleum hydrocarbon (TPH), and metals. Many of these industries also have on-site diesel, gasoline, lube oil, waste oil, solvent, and chemical storage tanks (see Appendix J). Spills, leaks, and general operation may have introduced these products and contaminants directly or indirectly to the Study Area."*

This discussion only generally covers the various kinds of compounds associated with automobile manufacturing, repairing and servicing. The specific Semi-volatile organic compounds (SVOCs), VOCs and metals should be identified, along with the concentrations of these compounds.

NYC Comment 47) Section 3.2.6.5 Coal Processing, Handling, Storage, and Fuel Use, Page 56, paragraph 2, only sentence, *"PAHs and metals are contaminants known to be associated with the storage, handling, transfer, and burning of coal and may have been introduced directly or indirectly to the Study Area."*

This only very generally discusses the various kinds of compounds associated with coal processing and fuel use. There is no mention of the specific metals associated with coal processing or the concentrations of these compounds in the study area. Additional detail is warranted.

NYC Comment 48) Section 3.2.6.8 Electronics and Electroplating Industries, Last paragraph, *"The electronics and electroplating industries produce a variety of solid, liquid, and hazardous wastes, as well as air emissions. These wastes would have included PCBs, SVOCs (including PAHs), VOCs, TPH, and heavy metals. Spills, leaks, and general operation may have introduced these contaminants directly or indirectly to the Study Area."*

This only very generally discusses the various kinds of compounds associated with electronic

and electroplating industries. There is no mention of the specific VOCs and metals associated with electroplating. In addition, concentrations of these compounds should be noted. Examples should be given where evidence of these contaminants is found in the Creek.

NYC Comment 49) Section 3.2.6.10 Manufactured Gas Plants: The discussion of "Manufactured Gas Plaints," (MGPs) which was prepared by National Grid, fails to include a description of the waste disposal methods that were generally followed at these facilities. National Grid's section also fails to include any discussion of remedial investigations and/or actions undertaken at the Site under the State's remedial program, and what, if any, impacts to the Creek were discovered pursuant to such investigations.

The section on MGP discusses the details regarding manufactured gas plants but does not mention the possible contaminants associated with these plants. It also fails to mention the potential of compounds relating to process of gas manufacturing leaking into the Study Area. NYSDEC is conducting an investigation at this upland Site and information regarding the COPCs and the concentrations of the COPCs is available and should be discussed in the NCG Draft RI. For example maximum total detected PAHs (sum of 17) from National Grid GPEC were approximately 49,000 mg/kg in sediment and 67,000 mg/kg in soil. Groundwater in the upland Site is contaminated; TPAH (17) concentrations in groundwater are as high as 12,500 ug/L. NAPL has been encountered at this Site; TPAH (17) concentration in the NAPL is 188,000 mg/kg. NAPL seeps entering the Creek from this Site have also been documented. The State has required National Grid to deploy a boom around the bulkhead/pier in an effort to contain the NAPL entering the Creek from the site.

This section must have a detailed discussion of MGP sites, wastes and disposal practices. It should identify where MGP were located on the Creek and what processes they used (e.g., coal gasification, carbureted water gas) as well as remedial investigations, remedial actions, and current existence of contamination in upland areas from MGP sites

NYC Comment 50) Section 3.2.6.11 Metal Production, Smelting, and Metal Works and Fabricating: The subsection relating to "Metal Production, Smelting, and Metal Works and Fabricating, written by Phelps Dodge Refining Company (PDRC), also includes an inadequate description of the COPCs released in connection with these operations, and of the remedial activities undertaken at the PDRC site. While PDRC does acknowledge that its site has been listed as an Inactive Hazardous Waste Disposal Site by NYSDEC. However, PDRC's description of the remedial actions undertaken at the site contains very little detail as to the nature and extent of contamination at the PDRC site. For example, while PDRC reports that it undertook soil removal in 1987 and 2004, it does not indicate the COPCs that were present in soil or the locations from which soil was removed. PDRC also notes that it installed a groundwater barrier

wall and groundwater collection/treatment system, which suggests that contaminated groundwater was impacting the Creek. In its 2003 Record of Decision (ROD), NYSDEC noted that remedial measures were selected at the Site in part to "prevent contaminant migration from the site to Newtown/Maspeth Creeks via the groundwater flow pathway."

Section 3.2.6.11 should be revised, at least, to include and assess information include in NYSDEC documents relating to the State-supervised cleanup at the PDRC site. In its 2003 Record of Decision, for example, NYSDEC noted the presence soil of contaminated by lead and cadmium, as well as the removal of 5,200 tons of waste contaminated with PCBs from the site. NYSDEC 's ROD also notes that PAHs, PCBs and Cu (as well as numerous other metals) were detected in soils at the site at levels exceeding the State's soil cleanup guidelines. The ROD also states that PAHs and metal were detected in groundwater at the site at levels exceeding the State's Class GA groundwater standards. Cu, a key COPC evaluated in the ROD, was detected at 54,200 part per billion (ppb), orders of magnitude greater than the State's standard (200 ppb). Given the presence of PCBs, PAHs and Cu at the site, Section 3.2.6.11 should be revised to include this information so that the RI can support an effective FS.

NYC Comment 51) **Section 3.2.6.15:** As noted above, the section pertaining to "Petroleum Refining and Bulk Storage" makes no mention of the types of waste generated by and released from petroleum-related operations along the Creek (by contrast, the proceeding section on "Paper Products Industry" expressly notes that PAHs and other contaminants are associated with those types of operations). Section 3.2.6.15 also fails to mention the numerous documented releases of contaminants from these industrial sites to the Creek and its tributaries.

Section 3.2.6.15 should be revised to include a more detailed discussion of ExxonMobil's historical operations along the Creek, including the facilities operating on the ExxonMobil Greenpoint Remediation Project (as written, the NCG Draft RI includes more discussion of ExxonMobil's corporate history than it does relating to its actual operations along the Creek).

This section should also be revised to include facts relating to the massive release of petroleum at the Greenpoint Remediation Project. In 1978, the U. S. Coast Guard discovered an oil spill entering Newtown Creek from the area at the end of Meeker Avenue. According to NYSDEC, a subsequent investigation concluded that the area of the spill under the Greenpoint area was in excess of 52 acres and the total spill volume, as estimated in 1979, was approximately 17 million gallons of petroleum products. While pertinent facts relating to the ExxonMobil facility are reported in Section 3.2.11, they should also be included in this section. Moreover, this section should be revised to discuss the types of contaminants associated with these releases that may have impacted the Creek. Given the size of the releases, it is imperative the NCG Draft

RI include discussion of these releases and evaluate their historical and potentially on-going impact on the Creek so that EPA can develop and approve an appropriate FS.

Section 3.2.6.15 should also be revised to include the NYSDEC's findings with respect to the Former Paragon Oil Terminal, which is located on the south bank of the Creek in the middle reach of the Creek. NYSDEC and Texaco, Inc. entered in a consent agreement in 2005, under which Texaco agreed to delineate and remediate the portion of a plume of free product underlying the Former Paragon Oil Terminal site, and to control seepage of petroleum into Newtown Creek. (NYSDEC, 2014, p4). According to NYSDEC's Record of Decision, "petroleum seepage was noted entering Newtown Creek along the bulkhead" at the Site in 1991. From 1991 until 2007, petroleum was captured via skimming operations. Starting in 2007, Texaco installed a totals fluid recovery and treatment system to abate "on-going" seepage into the Creek. Despite this and efforts, however, NYSDEC noted that "periodic seepage continued to be noted particularly in isolated locations".

NYC Comment 52) Section 3.2.6.18 Railyards: The section notes several spills that have occurred around Amtrak Sunnyside Yard. Review of the NYSDEC Spills Incident Database identifies that there have been many other spills that have occurred around the Study Area, but only spills around this specific site are mentioned. Spills from other sites should be also be noted. The section notes the concentration of total PCBs in the sewer system wastewater discharge and identified the specific PCBs that were found in the sediment. PCBs have been found elsewhere along the Creek and their concentrations should likewise be mentioned in the other sections.

NYC Comment 53) Page 71, paragraph 1, last sentence: *"Four distinct groundwater plumes were identified at the site, including a plume of NAPL containing PCBs (Aroclors 1248 and 1260) located at the northern portion of the site."*

Other NAPL plumes have been found around the Study Area and should be mentioned as well. For example, there was a NAPL plume by the ExxonMobil Greenpoint Remediation Project.

NYC Comment 54) Section 3.2.6.19 Sawmills and Lumberyards: Section 3.2.6.19 mentions specific metals that are associated with sawmills and lumberyards as well as pentachlorophenol (Motiva Brooklyn Terminal and Morgan Oil Terminal are mentioned) but does not say what the specific concentrations were for each of the sites. It also mentions PAHs and VOCs but no specific concentrations or analytes. PAHs were also detected in the groundwater by Morgan Oil Terminal. Such details should be included in the NCG Draft RI, as should information about TPH concentrations in site media, where available.

NYC Comment 55) Section 3.2.6.21, Solid Waste Disposal and Landfilling, Paragraph 1:

"Contaminants present in the wastes used for fill, disposed of in NYC dumps, and/or spilled into Newtown Creek included metals, pesticides and rodenticides, petroleum products, PAHs, and PCBs."

The NCG Draft RI should cite the reference(s) for this list. This section does not identify presence of coal tar products and byproducts in the wastes disposed of in NYC dumps and or spilled into the Creek.

NYC Comment 56) Section 3.2.6.22 Utilities Page 74, paragraph 3: Several spills and contaminant concentrations are mentioned for Con Edison – Maspeth Substation. Aroclor 1260 is noted as being a contaminant of concern for this site and were detected in soil and groundwater at the site; therefore details pertaining to it warrant inclusion in the NCG Draft RI.

NYC Comment 57) Section 3.2.6.23 Waste Oil Refining Operations: This section discusses that for BCF Oil, *"the pollutants potentially released in the discharge would include oil; benzene, toluene, ethylbenzene, and xylene; and PCBs."* Concentrations of these analytes , details of which are available, are not included in the report. For example, total PCBs were found in the sediment (maximum of 19.3 mg/kg), LNAPL (maximum of 7.5 mg/kg totals), soil and g groundwater (maximum of 2.9 ug/l) at BCF Oil. Also, BTEX (benzene, toluene, ethylbenzene and xylene) were found in the soil and in groundwater and warrant further discussion.

NYC Comment 58) Paragraph 5, penultimate sentence, *"Both sites (RAD I and Quanta/RAD II) have been through RIs where NAPL, PCB fluids, and other contamination have been found at these sites and an adjoining site."*

Further description and inclusion of detail is required. The adjoining site must be identified. There is no mention of the concentrations of NAPL, PCB fluids or other contamination, nor is there mention of what the other contamination is. PCBs have been detected in soil and NAPL at Quanta with the majority comprising of Aroclor 1242 and Aroclor 1260. Discussion of such information should be included in the NCG Draft RI.

NYC Comment 59) Section 3.2.7 Current Upland Activities, Uses, and Marine Facilities There needs to be a section that discusses upland remedial efforts and the status of site investigations. The current known extents of NAPL in the subsurface and the use of LIF at upland sites to delineate NAPL must be presented.

NYC Comment 60) Section 3.2.8: The City is currently developing a Long Term Control Plan under the Clean Water Act for Newtown Creek. This document details the history and development of the sewershed, language in the RI/FS should be consistent with that report.

NYC Comment 61) Section 3.2.8.1, paragraph 1, 1st sentence, *"Through centuries of urban development...."*

Figure 3.7 shows that the entire area around Newtown creek is free of development in 1844. Figure 3.8 shows that most of the area around the creek is open land in 1891. That the area was urbanized through "centuries" is not supported and is an exaggeration. This discussion needs to be corrected and more specific.

NYC Comment 62) 46. 46: page 79, Section 3.2.8.1, paragraph 3, 1st sentence, *"...the Newtown Creek WWTP effluent overflow..."*

This is treated effluent and must be acknowledged in this report as such.

NYC Comment 63) Section 3.2.8.1 Historical Discharges to Newtown Creek, Paragraph 1, 1st sentence, *"In the 1800s and early 1900s, direct discharge to Newtown Creek was the primary method for disposal of stormwater, sewage, and industrial wastewater."*

A map of the Newton Creek area showing residential and industrial areas would be helpful and should be included so that the relative importance of residential sewerage can be compared to industrial discharges.

NYC Comment 64) Page 80, paragraph 1, 2nd sentence, *"...investigations conducted by the Brooklyn and Long Island City Boards of Health documented discharges to the creek of waste liquor from grease vats and digesters at fertilizer and fat rendering facilities, oily wash water generated during the kerosene treating process at refineries,"*

These industrial discharges would be have significant OC content. The effect of discharging such high OC wastes into the creek needs to be discussed.

NYC Comment 65) Page 80, paragraph 2, 2nd sentence, *"Municipal sewers were constructed in many areas prior to the consolidation of the boroughs of Brooklyn and Queens into NYC, which occurred in 1898."*

Figure 3-8 shows that the area around Newtown Creek has sparse residential areas and is either mostly industrial or open land. A map of where municipal sewers were located would be helpful and will likely show that municipal sewerage was unimportant compared to industrial discharges.

NYC Comment 66) Page 79, overall comment. Section 3.2.8.1 leads in with the second paragraph, *"...a considerable quantity of manufacturing wastes and the flow of a few sewers,"*

This is a quote from a report issued by the Metropolitan Sewage Commission circa 1910. The bulk of the remainder of the section, of which there are pages, goes on to describe in detail sewerages and reported sewer overflows. The only instance where the section acknowledges industrial discharges to the creek is on page 83 (3rd paragraph). The limited description of industrial discharges provided on page 83 is severely lacking and inaccurate: brief examples and gross generalization need to be augmented with facts and details. For example, the carcass processing/fat rendering/fertilizer industry that discharged untreated waste into the creek is not even mentioned. Furthermore, there is no discussion of many of the important industrial process and/or waste management features that likely contributed to contamination of the creek, like the "Slip" at Standard Oil or the extremely large discharge at the Brooklyn Union Gas plant, for example. This section must be increased in detail as well as in scope, as pertains to industrial releases. As currently presented, this important element of the CSM has been generally omitted and constitutes a major data gap (in understandings and assumptions, which are otherwise unduly biased toward sewerages and sewer overflows). Further investigation and evaluation of the industrial discharges is required.

NYC Comment 67) Page 84, paragraph 3, last sentence, *"Between 2000 and 2011, the plant was renovated to meet the requirements for secondary treatment in the 1977 amendments to the CWA (NYCDEP 2011a; Anchor QEA 2012n)."*

This single sentence is included for the multibillion dollar upgrade made to the Newtown Creek WWTP. The details provided are inadequate and require further factual discussion. The plant upgrade required the installation of very deep water-tight sheet piling to aid dewatering. This sheet piling and the subsurface structure that were constructed isolates the subsurface beneath the plant's footprint from the adjacent aquifer. Also, the upgrades make it so that all water passing through the plant undergoes tertiary treatment.

NYC Comment 68) Section 3.2.8.2 Current Discharges to Newtown Creek, Page 84, Section 3.2.8.2, paragraph 1, 7th sentence, *"…WWTP effluent overflow…"*

This needs to be revised to more accurately state "treated effluent."

NYC Comment 69) Page 85, Section 3.2.8.2.2, paragraph 1, last sentence: *"This discharge is included as a CSO on the Newtown Creek WWTP permit (SPDES number NY-0287890, effective August 1, 2015)."*

NCG has been informed by NYSDEC and the City that this outfall is not a CSO, despite this they continue to include it with CSOs. This sentence is confusing needs to be removed.

NYC Comment 70) Section 3.2.10.1 Historical Groundwater Use: This section is interesting

from a historical stand point but as written is academic and has very little bearing on the NCG Draft RI. The important information about salt water intrusion, how it occurred for multiple decades, and how saline water in the aquifer now could be a relic from that time period is not discussed. Also, the importance of historical groundwater use to the occurrence and distribution of NAPL and COPCs in the aquifer adjacent to the site needs to be discussed.

NYC Comment 71) Page 92, paragraph 2, 6th sentence, *"The water-table depression south of the Study Area in 1936 was up to 30 feet below sea level within approximately 0.5 mile south of the upstream end of English Kills (Cartwright 2002)."*

The NCG Draft RI needs to discuss how the depression of the water table affected or is expected to have affected both the distribution of NAPL in the adjacent upland sites, as well as discharge of Creek water to the aquifer.

NYC Comment 72) Page 92, Section 3.2.10.1, paragraph 2, last sentence, *"...saltwater intruded into the UGA from Newtown Creek."*

Water in Newtown Creek was highly contaminated during the time period discussed in this paragraph/section (and had to pass through a highly contaminated sediment bed). The NCG Draft RI needs to discuss how historical groundwater withdrawal and the "negative water table" influenced the presence COPCs in the native material.

NYC Comment 73) Page 93, Section 3.2.10.1, paragraph 2, 1st sentence, *"By the early 1990s, the only public supply pumping in Kings and Queens counties was 22 MGD from Jamaican Water Supply Company wells."*

The location of these pumping centers needs to be defined (and a map showing the location(s) would also be beneficial). This way it can easily be seen that these withdrawals are remote from Newtown Creek and have no adverse effect on groundwater near Newtown Creek.

NYC Comment 74) Section 3.2.10.2 Current Groundwater Use, Page 93, paragraph 1, 1st sentence, *"The results of groundwater sampling and analyses during Phase 2 indicate that groundwater underlying the Study Area is saline and does not meet the New York State requirements for use as a potable or non-potable water source. (NYSDEC)"*

This is only true for portions of Newtown Creek and is an over-generalization. More detail is needed for this discussion. Additionally, please cite what method was used to analyze chloride.

NYC Comment 75) Page 93, paragraph 2, *"By default, Class GSA is assigned to saline groundwater in New York State (6 CRR 701.18). Thus, this is the groundwater classification in the Study Area."*

This is based on over-generalizing the conditions near the Creek and should be corrected.

NYC Comment 76) Page 94, Section 3.2.10.2, paragraph 1, 1st sentence, *"A permit from the New York City Department of Health and Mental Hygiene is required for the installation, drilling, replacement, or operation of a water well, water well pump, or well pumping equipment used to supply water to buildings in NYC."*

A Long Island Well Permit is also needed from NYSDEC to withdraw water from Long Island aquifers (the UGA).

NYC Comment 77) Page 94, Section 3.2.10.2, paragraph 2, 1st sentence, *"A list of permitted water wells was obtained from New York City Department of Law (Plache 2015)."*

NYSDEC may have issued Long Island Well Permits for the Creek area, this should be checked.

NYC Comment 78) Section 3.2.11 Historical Spills: The NCG Draft RI should have an explanation of what other databases (beyond NYSDEC Spills Incident Database) were searched. At a minimum, a table summarizing the sites identified (including orphans) should be provided in this report. Ideally, a figure depicting the locations should also be included. In the absence of the details that should otherwise be included about historical spills in this NCG Draft RI, inclusion of the environmental database results (and inclusion of full package provided in an attachment, ideally) is strongly recommended.

NYC Comment 79) Page 94: The Draft RI states that there was a major fire at the Standard Oil Refinery in 1919. Thirty 1,000,000 gallon tanks burned and released oil to Newtown Creek causing the Creek to burn and for fire to spread to the opposite (Queens) bank. This was a significant release of oil to the Site and must be discussed in the NCG Draft RI. Several seeps of NAPL are documented in the Creek and these sources of NAPL and COPCs to the Site need to be acknowledged and discussed in the NCG Draft RI.

NYC Comment 80) Page 95, paragraph 3, 2nd sentence, *"...and the total spill volume, as estimated in 1979, was approximately 17 MG of petroleum product (EPA 2007a)."*

This is one of the largest oil spills in the United States. 17 million was estimated in 1979, which was a gross underestimation. The NCG Draft RI should report more recent estimation (32 million gallons) and provide appropriate references/citations. Recent activity at the site, including the continued addition of recovery wells, shows that this NAPL body is not completely controlled and the amount of oil is not accurately estimated.

NYC Comment 81) Page 96, paragraph 1, 2nd sentence, *"ExxonMobil has been actively engaged in remediation activities in Greenpoint on a continuous basis since 1979."*

ExxonMobil is not the only entity actively engaged in remediation. The NCG Draft RI should discuss in detail (with appropriate references and backup included) all remedial efforts in the Newtown Creek groundwater recharge area.

NYC Comment 82) Page 96, paragraph 1, 5th sentence, *"ExxonMobil has recovered in excess of 10 MG of product, with the majority of product recovery from systems installed and operated by ExxonMobil."*

Information on NAPL recovery from all entities recovering NAPL in the Newtown Creek groundwater recharge area must be provided and discussed in detail. Also, the LIF data (and any other data collected via other downhole NAPL or residual phase product logging techniques) collected at these sites and how it might be used for investigating NAPL in the Creek must be discussed.

NYC Comment 83) Page 96, Section 3.2.11, paragraph 2, last sentence, *"Forensic evidence was also collected for later prosecution of the alleged perpetrator (Brownstoner 2014)."*

The Draft RI should provide information about what was in the spill and how it impacted the Site.

City Comments on NCG Draft RI Chapter 4 – Nature and Extent of Contamination

This chapter discusses the nature and extent of contamination in the Creek for different media such as air, surface water, groundwater, porewater and sediments. The nature and extent of contamination is a critical element of any NCG Draft RI as it is essential for establishing a comprehensive, accurate conceptual site model. Without an accurate evaluation of the nature and extent of contamination, the EPA cannot properly evaluate remedial alternatives in the FS.

The chapter as written is deficient for a variety of reasons, as detailed below, including (i) failure to account for contaminants other than the three identified in this section, TPAHs, total TPCBs, and Cu; (ii) failure to provide required quantitative analysis; (iii) failure to properly identify the sources of organic carbon; (iv) failure to properly evaluate the source, presence and migration of NAPL; (v) failure to properly characterize contaminants and conditions in the native sediment; (vi) failure to account for groundwater impacts through the Creek's banks; (vii) failure to properly attribute COPC contamination from industrial sources by ignoring reference area data which demonstrated that with CSO/stormwater inputs but absent these industrial sources, COPC concentrations are at background levels.

General Comments from the City on NCG Draft RI Chapter 4

NYC Comment 84) This chapter is focused only on describing the concentrations of TPAHs, TPCBs and Cu. There are multiple issues with this approach. Discussing only the totals for PAHs and PCBs ignores that these groups are comprised of many individual compounds whose individual concentrations vary in response to many environmental factors, resulting in variations in the relative and absolute amounts of these compounds (*i.e.,* the "contaminant patterns"). Given the different sources of these COPCs to different sections of the Creek, these patterns of PAHs, PCBs and metals distribution in the Creek vary substantially and must be evaluated. In addition, NCG's rationale for discussing only Cu concentrations is based on an inaccurate assumption that Cu is a representative metal and hence there is no need to discuss any other metals. For example, lead, unlike Cu, has no peak concentration in the Turning Basin area. The City's evaluation of metal concentrations shows that the patterns of metals in the Creek vary by location. The Draft RI must include a discussion of additional metals in the Creek and include all COPCs identified in the risk assessments.

NYC Comment 85) The Draft RI divides the Creek in three sections, Creek Mile (CM) 0-2, CM2+ and tributaries. NCG has not provided any rationale or quantitative analysis for this breakdown of the Creek. Breaking the main stem in two categories appears to be a preemptive approach for development of FS alternatives. This breakdown is premature without any evident rationale

or robust data evaluation. Comparing these three categories to an upper tolerance limit (UTL) or a background value is not sufficient to support dividing the main stem in this way. In addition, the text describes the tributaries as one entity when the data unquestionably shows that the sources of COPCs, both ongoing and historical, to each individual tributary are different. The text should describe the main stem as a single entity while noting the important contaminant gradients, and discuss each tributary and its unique distribution of contaminants separately.

NYC Comment 86) Discussion of the three selected COPCs concentrations and spatial trends in the Creek is mostly qualitative. A robust quantitative discussion of the concentrations and COPCs' spatial trends and patterns of individual PAHs, PCBs and metals is needed.

NYC Comment 87) Throughout the text the NCG attributes elevated concentrations of organic carbon (OC) to impacts of CSOs and MS4s. There are many other more important OC sources. Reference area waterbodies with CSOs that are not impacted by industrial have relatively lower OC concentrations, implying that there must be other OC sources unrelated to CSOs on the Creek.

In addition, the NCG fails to correlate the presence of elevated OC in the sediments to NAPLs - the data shows presence of elevated OC in surface, subsurface and native sediments adjacent to the GPEC former MGP site, where NAPL is known to be present.

Available porewater data also shows presence of elevated dissolved organic carbon (DOC) in sediment porewater. Elevated DOC in porewater, a likely indicator for local NAPL presence, is seen in the impacted sediments in English Kills first bend, Turning Basin, middle reach and East Branch area. A thorough discussion of all the sources of OC to the system and a differentiation of the impacts of those sources is needed.

NYC Comment 88) The chapter both fail to discuss impacts of migrating NAPL on the sediments and resulting elevated COPC concentrations, and downplays the impact of NAPL on the sediments of the Creek by using terms such as "residual pore saturation" and "immobile". These statements are unsubstantiated, no quantitative data on the mobility of NAPL has been collected. NCG's use of qualitative tests (visual observations and shake tests – used to assess presence or absence of NAPL) to make quantitative assertions about NAPL transport is not technically sound. NAPL migration from subsurface sediments has been documented by EPA, the City, NYSDEC and the community throughout the Creek. The text should discuss NAPL migration as COPC concentrations in NAPL are significantly higher than any other source.

NYC Comment 89) The presence and impacts of NAPL in the Creek is not discussed adequately. Presence of sheens, NAPL that has spread on water surface, is a common occurrence in the sediments of the Creek. NAPL has been also documented in the surface sediments of the Creek by EPA ESI data, NYSDEC led sampling programs, and the US Army Corp of Engineers (ACE) Engineering Research and Development Center (ERDC) lab and in surface sediments collected by NYSDEC. NAPL was also documented by NCG in the sediment trap data collected during the Phase 2 RI field program. These observations provide evidence of different source of COPCs to the Creek and are important for developing a reliable contaminant fate and transport model for the Creek that accounts for presence of third phase (NAPL) in the sediments.

NYC Comment 90) This chapter also fails to explain the source of elevated COPCs in native sediments beneath the Creek. For example, the TPAH concentrations in the native sediments of English Kills, first bend, are as high as 12,000 mg/kg. The text in the NCG Draft RI does not identify this observation and then refers to Appendix C for a discussion of elevated TPAH concentrations in the native sediments; however, there is no discussion of sources of TPAH to the native sediment in Appendix C. The nature and extent of contamination in the NCG Draft RI is significantly incomplete without a full evaluation of the elevated concentrations of COPCs in native sediment, which can be clearly attributed to sources from NCG sites.

NYC Comment 91) The discussion of groundwater and porewater in this section and elsewhere in the Draft RI ignores the data which demonstrates that approximately 75 percent of groundwater discharge to the Creek through the Creek's banks. Despite evidence to the contrary, the text assumes that all groundwater discharge occurs through the sediment bed and that the sediment bed mitigates the contaminants loaded by the groundwater before it discharges as porewater to the surface water.

As a result of this faulty assumption, contaminants in the groundwater discharging through the banks have not been characterized and are not discussed in the Draft RI. Observations of groundwater seeps associated with NAPL seeps along the Creek indicate that the load transported through the banks by groundwater are significant. Further, the Draft RI does not discuss the role of contaminants that are complexed to DOC in the transport and loading process. The majority of groundwater and porewater samples collected for DOC from the sediment bed and below were invalidated because of associated blank contamination. The Draft RI concludes that DOC is unimportant because it was only detected sporadically, however this based on insufficient data. The locations where the DOC was not reduced to below the detection limit by the validators align with areas of significant groundwater contamination, showing that the DOC data needs to be re-collected.

NYC Comment 92) In the load calculations that are provided, the Draft RI underestimates groundwater loading to the surface sediments and the water column by using porewater concentrations representative of groundwater and surface water mixed by tidal pumping. That is, NCG estimates groundwater loads by multiplying tidally diluted COPC concentrations by the net groundwater discharge. This is clearly wrong since it fails to account for the tidally driven bidirectional flow at the sediment-water interface. For these reasons, the groundwater discussion in this section is flawed.

This incorrect interpretation is compounded by a groundwater CSM that suggests that contaminated groundwater present in the somewhat contaminated soils of the aquifers adjacent to the Creek would be mitigated by passing through the much more contaminated sediments on the Creek bed. This premise is clearly wrong.

NYC Comment 93) This chapter goes into detail about how new solids delivered by the East River and by point sources are mixed by various processes with historical solids to yield the COPC levels that presently exist in the surface. The Draft RI also argues that CSOs and stormwater discharges are a major contributor of these COPCs. Both assertions are incorrect.

NCG fails to note that the sediment coring evidence does not support this mixing scenario as several of the high resolution cores do not indicate extensive vertical sediment mixing based on the profiles of radionuclides and/or the COPCs themselves. Moreover, if the CSOs and stormwater outfalls were responsible for the elevated concentrations seen in the Creek surface sediments, then the reference area waterbodies, which are tidally connected to the East River, have similar sewersheds and histories, and also receive CSO and stormwater discharges (e.g., Westchester Creek, Flushing Creek and Steinway Creek) would contain elevated COPC concentrations comparable to the Creek. On the contrary, these reference waterbodies have surface sediment concentrations at background levels. This demonstrates that the elevated COPC concentrations in the Creek are a result of on-going contaminant discharges or upland-related NAPL and groundwater transport specific to industrial sources to the Creek and unrelated to urban background inputs such as CSOs. Failure to recognize and explore this inferential evidence for contaminant transport to the Creek is yet another fatal flaw in the Draft RI.

Specific Comments from the City on NCG Draft RI Chapter 4

NYC Comment 94) **Section 4.1.2:** This section discusses selection of three chemicals for discussion in the NCG Draft RI, TPAH, TPCB and Cu. The entire text in the Draft RI uses these totals (TPAH- sum of 17, sum of PCB congeners/aroclors) and Cu to draw conclusions regarding

the sources of these contaminants in the NCG Draft RI and to support the flawed CSM. This process used by the NCG is inadequate and renders the NCG Draft RI incomplete. Individual chemical patterns for PAHs, PCBs or metals are not discussed at all. The text also inaccurately states that Cu is representative metal given that the patterns in sediments are similar to other metals. Limiting the discussion in the NCG Draft RI to these three chemicals does not provide an accurate or comprehensive characterization of the different individual PAHs, PCB homologs/aroclors and different metals that are present in the sediments of the Creek. The NCG Draft RI should be revised to include discussions of patterns and distributions of PAHs, PCBs and metals in the Creek. Such discussions should focus on the geographic variations of PAHs, PCBs and metals patterns across different sections of the Creek. Such spatial and chemical patterns will help identify different sources and processes transporting COPCs to the Creek.

NYC Comment 95) Section 4.1.2, Page 9: *"spatial pattern of Cu in sediments is generally similar for other metals indicating it is a representative material."*

This assessment is inaccurate. Review of Appendix A plots shows that the patterns of metals are not generally similar to dopper. Cu concentrations in the surface sediment are highest in the Turning Basin area, adjacent to the former Cu smelter site. The concentrations in this area are four times higher than the concentrations in majority of the Creek. Cu concentrations then decrease upstream and downstream from the Turning Basin area. This pattern is not always found in the metals.

One example is lead concentrations in the sediments of the Creek. Unlike Cu, lead did not show peak concentrations in the Turning Basin area. Lead concentrations are elevated in the Turning Basin, English Kills and Dutch Kills as compared to the main stem and other tributaries. This indicates that sources of Cu and lead to the system are different. Patterns of mercury, nickel, silver, zinc are also not comparable to Cu. NYC Figures 3a to 3e show the spatial distribution of these contaminants. NCG's assertion that Cu is representative is not supported by data. The NCG Draft RI should include discussion of other metals in the Creek since the patterns of metals in the Creek indicate multiple sources of contaminants the Creek.

NYC Comment 96) Section 4.1.4 Page 105 Longitudinal Profiles in the main text and in Appendix A: These profile figures are displayed on multiple log cycles to show the entire range of concentrations present in the Creek as well as the reference areas. This presentation of results does not allow for visualization the variation of COPC concentrations in the Creek. To avoid this issue, the few extremely high concentrations can be identified by a note on the figures.

Also, the representation of COPCs in East Branch on the longitudinal profile plot does not allow

for understanding of the spatial differences in the Creek. There are two forks in East branch, a fork with CSO and a fork without CSO. The concentrations in these two forks are also significantly different for certain COPCs. Representing these two forms on the same river mile and as one contiguous tributary obscures the differences and is not an accurate representation of data. These plots should be modified to show the EB non-CSO fork with a different symbol or color.

NYC Comment 97) Box Plots in the main text and in Appendix A: The box plots do not identify the number of samples used to draw conclusions regarding the COPCs in a given reach. This is particularly important for datasets with low sampling density such as sediment traps and surface water. The box plots should be revised to include the dots in the boxes and a value ("*n* = ") presenting the number of samples used.

NYC Comment 98) Section 4.2.2 Percent Fines and TOC: This section describes the importance of TOC in the sediments of the Creek. The text acknowledges that there are various sources of OC to the Creek including petroleum products. The text further goes to say that the behavior of OC in this system is complicated because "the OC consists in part of the contaminants that are focus of the NCG Draft RI (TPAH in this case)" The text also states that, "In addition, there are major sources (CSOs and MS4s) of organic matter and solids within the tributaries, as well as at the downstream boundary at the East River, and there are anthropogenic forms of OC in the surface and subsurface sediment.".

Throughout the remainder of the text the elevated sources of OC are attributed to only CSOs and MS4s. The text never describes how other "anthropogenic forms" of OC arrived in the system and what the sources are. NAPL, which is a source of PAHs and TPHs to the system is never identified as a source of OC to the system. By failing to acknowledge this the NCG Draft RI and the CSM for the Creek is incomplete. Review of available upland data shows that the OC concentrations in the upland soils are elevated. For example, the OC concentrations in upland soils from the Greenpoint Energy former MGP site range from 5% to 31%. The text should identify the pathways and sources of all "anthropogenic forms" of OC to the Creek.

NYC Comment 99) Section 4.2.2.1 Percent Fines: *"Somewhat lower percent fine values are generally found at the upstream ends of the tributaries near the CSO discharges (except for Whale Creek)."*

This text does not an accurately describe data, the concentrations should be discussed on a quantitative basis. The percent fines in the main stem of the Creek are greater than 80%. In Dutch Kills, a tributary with a CSO, the % fines concentrations in the surface sediments along the centerline are mostly greater than 80%, while the concentrations in sediments along the bulkheads are mostly less than 40%. In Maspeth Creek, also a tributary with CSO, the % fines

concentrations along the centerline are less than 40% while those along the banks are finer with concentrations ranging from 34% to 90% fines with an average value of 60%. Similar discussions should be provided for Maspeth Creek and East Branch.

The text also fails to discuss the heterogeneity in the percent fines content in the Creek. The NCG has collected several collocated sediment samples in the Creek. The % fines concentrations in the co-located samples vary significantly. For example at RM 3.58, the NCG has collected co-located sediment samples at four locations across the Creek. The % fines concentrations in co-located samples varies significantly. This is an important observation of the data and needs to be discussed.

NYC Comment 100) Section 4.2.2.1: The text as written indicates that there is a CSO discharge at Whale Creek. This is inaccurate, the City and NYSDEC have shared several documents with the NCG that state that the outfall at Whale Creek is not a CSO, but treated discharge from WWTP effluent. These inaccuracies in the text are intentional and need to be deleted from all sections of the Creek.

NYC Comment 101) Page 108: *"The highest percent fines are generally found in the main stem below approximately CM 2, the downstream portion of Dutch Kills (approximately CM 1), and the western half of the Turning Basin (approximately CM 2.5). Somewhat lower percent fine values are generally found at the upstream ends of the tributaries near the CSO discharges (except for Whale Creek)."*

The Draft RI must state that these are qualitative and subjective observations. Values of percent fines in various regions of the Study Area (e.g., Draft RI Figure 4–6) cannot be distinguished statistically.

NYC Comment 102) Section 4.2.2.2 TOC: There are several inaccuracies and omissions in this section of the text. The text states that the TOC content in the Creek ranges from 3% to 15% - this is inaccurate. The range of TOC in the surface sediments of the Creek ranges from 1% to 26%. The text and the tables should be updated to correct this inaccuracy.

The text also states that TOC levels greater than 3 to 4% are high and are consistent with high organic loads from the large CSOs at the head ends of tributaries. The text also states that "the spatial distribution of surface sediment TOC provides further evidence of the key role played by the CSOs in discharging organic matter into the Study Area."

This assessment by the NCG is flawed. A spatial map of the TOC (NYC Figure 4) shows that the concentrations in the Creek after CM 0.6 are greater than 4%. If the only source of OC to the Creek was solids derived from CSOs, then the OC content in the sediments of the upper portion

of the Creek should look like values observed in CSO waterbodies in the reference areas. The presence of elevated OC indicates that other non-solids based sources are present in the system.

The NCG provides no explanation for other sources of OC to the in the middle reach and other areas of the Creek. NAPL, a likely source of OC, is present in the sediments of the Creek due to industrial activities such as petroleum refineries that operated in this reach for decades but is not mentioned in the text. This should be identified as a potential source of OC to the sediments of the Creek. The other potential sources of OC should be discussed in the text; currently the sole source of OC identified in this section is CSOs and MS4s.

In addition, the ranges of OC identified in the CM2+ area are inaccurate. The OC in the sediments of the Turning Basin is elevated and is as high as 18%.

NYC Comment 103) Section 4.2.2.3, Page 109, third paragraph: This paragraph describes the positive relationship between percent fines and OC observed in reference areas. It then subjectively identifies four locations in the reference areas with OC greater than 10% and makes a broad assumption that these high OC is due to presence of CSO at the head end. There are several issues with these statements. First, this section inaccurately identifies the number of samples in the reference area bodies exceeding 10% OC. It appears that NCG has not applied the correction factor to Phase 1 OC data collected in reference area tributaries. Furthermore, it is unclear whether the positive relationship with fines is anyway affected by these samples. If such relationship does exist, it is not described in the text.

The text indicates that in the reference areas percent fines and TOC generally exhibit positive relationship, while such a relationship is absent for the Creek (NCG Draft RI Figure 4-10a). The text does not provide any strong technical basis for why such a relationship between fines and OC does not exist for Newtown Creek. Rather it makes an unsupported statement that the distribution of OC and fines is consistent with the CSM that the Creek is depositional and East River solids are a primary source of solids in further downstream sections of the Creek. If solids derived OC from East River and CSOs were the only sources of OC in the system, then the site should reflect the same patterns observed in the CSO waterbodies in the reference areas. The complex distribution observed for the site strongly indicate other non-solids inputs of OC to the system.

This section then states that the concentrations in Flushing Creek, Coney Island Creek, Fresh Creek and Sheepshead Bay are similar to the Study Area tributaries, which is consistent with influence of large CSOs in those reference areas. This statement is inaccurate for several reasons. This text fails to mention that the NCG and EPA classified Sheepshead Bay as a waterbody with no CSOs, which is contradictory to the text in the Creek. Also, the text fails to

mention that Coney Island Creek is also impacted by a former MGP Site, which is a source of OC to the sediments as evident in the elevated OC values measured in the surface, subsurface and native sediments of the Turning Basin area adjacent to the former National Grid MGP Site. Furthermore, comparison of the OC in the tributaries of Newtown Creek to the reference area tributaries with CSOs shows that the OC in the Creek tributaries is significantly higher than the reference area tributaries (NYC Figure 5a) with the exception of Fresh Creek. This result is in direct contradiction to NCG Draft RI statements. The reference area data actually shows that with the presence of CSOs in a given waterbody, the OC concentrations are not expected to be as high as the levels measured in Newtown Creek. The NCG should change the text in the sections to reflect the data accurately.

NYC Comment 104) Figure 4-10b: It is not clear what technical justification is how the data was manipulated to derive NCG Draft RI Figure 4-10b. There is no way one can derive an inverse relationship in Figure 4-10a, and it is unclear if other forms of averaging the data will arrive at the same patterns depicted in Figure 4-10.

In comparing the middle panel (Reference Areas) to the left panel (Study Area), the NCG asserts that the reference areas exhibit the expected positive relationship between percent fines and TOC and the Study Area exhibits an inverse relationship. These assertions, however, are invalid. Firstly, given the high data variability, there are insufficient data values in the Study Area panel to assert any sort of relationship (positive or negative) between percent fines and TOC. Secondly, one cannot compare the Study Area and Reference Areas panels owing to the large difference in the number of data values plotted in each panel (i.e., 13 for the Study Area and 39 for the Reference Area). If one were to randomly select and plot 13 data values from the Reference Areas panel, it is unlikely that a significant relationship between percent fines and TOC would be apparent in those few values. Lastly, the spatial distribution of TOC and percent fines is a complex function (at a minimum) of source discharge, solids dispersal, historical NAPL and soot carbon contamination, and the reactivity and degradation of the TOC from all different sources. One cannot simply aggregate and average data over some arbitrary spatial scale at different sites with an expectation that those spatially averaged values are acceptably comparable.

NYC Comment 105) Section 4.2.2.4 TOC Composition Page 110: The paragraph on this page identifies spills of tar like materials, spills and releases of petroleum products as sources of OC to the Creek. While these have been identified by the NCG as sources of OC to the Creek, NCG has failed to incorporate this information in the development of their CSM. In the previous sections (Sections 4.2.2.2, and 4.2.2.4) where the NCG Draft RI discusses TOC and its relationship between fines to TOC, the variability observed in the TOC data and its lack of direct correlation to fines is likely related to the presence of these industrial inputs. However, the NCG

focused the preceding section on the contribution of CSOs, MS4s, and the East River.

This paragraph also acknowledges that the portion of OC from some sources is labile, but does not mention what fraction of OC is labile and which sources carry the labile fraction of OC. This needs to be described in the text, because the preceding sections of the text attribute all the elevated OC in the tributaries to CSOs.

NYC Comment 106) Section 4.2.2.4 Page 111: The first paragraph of this text identifies all the TPH measurements conducted in the Creek for understanding the source of OC in the sediments. The text fails to mention that Phase 1 data, which was based on an unbiased sampling design, measured only C9 to 40 fraction in the sediments of the Creek. All other finer measurements of TPH such as C5 to C8 aliphatics etc., were measured only for the Phase 2 program, which is a biased sampling consisting of a high density of data collected by the NCG in the tributaries. Also, missing in NCG text is that the National Grid data used to fill a data gap in the most contaminated section of the Creek also does not have TPH measurements. The text of this section must describe these aspects of the data sets used.

The remaining text provides a discussion on what the TPH to TOC ratio is in the sediments of the Creek. NCG does not draw any conclusions about what this ratio indicates. The text just discusses the ranges of this ratio in the sediments without drawing any conclusions regarding what this ratio indicates. Without a discussion of the meaning of the TPH to TOC ratio, this section provides no input for the NCG Draft RI.

Comparison of the ratio of TPH to TOC (NYC Figure 5b) shows that the ratio is not the same for all Creek tributaries. The TPH/TOC ratio is higher in English Kills and Turning basin as compared to the rest of the Creek tributaries. Comparison of this ratio to Creek sediments with CSOs shows that with the exception of Fresh Creek, this ratio is lower than what is measured in the Creek sediments tributaries and Turning Basin. This ratio is another line of evidence which shows that CSOs and MS4s are not the only source of OC to the Creek surface sediments. Other sources such as tar and NAPL are also present in the surface sediments of the Creek tributaries and are a source of OC. This information is currently lacking in the NCG Draft RI and should be discussed these sections on OC.

NYC Comment 107) Section 4.2.3 Distribution of Contaminants, Page 112 – 113: The wording in the first paragraph of this section suggests that the data to be described were shown in NCG Draft RI Figure 4-16a, the data are shown on Figure 4-16B.

NYC Comment 108) Section 4.2.3.1 Distribution of Contaminants – TPAH: As discussed in the comments before, the entire text in the NCG Draft RI only focuses on the total PAH calculated using 17 different PAH compounds. The NCG Draft RI uses this total concentration to make

conclusions regarding the sources of TPAHs to the Creek without examining the concentrations and spatial patterns of some of the individual PAH compounds. This is a severe flaw in the way the NCG Draft RI attempts to describe the nature of COPCs in the Creek and the way it attributes this distribution to the sources. Without examining the some of the individual PAH compound concentrations the reader cannot assess whether certain chemicals are responsible for elevated concentrations in one portion of the Creek compared to other portions of the Creek.

In this section the text also describes patterns in total PAHs. The description for East Branch fails to mention that the elevated concentrations in the East branch show a trend that the concentration in the non-CSO fork is elevated when compared to TPAH concentration in other section of this tributary.

For the tributaries and CM2+ sections of the Creek, this section does not provide a comparison of the concentrations in the surface sediments to the reginal background value. Such comparison is discussed only for the main stem sections of the Creek with RM < 2. The NCG Draft RI should be updated to provide a consistent discussion for all sections of the Creek.

This section also fails to provide a quantitative discussion on the ranges and average concentrations in different sections of the Creek. That discussion needs to be added.

NYC Comment 109) Section 4.2.3 Page 112- 113: Figure 4-17 is mentioned, but never actually described explicitly. Inspection of Figure 4-17 leads one to question the validity of comparisons of the Newtown Creek data to the UTL of the reference stations. The fact that CM 0-1 data are lower than the UTL is not the same as saying they are "consistent with regional background" (stated in NCG Draft RI page 112 for TPAH, page 113 for TPCB and page 114 for total Cu).

The upper tolerance limit is based upon concentrations for individual samples, with 95% of reference area concentrations being below this value. A disproportionate percentage of the CM0-1 concentrations are very close to the UTL. A different type of comparison, such as a comparison of probability distributions for CM 0-1 to the reference area stations, would highlight that the fact that measured concentrations in CM 0-1 are inconsistent with regional background.

NYC Comment 110) Section 4.2.3.2 and 4.2.3.3 Distribution of Contaminants – TPCB and Cu: Similar to PAHs, this section only discussed the total PCB concentrations. Presentation of some homologues of TPCBs needs to be discussed in the text. The NCG Draft RI is incomplete without this discussion.

The NCG Draft RI only shows patterns of Cu in the sediments of the Creek indicating that it is a

representative metal. As discussed in prior comments, patterns of Cu concentration are not representative. NCG must include a discussion of other relevant metals in this section.

Similar to the comments on TPAHs, a discussion comparing the sediment concentrations to the regional background is needed for the tributaries and CM2+ section of the Creek. These sections should also provide a quantitative discussion on the ranges and average concentrations in different sections of the Creek. Such discussion is needed in the NCG Draft RI.

Section 4.2.3.3 should also include a discussion of very high Cu concentrations in the surface sediments of the Creek, concentrations as high as 37,000 mg/kg have been measured in the surface sediments. This elevated concentration is comparable to concentrations measured in the subsurface sediments of the Creek in this area.

Section 4.2.3.2 discussed TPCB concentration as high as 380 mg/kg reported from Dutch Kills, but provides no possible reason for this elevated concentration. A thorough review of laboratory report and field note are needed to ensure this data met DQOs and a discussion on the PCB fingerprint is needed to understand the cause of this high concentration.

NYC Comment 111) Section 4.2.5: This section uses some metrics in an effort to understand the spatial patterns of PAH and PCB compounds in the sediments of the Creek. While this is useful, this analysis still falls short in evaluating individual PAH and PCB compounds to understand sources. The text acknowledges that the sources of PAHs and PCBs to the surface sediments are different, but no attempts are made in the succeeding chapters to identify these sources. The rest of the NCG Draft RI focuses only on CSOs and MS4s as the sources of PAHs to the CM2+ and the tributaries. This assertion from is contradictory to NCG findings in this section.

NYC Comment 112) Section 4.2.5.1: This section lists the different metrics used by the NCG to show different PAH sources in the Creek. However, this section fails to describe the results of these plots. For example, the text states that the TPAH (sum of 34) concentration in the CM0-1 is within the range of concentrations in the reference areas. This is an incomplete description of the figure depicting these concentrations. The figure also shows that the concentrations at the head ends of tributaries are also within the range of reference area concentrations.

The NCG also fails to describe Draft RI Figure 4-26 – ratio of TPAH34 to TPAH17, this figure again shows that the head ends of the tributaries (other than Whale Creek) are within the range of concentrations on the reference areas. A map of this plot is needed to understand spatial distribution. Finally, the section fails to mention that the National Grid data, used to fill a data gap in the most contaminated area of the Creek, cannot be used to develop this metric since it is missing data for all 34 PAHs.

Descriptions of Draft RI Figures 4-27 and 4-28, which show total HPAH and total LPAH Concentrations, are also inadequate. These figures show that the composition of TPAHs along a tributary is different from the main stem of the Creek. The PAHs in the Turning Basin area are mostly comprised of low molecular weight PAHs as compared to any other section of the Creek. Some locations in the tributaries have higher composition of LMW PAHs as compared to other areas of the Creek. This is a clear indication that the sources of PAHs to the Turning Basin area and the tributaries are different. Similar observations can be made about the main stem, CM0-1.

Figure 4-29, the ratio of total LPAH to total HPAH confirms the observations of figures 4-27 and 4-28. This ratio is an order of magnitude higher I the Turning Basin as compared to other areas of the Creek. This ratio demonstrates a decreasing trend in the English Kills from mouth the head end. Maspeth Creek also shows a trend from the mouth to the head end. This ratio in the tributaries is comparable to the concentrations in the reference areas. In addition to the observations in tributaries and the Turning Basin area, this ratio shows that the sources of PAHs in some areas of CM0-1 are also different. This ratio is higher in the mouth as compares to CM 1to 2, indicating presence of different sources in this area. Also this ratio is elevated in some locations in Whale Creek.

The Draft RI needs to adequately discuss these figures as they clearly show presence of different sources of PAHs to the Creek.

NYC Comment 113) Section 4.2.5.2: This section uses chlorine atoms per biphenyl molecule (CBP) as a metric to understand the PCB composition in different areas of the Creek. Description of this metric is inadequate, the text fails to mention that the PCB patterns in the sediments of the tributaries are different. PCBs in the sediments of Dutch Kills and Maspeth Creek are comparable and are different from PCBs in East Branch and English Kills. There is also a difference in PCB composition in the sediments of East Branch and English Kills, and locations at the mouth of English Kills are comparable to some locations in East Branch and in the Turning Basin. These observations should be included in the text.

NYC Comment 114) Section 4.2.5.3 Simultaneously Extracted Metals: This is a subsection to section 4.2.5 titled PAH, PCB and Metals Composition and Speciation, however the metals subsection is lacking this information. Section 4.2.5.3 does not discuss metals speciation at all nor does it discuss composition of metals. This section should describe the concentrations of different metals in the Creek and also the concentration of methyl mercury in the Creek. Discussion of the AVS/SEM results is not a substitute for metals speciation or metals composition. Without discussion of different metals this section is incomplete.

The AVES/SEM result shown in this section contradict NCG's assertion in section 4.1.2 that the

SEM results show that metals are bioavailable in some portions of the Creek. NCG's figure 4-31 unequivocally shows that metals are not bioavailable. Section 4.1.2 should reflect that.

NYC Comment 115) Section 4.3.2 TOC Composition, Page 122: There is a lot of data on soot carbon for the Creek. Other than to point out that soot carbon complicates the characterization of partitioning, NCG has not presented a rigorous analysis of these results (see Chapter 5 comments). These data, in combination with TOC and other partitioning-related data (porewater measurements) need to be reviewed in the NCG Draft RI for consistency from a partitioning and fate and transport perspective.

NYC Comment 116) Section 4.3.2.1 Percent Fines in Subsurface Sediments: *"Lower fine sediment contents are generally found upstream ends of tributaries near CSO discharges (except for Whale Creek)."*

This statement is inaccurate. Review of Figure 4-32 shows that sediments with low fines are found throughout the Creek, not just at the head ends of the tributaries. This statement should be deleted from the NCG Draft RI. Also, as stated before there is no CSO discharge in Whale Creek, any statements alluding to this inaccuracy must be deleted from the NCG Draft RI.

NYC Comment 117) Page 121: NCG asserts that percent fines in subsurface sediment are generally lower near the tributary heads due to coarse solids discharged and deposited locally by CSOs. While the proposed mechanism is certainly reasonable, it is hard to say from the referenced Figure 4-32 that any discernable pattern exists in the data. One must be particularly cautious when comparing data populations of unequal sample size. For example, NCG Draft RI Table 4-9 indicates that 174 samples were collected in English Kills (EK) and East Branch (EB), while only 74 samples were collected over CM 0-1. Given the unequal sample size, it appears that the EK/EB sample population has more instances of lower percent fines than CM 0-1, when really it has more instances of the entire range of percent fines from 0-100%. It is possible that subsurface sediments may be slightly coarser near point-source discharges, however, the NCG Draft RI report needs to be more explicit about which assertions are merely qualitative and which are quantitative. In this particular instance, it might be fair to say qualitatively that percent fines may be generally lower upstream due local deposition of coarser solids from point-source discharge; however, a statistical test of this expected difference was not significant at either alpha = 0.05 or alpha = 0.10.

NYC Comment 118) Section 4.3.2.2 TOC in Subsurface Sediments: *"TOC concentrations within the subsurface sediment increase with depth in some reaches, generally by a factor of approximately 2 over depths of 2 to 4 meters (see Figure 4-36). This pattern suggests higher historical organic loads from CSOs, as well as industrial facilities, combined with the depositional nature of the system."*

NCG fails to adequately describe the distribution of TOC in the subsurface sediments of the Creek. NCG Draft RI Figure 4-34 shows that TOC increases with depth in all reaches of the creek. The range of TOC in subsurface sediments is comparable throughout the Creek. TOC concentrations are highest in the Turning Basin area adjacent to the former MGP site, concentrations are as high as 40%.

NCG makes unsubstantiated assertions regarding historical loading from CSOs. There is no data presented which suggests that the historical organic loads from CSOs were higher. NCG should delete this statement from the NCG Draft RI unless they can provide data that supports this assertion. NCG also fails to mention the sources of high OC from industrial facilities (such as discharge of NAPL and the use for decades of an oil-water separator constructed in the Creek). This vague discussion of loads from industrial facilities is not appropriate for a technical document. NCG should identify the sources of high OC from industrial facilities such as NAPL (tar and petroleum), and the fact that they may not be associated with sediment input is one reason for the complex relationship between grain size and TOC in the system.

Figure 4-36, which depicts the TOC concentrations in the Creek on a reach by reach basis is not even discussed. What is the purpose of this figure? NCG should either discuss this figure or delete it from the text completely.

NYC Comment 119) Figure 4.3.2.3 TOC Composition in subsurface sediments: NCG Draft RI
Figures 4-37 and 4-38 depict the TPH concentration and ratio of TPH to TOC in sub surface sediments of the Creek respectively. These Y- axis of these plots includes multiple log cycles which are unnecessary and prevents the reader from assessing the variability in subsurface sediments. These plots should be redone to allow the reader to evaluate the distribution of these analytes. These plots should also include a note stating that National Grid data is not included in these plots because the Grid samples were not analyzed for TPH.

NYC Figure 6a shows the TPH concentrations in the subsurface sediments of the Creek. With the exception of the first mile of Newtown Creek, the TPH concentrations in the subsurface sediments are comparable throughout the Creek area. Elevated concentrations of TPH are present in the Turning Basin area, non-CSO fork of East Branch and in some locations of English Kills. NYC Figure 6b depicts the ratio of TPH/TOC in the subsurface sediments of the Creek. The patterns of this ratio are similar to the patterns observed in NYC Figure 6a.

This section also fails to adequately discuss the patterns of soot carbon in the sediments of the Creek. The discussion fails to mention that the highest soot carbon is measured in the Turning Basin area of the Creek adjacent to the former MGP site. Soot carbon is also elevated in main stem of the Creek near RM 0.8. Similar to other figures referenced in this section, scaling of Y-axis in NCG Draft RI Figure 4-40 does not allow the reader to assess the variability in soot

carbon throughout the Creek. The scales on this figure need to be adjusted.

This section also makes an unsubstantiated assertion that elevated soot carbon in the sediments indicate that historically the inputs of soot carbon from municipal and industrial sources was higher. Again, the NCG has not provided any data to support this assertion. NCG has not measured soot carbon in current sources nor does it provide any data that shows the soot carbon levels in historical discharges. Such unsupported assertions must be deleted from this technical document.

Finally, NCG does not explain what the composition of the OC is based on the calculation of TPH to TOC ratio. A mere calculation of ratio is not an explanation of the sources of OC to the system. Discussion regarding what information this ratio provides regarding the composition of OC is needed.

NYC Comment 120) Section 4.3.3.1 Distribution of Contaminants – TPAH: Discussion regarding the distribution of TPAH concentrations in subsurface sediments of the Creek is deficient. The discussion fails to mention the obvious trends in the data. NYC Figure 7 shows that the highest subsurface concentrations of PAHs (50,000 mg/kg) are found in the Turning Basin area adjacent to the former MGP site. Elevated concentrations are also seen in sediments near RM 0.8 in the main stem of the Creek. Subsurface concentrations rapidly decline from the Turning Basin area into the upstream and downstream sections of the Creek.

This section or any following sections do not show any plots that depict the composition of TPAHs in the subsurface sediments of the Creek. At least for purposes of consistency, the reader expects plots that show the LMW and HMW fractions of TPAHs in the Creek similar to what was included for surface sediments. This lack of consistency should be addressed. In addition to this, patterns of individual PAHs in the sediments of the Creek should be presented and discussed.

Figure 4-44 shown by the NCG needs to be revised, as currently shown the Y-axis has unnecessary log cycles which prevent the reader from assessing the variability in TPAH concentration in the subsurface sediments.

NYC Comment 121) Section 4.3.3.2 Distribution of Contaminants – PCBs: Discussion regarding the distribution of TPCB concentrations in subsurface sediments of the Creek is deficient. The discussion fails to mention the obvious trends in the data. NYC Figure 8, shows that the highest subsurface concentrations of TPCB are found in the Turning Basin area adjacent to the former MGP site and in the first bend of English Kills. Concentrations for some subsurface sediment samples in these areas are greater than 150 mg/kg. Elevated concentrations are also seen in subsurface sediments in Dutch Kills. Similar to RM 0 to 1, subsurface concentrations at

the head ends of the tributaries in some samples are less than 1mg/kg.

This section or any following sections do not show any plots that depict the composition of TPCBs in the subsurface sediments of the Creek. In addition to this, patterns of PCBs in the sediments of the Creek should be presented and discussed.

NYC Comment 122) Section 4.3.3.3 Distribution of Contaminants – Cu: The text fails to mention that the elevated Cu concentrations are measured in the subsurface sediments of the Creek in areas adjacent to the Cu smelter.

NYC Comment 123) Section 4.3.4 Near Surface Vertical Patterns, Section 4.3.4.2, first bullet: *"TPAH, TPCB, and Cu concentrations in the top 30 cm do not exhibit consistent vertical patterns (cores NC154, NC161, and NC259)."*

While concentrations are low, all three cores exhibit a similar TPAH depth profile: variability in concentration until the 28-30cm segment, then clear increase in concentration in the bottommost depth. Similarly, all three cores exhibit a positive relationship between depths and Cu and TPCB concentrations, with the highest concentrations at the deepest depths. Clearly, these three cores do exhibit consistent vertical patterns.

NYC Comment 124) Section 4.3.4.2 fourth bullet: *"In the one core in Dutch Kills (DK037), patterns differ among contaminants. TPAH and TPCB exhibit gradients in the top 15 cm. TPAH and TPCB concentrations in this core are elevated (in contrast to nearby CM 0 – 1, where surface sediment contains similar concentrations to background). Cu exhibits a more variable profile that is more difficult to interpret."*

It is apparent from the figures that all contaminants show an increasing trend with depth, and Cu is not more difficult to interpret compared with TPAH and TPCB.

NYC Comment 125) Section 4.3.4.2: NCG appears to select a few cores, with no clear reason why certain cores were selected over other cores, and interpret the cores without providing explanations to what the patterns are related to or what sort of information the high resolution core can provide that is relevant to understanding fate and transport of chemical in the Creek.

NYC Comment 126) Section 4.4 Native Material: This section discusses the concentrations of TOC, TPH, TPAH, TPCB and Cu in native sediments of the Creek. Descriptions provided by the NCG are lacking and fail to identify salient observations in the native materials of the Creek. Some examples of these observations are as follows:

In the section describing TOC, the NCG fails to discuss elevated TOC concentrations of OC in the native material. Concentrations greater than 4% TOC are present in several samples the Turning

Basin area. Concentrations as high as 20% TOC have been measured in native materials. This is an important finding because it provides an unequivocal evidence that CSO and MS4 solids are not the only source of OC to the sediments of the Creek. NAPL, which is ubiquitous in the sediments of the Creek is likely another important source of elevated OC measured in the sediments.

NCG also fails to mention in the text that elevated TPH concentrations are also measured in the native materials of the Creek. Concentrations greater than 1,000 mg/kg are measured in the native materials in the middle reach, adjacent to former refineries, and in the first bend of English Kills. The first bend of English Kills has concentrations greater than 10,000 mg/kg in the native materials. This is a clear indication of a source of TPHs to the Creek which is not from CSOs and MS4s. The NCG Draft RI must include these important observations. The figure depicting the TPH concentrations should also note that National Grid data is not included in the plots because this analyte was not measured in this dataset.

The ratio of TPH/TOC in the first bend of English Kills and in the middle reach, adjacent to refineries, is within the range of TPH/TOC concentration in the surface and subsurface sediments of the Creek. This is an important observation in the dataset, because this indicates that the composition of OC in these areas is similar to the composition of OC in the surface and subsurface sediments of the Creek. This is a clear indication that there are other sources OC to the surface sediments of the Creek unrelated to CSOs and MS4s.

The section also fails to mention that elevated soot carbon concentration in the Creek is measured in the Turning Basin area. NCG Draft RI Figure 4-40 depicts the concentration of soot carbon in native sediments must be rescaled so it is possible to visualize the variability in soot carbon in native areas. As presented, the figure fails to accomplish this and needs to be revised.

The section describing TPAH concentrations in the native materials fails to mention that concentrations greater than 1000 mg/kg have been measured in native materials of Turning Basin area near national Grid and in the first bend of English Kills (maximum concentration of 12,000 mg/kg). These elevated concentrations in the native materials are indicative of presence of NAPL in these sediments which has been confirmed by visual observations in sediment core logs. This is an important observation which needs to be included in the NCG Draft RI. The text falsely states that additional discussion of TPAH concentrations in the native and subsurface sediments is provided in Appendix C. No such explanation is provided in Appendix C. NCG should provide this explanation in the main text of the NCG Draft RI, and not relegate it to an appendix.

The text does not identify elevated TPCB concentrations in the native materials in the Turning Basin area. TPCB concentration greater than 100 mg/kg has been measured in the native

materials adjacent to the national grid Turning Basin area. The presence of TPAH and TPCB in the native material shows that there must be an adjacent upland source (these compounds were not deposited at the same time as the native material, so must have migrated there through either groundwater transport or as mobile NAPL). No information regarding the origin or transport of these COPCs through the native material is provided. This is a significant shortcoming and represents a data gap in the NCG Draft RI.

Discussion on the Cu concentrations in the text states that there are no patterns in the Cu concentrations in the native materials in the Creek. This statement is false, review of Figure 4-50 shows a clear trend. The Cu concentrations in the native materials are in the Turning Basin area are elevated, with an average value of 80 mg/kg (excluded the max value) and high as 11,000 mg/kg. Elevated concentrations greater than 100 mg/kg are also observed in the East Branch, Dutch Kills and English Kills tributaries. Adjacent upland sources must be identified and transport mechanisms that can explain how elevated Cu concentrations came to occur in geologic strata that is much older than the industrialization of Newtown Creek must be provided in the NCG Draft RI text. Failing to discuss sources and the transport of Cu in the native material is a significant data gap in the NCG Draft RI.

These deficiencies identified in this comment must be addressed by the NCG. Without these discussions, the Draft RI is incomplete and inadequate.

NYC Comment 127) Section 4.5.1 Sediment Trap Dataset: The text in this section identifies the sources of solids to the traps, East River, point source discharges, local sediment resuspension. However, the text fails to identify sources of COPCs to the trap which include NAPL due to ebullition and seeps from bulkheads, East River, local resuspension point source discharges and other non-solids related chemical inputs. Sheens were present in some traps for all quarters which is an important observation that needs to be discussed. Based on the field notes, there are 131 physical and chemical traps which were described as impacted by sheens to a different degree. For example, trace rainbow sheen, rainbow sheen and moderate (dark) rainbow sheen were used to describe trap samples deployed at EK004, the location with highest TPAH concentrations in the Creek. Without discussion on the possible impact of sheens on the sediment trap samples, the integrity of the data analysis is questionable. The text should also include a discussion regarding field observations of traps.

This section also states that after one month's deployment, during the first quarter, the traps at two locations, EB042ST and EK086ST, were nearly full, with the 12-inch collection cylinders containing 10 and 8 inches of sediment, respectively. NCG does not provide any discussion as to why these traps filled so quickly, nor does NCG discuss chemistry results from these two traps given that the COPC concentrations in these two traps were lower than subsequent trap

samples at the same location. This is an observation that should be discussed in the Draft RI.

NYC Comment 128) Section 4.5.2 Mass Flux and Characteristics of Solids in Sediment Traps: The dry weight of mass captured by sediment trap was calculated based on the wet weight and percent solids. The percent solids was reported as low as <5% in some of the trap samples. Accordingly, the dry mass was as low as <30 grams for some of the samples. For example, traps related to sample NC078ST-C-20140923 had a total wet weight of 0.18 kg. The percent solid was 10.8% in this sample and the total dry weight was calculated as 20 grams. This mass is not enough for the chemical analysis. Each organic group (PAH or PCB) requires about 30 grams of mass, not including additional mass for the TPH and OC measurements. NCG should explain how the lab can report reliable results based on such small amount of mass.

Also, the percent fines method used by the NCG for Q1 requires about 100 grams of mass according to method ASTM D422. It is unclear how NCG's lab was successful in characterizing grain size given the insufficient amount of mass in most samples. A description should be provided to assess whether the results provided by NCG labs for trap samples are reliable.

NYC Comment 129) Section 4.5.2.1 Gross Solids Deposition: The text in this section states that at 80% of the locations, the highest solid deposition was measured in either Q1 or Q3. This temporal variation is not correlated with rainfall amount and intensity, which peaked in Q2. The results indicate that the solids captured in the traps was not affected by precipitation, which is contrary to NCG's assertion in later sections of the text that the traps are affected by precipitation.

With regard to the use of "gross" sedimentation rates as an additional line of evidence to understand net sedimentation rate (NSRs) in the study area (pg. 131, last sentence), according to NCG's definition of "gross" sedimentation rates: *"gross rates ... provide an estimate of the total mass per unit area of suspended sediment particles that settle into a sediment trap over a given period, and do not necessarily represent the long-term NSR in the creek bed."*

As a result of how the "gross" sedimentation rates were measured, this dataset is of limited use as an additional line of evidence to support NSRs in NTC. Contrary to NCGs assertion that gross rates deceases from downstream to upstream with distance from East River, NCG Draft RI Figure 4-57 showed significant variability in the gross rates with no spatial pattern. NCG further cited Appendix G section 5 for more details on how the gross rates compared to other lines of evidence of net rates. However, in Appendix G, Section 5.2.1, NCG does not quantitatively or qualitatively compare "gross" sedimentation rates to NSRs based on other lines of evidence. They restate the above caveat about using "gross" sedimentation rates to represent NSRs, then provide four general observations of "gross" sedimentation rates within NTC. Given that "gross" sedimentation rates do not represent NSRs, and NCG provided no additional

information to support how they compare/relate to the NSRs the statement in the last paragraph on page 131 should be removed.

NYC Comment 130) Section 4.5.2.2 Percent Fines: It appears that NCG used different analytical methods for the grain size analysis. The grain size distribution (GSD) was typically analyzed by Alpha analytical laboratory following method ASTM D422. However, due to the limited sample mass captured in the sediment traps, an alternative method via a Laser Diffraction Particle Size Analyzer (with larger particles via the Puget Sound Estuary Program [PSEP] Method) was used for the 3-month composite physical sediment trap samples as indicated in the field deviation memo dated on October 29, 2014. Based on the EDD, Q1-July samples were analyzed by ASTM D422, while the remaining trap samples were analyzed by PSEP. According to ASTM D422, percent fines is the percent passing 75 micron sieve (#200) #200 sieve. For PSEP method, lab reported 13 fractions. Without laboratory SOP, we do not know the particle size range for each fraction. It is also not clear how NCG calculated percent fines based on the lab reported data. If percent fines is calculated as the total of the fine and very fine fractions, the percent fines in sediment trap samples would range from 16% to 63% with a mean of 46%. These values are smaller than data reported in Figure 4-59. NCG should add detail information on how percent fines were analyzed and reported. NCG should also discuss the different analytical methods and associated uncertainties. Lab SOP for this method should be provided.

NYC Comment 131) Section 4.5.2.3 TOC: This section states that TOC was generally higher in the upper tributaries and attributes this spatial variation to the presence of CSOs at the head of the tributaries. This assertion by the NCG is flawed, NCG fails to account presence of NAPL in the traps, as documented in field notes, as a source of OC to the solids in the traps. If CSOs are the main contributor to the TOC levels in the sediment traps, TOC in the trap samples should decrease from the CSO outfall location to the downstream portion of the tributaries. However, this was not seen in each of the tributaries as indicated by Figure 4-61. At English Kills, TOC increases from the head end location to downstream. In addition, TOC levels in sediment traps in the tributaries are similar to the TOC in trap samples from the upper tributaries and the main stem CM2+. In addition, the NCG fails to discuss low levels of OC reported in the sediment traps at the head ends of English Kills and East Branch in Quarter 1. These are the same locations where the traps filled up in a period of 1 month. The TOC in these samples is less than 4%. Also, all Q1 traps at the head on the tributaries have OC less than 6% which is comparable to the OC levels measured in reference areas with CSOs.

Attribution of elevated TOC in the traps to CSO solids is flawed and is not supported by NCG's sediment trap data in Q1. NCG should acknowledge presence of NAPL in the traps as a source of elevated TOC and references to CSOs should be deleted.

The text also states that the TOC content in the sediment traps is consistent with surface sediment data. This is not always true, for example, the OC content in sediments of the East Branch fork with CSOs is on average 15%, however the traps report OC values of 4% OC in Quarter 1 which is approximately 4 times lower than what is measured in surface sediments. NCG should use the data to adequately describe the patterns rather than formulate generalized patterns that do not support match their hypothesis.

NCG has no basis to state that the differences in OC in quarter 2 vs quarter 1 are due to temporal variations in depositing solids. It is likely that other sources that may not be associated with solids are important in explaining some of the variabilities observed in the sediment trap OC data and the text should be revised to reflect this.

NYC Comment 132) Section 4.5.2.4 Percent Solids: Text in the NCG Draft RI states that percent solids data can be used to infer the sources of solids. Text says "Percent solids from the sediment trap samples steadily decrease from downstream to upstream, and within the main tributaries, likely reflecting differences in sources of solids".

The basis for the NCG's assertions regarding the interpretation of the measurement of percent solids in a sediment trap is without merit. Sediment traps when deployed are entirely filled with water, and gradually accumulate solids over a short period of time. Sediment traps by their design are not intended to provide measure of the percent solids associated with the trapped particles. Under in situ conditions in the water column, as suspended matter particles are carried by the currents and delivered to the traps, their effective percent solids is typically 0.01% or lower (equivalent to 100 mg/L of TSS or 99.99 % moisture). Once in the trap, the solid particles accumulate and settle to the bottom, forming a slurry that is dependent on multiple features unrelated to the solids themselves. These include the geometry of the trap itself, the length of deployment, the frequency and intensity of disturbance of the trap by tidal currents, ship traffic, storms, etc. The efficiency of the trap in collecting solids in its local environment will also vary due to differences in in-situ conditions such as tidal velocity, channel depth, etc. As a result, the same trap may not have the same collection efficiency near the mouth of the creek as it does in the tributary locations. It is also likely this efficiency will vary across particle sizes. Additionally, the retrieval procedures themselves will also impact percent solids, as the field staff must attempt to minimize solids loss during retrieval while not incorporating undue amounts of creek water which dilutes the samples and raises the detection limits. As a result, the NCG's percent solids is not a metric which can be used to infer spatial variations in suspended matter properties. Direct measurements of the particles themselves (via analytical chemistry) provide the only basis for comparison.

The statements made by the NCG to use percent solids to identify different sources of solids is

not supportable. Their assertion ignores all of the issues raised above, effectively assuming all the traps are equally efficient, deployed in identical settings, and they are all sampling the same "stream", which they are not.

Even if all of the concerns raised above are ignored, the NCG's assertion is still without merit. Elsewhere they assert that the coarsest materials deposit closest to the sources, with the CSOs delivering large amounts of coarse solids. However, the traps at the head ends of the tributaries near the CSOs have some of the highest percent moisture and lowest percent solids, characteristic of finer suspended matter. If these traps were accurately reflecting the deposition of coarse solids near the CSO discharges, they would have the highest percent solids, as is generally characteristic of coarse grained solids. More likely, the variation in percent solids is reflecting trends in other environmental conditions. This statement should be deleted from the NCG Draft RI given that percent solids cannot be used determine differences in sources of solids.

NYC Comment 133) Section 4.5.3 Distribution of Contaminants Pages 133/191 - 136/194: The sediment trap TOC tracks the surficial (0-15 cm) sediment TOC (compare NCG Draft RI Figures 4-8 and 4-61), along with a selective enrichment in % fines in the trap material relative to surficial sediments (Figures 4-5 and 4-59). These results could either be indicative of trap accumulation of re-suspended surficial sediment material or an indication of the concentrations of newly depositing burial solids. Inspection of additional graphics indicates that sediment trap particulate chemical concentrations seem to generally parallel 0-15 cm surficial sediment chemical concentrations. That is, spatial profiles of chemical concentrations in sediment traps are qualitatively similar to 0-15 cm surficial sediment chemical concentrations (compare Figure 4-65 to 4-16a for TPAH, Figure 4-68 to 4-19a for TPCB and Figure 4-71 to 4-22a for Cu). This consistency of the sediment trap results with sediment concentrations in the 0-15cm surficial layer suggests that the data from the sediment traps is not necessarily indicative of "newly depositional sediment". Because the traps were placed on the channel bottom, the trap accumulations may be inherently biased to reflect 0-15 cm concentrations of surficial sediment material that is re-suspended and then resettles, rather than concentrations associated with recently introduced and relatively uncontaminated burial solids. The NCG Draft RI needs to include a discussion of these possibilities.

NYC Comment 134) Section 4.5.3.1.1 Distribution of contaminants – TPAH Spatial Patterns: Regarding the chemical make-up of the sediment trap solids, the Draft RI fails to mention that the solids in the sediment trap of the Creek will also receive inputs form non-solids associated sources such as NAPL (seeps, ebullition). These inputs will increase COPCs in the traps on solids.

The text in this section fails to adequately discuss the total concentrations of TPAHs in traps. Currently, the text describes only the trends in the TPAH concentration measured in the traps, and even that discussion is in qualitative. A quantitative discussion of the concentrations measured in the traps should be provided. Also, comparison of the concentrations in the traps and surrounding sediments is needed. Without this, the this discussion is incomplete. For example, the average TPAH concentration in the traps is approximately 40 mg/kg, range of 3.5 to 120 mg/kg, which is more than three times lower than the average value in CM2+ area and thirty times lower than the maximum concentration (1245 mg/kg) in the surface sediments of this Creek section. This observation needs to be discussed for all sections of the Creek. In addition, the RI should discuss the patterns of PAHs in the traps compared to those observed in the sediments.

NCG mentions that the highest discrete TPAH sample result, 400 mg/kg, was observed in English Kills at CM 3.0 in Q2 and also notes that the concentrations decrease upstream and downstream from this location. This indicates presence of a localized source of COPCs in that area. NCG fails to provide information on the causes of this high TPAH concentrations.

NYC Comment 135) Section 4.5.3.1.2 Distribution of contaminants – TPAH Temporal patterns: *"These differences over time likely reflect differences in precipitation and/or point sources discharge activity (discussed further in Section 6.4.3)."*

The NCG states that the TPAH concentrations in Q2 are elevated when compared to concentrations in traps from Q1 and Q3 and attributes this increase in concentration to precipitation and point source discharges. This assertion by the NCG is flawed for many reasons. NCG and the City were actively conducting point source sampling during the time the Q2 sediment traps were deployed. Data collected by the NCG and the City shows that the concentrations in CSOs and MS4s are lower than the concentrations measured in traps during Q2. The concentrations in the sediment traps during Q2 are as high as 400 mg/kg with average concentration in the tributaries of 126 mg/kg. In contrast the average concentrations in CSOs is 36 mg/kg with a max of approximately 100 mg/kg. For MS4s the average concentration is 56 mg/kg with a max concentration also around 100 mg/kg. The average concentrations in CSOs and MS4s are 2 to 4 times less than the average concentration measured in the tributary traps for Q2. Point source concentrations clearly cannot be responsible for the elevated levels measured in Q2 traps. If NCG wants to attribute it to the elevated concentrations to point sources, then a quantitative comparisons of patterns of TPAHs in the traps to those in point sources is required. Such comparisons are missing for a Draft RI level document. The City has conducted a principal component analysis comparing patterns of PAHs in traps and CSOs and MS4 sources and the results (discussed in comments on section 6.4.3.2) show that the patterns in CSOs and MS4 are different from those in the traps indicating that these point sources are

not the source of elevated TPAHs concentrations in the traps. NCG should demonstrate what the sources of the elevated PAHs are rather than making arbitrary and unsupported statements.

There is also a fundamental flaw in NCGs data. Split samples and field duplicates get routinely collected during field investigations, under CERCLA, to conduct a quality review of data and to ensure integrity of collected for the Site. The EPA guidance states that one QC sample (field duplicate, MS/MSD) will be collected for every 20 samples collected for a given matrix. EPA also collects split samples where in a sample is sent to an independent lab to verify the result from the entity conducting the RI. NCG has failed to follow EPA guidance and collect field duplicate samples for the sediment trap program. In addition, NCG has also failed to evaluate split data collected by EPA and the City.

The City has collected 9 splits with NCG for the sediment trap data. Evaluation of the TPAH results for the split samples are shown in NYC Figure 9. TPAH concentrations in the Q2 sediment traps from NCG are biased high. Four of the 5 NCG samples report high TPAH concentration as compared to the City samples, and 3 of the 5 samples are higher than the +/- 40% acceptable range of difference. The one split Q2 sample where NCG and City results are comparable, the concentration in NCG sediment trap is consistent for all three quarters. Available EPA split data for Q2 also shows that the NCG results for Q2 are elevated. NYC Table 2 shows the results for the City and NCG split samples for all quarters. Available split data shows that there is high uncertainty in Q2 split sample results from the NCG and that data is unreliable. Rather than attributing the elevated concentration arbitrarily to point sources, the RI should focus on understanding the uncertainty in the sediment trap data.

NYC Comment 136) Section 4.5.3.2.1 Spatial Patterns of TPCB.

The text in this section fails to provide a quantitative discussion about the concentrations of TPCBs measured in the traps. All discussion in the in the text is qualitative and does not identify the elevated concentrations of TPCBs measured in the Creek. For example, elevated concentrations of TPCB were reported in Q2 at one location from Dutch Kills (27 mg/kg) and one location from Maspeth Creek (28 mg/kg). NCG fails to provide information on the causes of these high TPCB concentrations.

NYC Comment 137) Section 4.5.3.3.1 Spatial Patterns of Cu: The text in this section only provides a qualitative discussion regarding the concentrations of Cu in the sediments of the Creek. A quantitative discussion is needed for the Draft RI. While the text identifies the maximum concentrations of Cu in RM 2+, it fails to discuss the low concentrations measured at the head end of the tributaries. During Q2 and Q3 the concentrations measured at the head end of the tributaries are well below the regional background concentration for Cu. The

average concentration of Cu in the traps at head end tributaries for Q2 and Q3 is 75mg/kg for English Kills, 36mg/kg for East Branch and 120 mg/kg for Maspeth Creek. These concentrations are also less than the concentrations measured in point sources and surrounding sediments and in sediment traps at the mouth of the Creek. The NCG does not mention this observation in the text. Furthermore it also fails to discuss increasing spatial trend in the tributaries for Cu. For example, in English Kills the average concentrations of Cu at RM3.77, RM3.5, RM3.3 and RM3.0 were 310, 490, 650 and 1800 mg/kg, respectively. The concentrations vary by a factor of 6 from one end to the other. This observation needs to be discussed in the NCG Draft RI.

As stated in previous sections, a complete RI requires discussion of other metals in this section.

NYC Comment 138) Section 4.5.3.3.2 Temporal Patterns of Cu: NCG failed to adequately discuss temporal patterns of Cu in the text. Temporal patterns exist in the traps. The data provided in RI Figure 4-71 showed a large variability of Cu concentrations among three quarterly events, especially at English Kills and East Branch. For example, the concentrations of Cu varied by an order of magnitude between Q1 compared to Q2 and Q3 at the head end of English Kills (EK086ST). The concentration of Cu was reported at 285 mg/kg, 815 mg/kg, 75.5 mg/kg and 74.1 mg/kg in Q1-July, Q1, Q2 and Q3 at EK086ST, respectively. NCG should explain the causes for this large variation in the data.

NYC Comment 139) Section 4.6. Non-aqueous Phase Liquid: The City has provided extensive comments on Appendix C which discusses NAPL evaluation. Comments in that Appendix are applicable to this section of the main text. In general the study conducted by the NCG to data and proposed FS investigations for NAPL delineation are deficient. Throughout the NCG Draft RI, the NCG downplays the presence of NAPL in the sediments (surface and subsurface) of the Creek by using localized data, misinterpreting available results of NAPL tests, and making unsubstantiated claims assertions regarding the mobility of NAPL. A focused study to delineate the presence of NAPL is needed.

To understand the extent of NAPL in the sediments of the Creek, the City conducted a robust sampling program using LIF technology. The technology is routinely used by various state and private agencies including NYSDEC and several NCG members to delineate NAPL in upland properties. Review of upland data has shown that fluorescence results were good predictors of presence of NAPL and were used by industrial parties such as ExxonMobil to delineate NAPL in upland Sites adjacent to Newtown Creek. Results of the City's survey show that the fluorescence responses indicate extensive presence of NAPL impacted sediments throughout the Creek. These fluorescence responses indicative of NAPL have been verified by visual observations in nearby sediment cores of the Creek. The City recommends that the EPA use the data collected by the City to direct NCG to collect additional cores to delineate NAPL. As an

initial step, NCG should collect cores to verify the LIF results and tie the LIF study to specific NAPL types present in the sediment bed of Newtown Creek. The combined dataset will facilitate a robust understanding of presence of NAPL in the Creek sediments and such guided studies will help develop a correlation between LIF responses and mobility of NAPL. The results of an LIF-based study will help in developing remedial options for the site that prevent recontamination. The current program proposed by the NCG does not provide the information necessary to assure recontamination from NAPL will not occur.

NYC Comment 140) Section 4.7 Surface Water: There are several data gaps in the surface water data. These include:

a) **Lack of Wet Weather Data in Reference Areas and East River**

During the surface water program, the NCG failed to characterize the COPC concentrations in the East River and the reference areas during wet weather events (wet weather sampling). NCG has collected wet weather samples in the Creek and the data shows that the surface water concentrations in the Creek are elevated relative to dry weather conditions. However, due to lack of wet weather data in the East River and in the reference areas, it is difficult to assess whether the concentrations in Newtown Creek compares to urban background wet weather concentrations. It is likely that the concentrations in the entire harbor, not just Newtown Creek, are elevated in wet weather compared to dry weather. Lack of this data is a data gap for the assessment of the Site. At a minimum the NCG should conduct concurrent sampling in the East River, reference areas and Newtown Creek during wet weather events to assess differences in COPC concentrations.

b) Lack of adequate TPCB data during dry weather conditions

During Phase 1 dry weather sampling, all samples were characterized using aroclor method to quantify PCB concentrations. Only 25% of the dry weather samples were analyzed using congener method. Evaluation of the data shows that there are issues with the data from the Aroclor Method. Table 4-23, in the NCG Draft RI report, shows that the detection frequency of Aroclor PCB data is less than 30% while all the congener data are detected. Note that the Phase 1 sediment data suffered from similar issues and EPA directed the NCG to develop a correction factor for all Phase 1 sediment data analyzed using the Arolcor method. NCG did not evaluate any correction factors for the Aroclor surface water data. The limited dry weather congener data prevents making any assessment of spatial trends in the Creek during dry weather, especially when comparing the upper tributaries to the main stem of the Creek.

In contrast all Phase 2 data was analyzed using congener data. This creates a significant data

gap when comparing Phase 1 and Phase 2 data, as some of the sampling stations do not have dry weather congener-based data to compare it to the Phase 2 dataset, especially when trying to assess the effect of wet weather in the tributaries. Phase 2 data has some dry weather measurements that could have potentially fulfilled some of the data gaps, but the dry weather measurements taking during dry weather conditions in Phase 2 data were mainly located at the main stem or at the sampling stations close to the CSOs.

c) Lack of spatial distribution in surface water sampling locations

Surface water data collected during Phase 1 and Phase 2 has several issues related to lack of adequate spatial distribution. These include:

i. Lack of surface water data in the most contaminated sections of Turning Basin area and East Branch: Turning basin area lacks adequate spatial distribution. During Phase1, the corner of the Turning Basin has not been sampled. There are only two locations sampled in the Turning Basin area during Phase 1; one location is next to the Laurel Hill site and other location is in the center of the Turning Basin. The corner of the Turning Basin, the most contaminated area in the Creek in terms of surface sediment concentrations of TPAH and TPCBs, has not been sampled at all. Similarly in Phase 2, only the edges of the Turning Basin have been sampled for wet weather conditions and the corner is again not sampled. NYC Figure 10 shows the sampling locations for Phase 1 & 2 surface water sampling. These figures clearly show lack of adequate information to completely characterize the Turning Basin Area.

   The non-CSO fork of the East Branch suffers from similar issues. This area of the East Branch has the highest levels of contamination in the surface and subsurface sediments and also NAPL sheens have been documented in this area. This area was not characterized at all by the NCG for surface water and is a data gap for the Site.

ii. Lack of SW data in the Middle Reach: The Newtown Creek Mile 1-2 section has only a single wet weather sampling station to characterize this section of the creek and there is no dry weather data for this specific location. This area of the creek has elevated TPAHs and TPCBs and it is located by the ExxonMobil plume, therefore, additional sampling locations should have been included to characterize this section of the Creek

iii. Lack of SW data in Dutch Kills and Maspeth Creek: SW data was collected only at the head end and entrance of Dutch Kills and only at the head end of Maspeth Creek in dry weather. In wet weather, data was collected only at the head end of these

tributaries. With the current sampling distribution, only dry/wet weather data is available for the head end of each tributary and not to the mouth and/or middle reaches of these waterbodies. Therefore the relationship between the head end of the tributaries and its connection to the main stem cannot be fully established under wet weather conditions.

iv. Lack of paired DW and WW sampling locations: The majority of the wet weather locations do not have a corresponding dry weather data with the exception of the four locations near the CSO outfalls (DK011, EB010, EK022, and MC008). This shows a bias in the sampling plan and because of the resulting data gaps, it is not possible to assess the effect of the wet weather conditions on the COPCs concentrations in the water column as in general there is no dry weather data at locations away from the CSOs.

In summary, additional sampling is necessary to adequately characterize the Creek, the data sets collected during Phase 1 and Phase 2 programs are insufficient due to the data gaps discussed above. Additional wet-weather sampling in the East River, the Reference Areas and the Creek is needed to fully understand the impact of wet-weather in COPC concentrations in the water column.

NYC Comment 141) Section 4.7.2.1 Salinity, Page 145, *"During the wet weather sampling, lower salinities were observed in the Round 1 samples (during day of discharges), as compared to Round 2 samples (day after discharges)".*

This statement is not true as indicated by NCG Draft RI figure 4-81. Figure 4-81 shows that the salinity during Round 1 was more variable than Round 2 as indicated by the 25th to 75th percentiles, however the median salinity from Round 1 was greater than Round 2 at the upper main stem (CM 1-2, CM 2+) and tributaries (East Branch, English Kills, Maspeth Creek). When only using the shallow samples (Figure 4-82), the median salinity from Round 1 was greater than Round 2 at English Kill, CM 2+ and Maspeth Creek. Due to the high variability of the salinity measurements, the difference between Round 1 and Round 2 is not statistically significant. This is further illustrated by the Tukey-Kramer test provided in NYC Figure 11. The similar salinity during Round 1 compared to Round 2 did not support the hypothesis that fresh water input from the point source discharges was more prominent in Round 1 than Round 2. NCG should present statistical analysis to support any assertions they make in the text.

NYC Comment 142) Section 4.7.2.1 Salinity, Temporal Variation: NCG failed to discuss the temporal variation of salinity during dry weather. Based on the City's review of the dry weather salinity data, February samples had lower salinity (average: 13 ppTh) than the other months (avg between 21 and 24 ppTh) for all the Reaches. NYC Figure 12 provides an example at Dutch Kills, English Kills and NC007 (the closest main stem location to the Newtown Creek Mouth). The NCG Draft RI should discuss the salinity data in detail to illustrate its spatial/temporal variations and explain the reasons for the low salinity in February.

NYC Comment 143) Section 4.7.2.2 Organic Carbon, Spatial Variation Page 146: In the NCG Draft RI, the NCG concludes that during dry weather POC (mg/L) and foc (pct) increased from lower creek to upper tributaries and were generally similar to those in the Reference Areas. This conclusion is not supported by the Tukey-Kramer HSD multiple pairs test. As illustrated in NYC Figure 13 (foc in pct), the concentrations of foc were significantly higher in CM2+ and tributaries than those in Phase 2 reference areas. The average foc is 14% at CM2+ and 11.5% at upper tributaries, which is significantly greater than the average of 7.6% at Phase 2 reference areas. Also, the OC is elevated in the Turning Basin as compared to the tributaries. Elevated OC is also measured in the CM1-2 reach. The spatial variation suggests that elevated sources of OC, such as NAPL, exist within the Creek and should be identified by the NCG. NCG should revise the discussion on the spatial variation in the text and acknowledge presence of other sources of elevated OC to the Creek such as NAPL. Incessant and unsupported focus on CSOs and MS4s will not result in development of a robust CSM for the Site.

NYC Comment 144) General Comments on DOC data: Nearly all of the dry weather dissolved organic carbon (DOC) data collected during Phase 1 and part of Phase 2 were reported as non-detect (at detection limits that ranged from 1 to 20 mg/L), due to relatively low concentrations and laboratory detection limit issues. This limited data prevents any useful discussion of the spatial variation and dry/wet weather comparison and is a data gap for the Site. NCG should explain how this affected its partitioning calculation in the surface water data.

NYC Comment 145) General Comments on TOC data: The NCG Draft RI did not discuss any TOC results for surface water. NYC Figure 14a compares the measured and the calculated TOC (POC+DOC) for surface water samples. The data demonstrate that there are large differences between the calculated and measured TOC, with relative percent difference up to 200%. NCG should evaluate the reliability of their OC (DOC, POC, and TOC) data.

NYC Figure 14b shows the spatial variation of measured TOC during dry weather. Contrary to POC, TOC concentrations are lower in the Study Area than in the Reference Area. This spatial variation is contrary to the typical spatial variations of contaminants, which have elevated concentrations in the Study Area than in the Reference Area. NCG should not use measured

TOC data. Due to the limited number of detected results for DOC (only three samples were detected) during dry weather, TOC cannot be calculated based on POC and DOC, either. This leads to another data gap for the surface water data set.

NYC Comment 146) Section 4.7.2.2 Organic Carbon, Temporal Variation: The NCG Draft RI fails to discuss the temporal variation of OC during dry weather. DEP's NYC Figure 15 presented the temporal variations of POC (%). The figure showed that OC had different temporal variations at different reaches of Study Area. The NCG Draft RI should include the discussion of temporal variation in the text and explain the reasons for the observed temporal variation. There are insufficient TOC data to illustrate its temporal variations during dry weather. This data gap should be addressed.

NYC Comment 147) Organic Carbon, Spatial Variation Within each River Section: NYC Figure 16a shows the spatial variation of foc in English Kills during dry and wet weather. Elevated foc concentration (as high as 60%) was observed at wet weather location EK107. This high concentration cannot be attributed to point sources because this location is farther away from the CSO, but close to the Former Ditmas Oil/ Gulf Oil Corporation and other private outfalls where NAPL and ebullition was observed. While data does not exist at this location for dry weather, it is likely that this location may also have elevated dry weather concentrations. Elevated concentrations cannot necessarily be attributed to wet-weather effects.

NYC Figure 16b shows the spatial variation of foc in Turning Basin during dry and wet weather. The data indicate that the spatial variations of dry and wet weather concentrations within Turning Basin is not obvious. However, foc was elevated in the Turning Basin compared to other river sections (as noted in NYC Figure 13). The elevated foc concentrations in Turning Basin cannot be attributed to the CSOs since there are no CSOs close by.

NYC Comment 148) Section 4.7.2.3 Total Suspended Solids Page 147: The discussion of NCG Draft RI Figure 4-87 (near mid-paragraph) needs to discuss whether TSS concentrations of deep samples are higher than surface samples. Visual inspection suggests that TSS in deep samples may be higher than the TSS of shallow samples. There also appears to be a decreasing trend in concentrations in the upstream direction. The presence of such patterns is relevant to discuss, as are any implications they may have about solids removal from the water column and net burial rates.

NYC Comment 149) Page 147: With regard to the discussion of NCG Draft RI Figure 4-88 (latter half of paragraph), use of unfilled (surface) and filled (deep) plot symbols, with a different variation for mid-depth samples, would facilitate the display and inspection of patterns in these datasets, particularly with respect to vertical gradients. Although these data are described as "dry weather TSS concentrations", it is necessary to indicate the proximity of

antecedent storm events to the sampling dates, to show when the data may or may not be completely representative of dry weather conditions. Please revise the Figure and/or discussion.

NYC Comment 150) Section 4.7.3.1 TPAH - Dry Weather Concentrations, Page 148, second bullet: *"English Kills and East Branch. The highest TPAH concentrations are observed in samples collected from these upstream tributaries, particularly English Kills. Specifically, the arithmetic average dry weather TPAH concentration is approximately 2 times higher than in CM 0 – 1 and CM 1 – 2".*

The data indicate that during dry weather, the TPAH surface water concentrations were higher at these upper stream tributaries. NCG should provide the reasons for the high concentrations of TPAH in the upper tributaries during dry weather.

NYC Comment 151) Page 148: The first bullet notes that all three main stem reaches are within the range of the four Phase 2 reference areas. It is important and needs to be noted that the four reference areas differ markedly in total PAH (17) concentrations. Head of Bay and Gerritsen Creek exhibit a similar maximum concentration, approximately 0.03 µg/L and well below the preponderance of the measurements in the three main Creek reaches and the tributaries. Please revise the discussion accordingly.

NYC Comment 152) Section 4.7.3.1 TPAH - Dry Weather Concentrations, Page 148, the last paragraph *"Figure 4-90. In the tributaries, there is no apparent systematic difference between surface samples and deep samples, with the exception of a subset of sample data that have concentrations greater than 0.5 µg/L in the deep sample, with lower concentrations in the corresponding shallow sample (particularly in English Kills)."*

The increase of TPAH with depth at English Kill indicates the influence of NAPL or GW discharge during dry weather at English Kills. NCG should explain the reasons for the high concentrations of TPAH in deep samples at English Kills.

NYC Comment 153) Section 4.7.3.1.2 Variations with Depth, Time and Tidal Cycle Page 148–149: The qualitative conclusion that there is no apparent systematic difference of TPAH concentrations of surface and deep samples (other than the exceptions noted), would be more robust if the data on Figure 4-90 were cross-plotted on log-log scales. Otherwise, over-plotting of data points may be obscuring some otherwise difficult to discern underlying patterns. Please generate a cross-plot.

NYC Comment 154) Page 149: The analysis shown on Figure 4-91 and described in first full paragraph would be improved by use of unfilled (surface) and filled (deep) plot symbols, with a

different symbol for mid-depth samples. It would facilitate the display and inspection of patterns in these datasets, particularly with respect to vertical gradients. Although these data are described as "dry weather TSS concentrations", it is also necessary to indicate the proximity of antecedent storm events to the sampling dates, to show when the data may or may not be completely representative of dry weather conditions. Please revise the Figure and/or discussion.

NYC Comment 155) Page 149: second full paragraph: Depending on the points in the tidal cycle when the samples were collected, comparisons during flood and ebb tide (Figure 4-92) may not provide a useful basis for assessing the importance of tidal velocity on surface water concentrations. Rather, it would be preferable to compare TPAH (and TSS) measurements made near high and low slack water conditions to results for samples collected near peak ebb and flood tide velocities.

NYC Comment 156) **Section 4.7.3.2.1 Spatial Distribution** Page 150, bulleted comments: The differences in sample sizes in the main stem (N = 28 – 52) and tributaries (N = 0, or 2 – 4) limits the utility of the comparisons made (Figure 4-92) using all of the data on the main stem to the rather sparse tributary data. Although the limited data is still somewhat problematic, it would be of interest to know how the data compare when a subset of sample results for the main stem corresponding to the times when the tributaries were sampled is used as the basis for comparison.

NYC Comment 157) **Section 4.7.3.2.2 Variations with Depth, Time and Tidal Cycle** Page 151/209: The clarity of the comparisons of Figure 4-95, described in the first paragraph of this section, would be enhanced by use of logarithmic scales.

NYC Comment 158) Page 151/209: As noted previously, the time series plots of Figure 4-96, described in the second paragraph, should be revised to facilitate the differentiation of data points collected at different sample depths. Also, it would be informative to indicate the times when storm events occurred shortly before the dry weather sampling events took place. NCG should explain the seasonality in PCB concentrations, given the absence of a similar trend for TPAH (Figure 4-91) or Cu (Figure 4-100).

NYC Comment 159) Page 151/209: Additional detail is needed with regard to the timing of sample collection over the tidal cycle for the data summarized on Figure 4-97. It is not obvious from the description provided if the sampling strategy would highlight any tidal cycle variations that may be occurring.

NYC Comment 160) **Section 4.7.3.3.2 Variations with Depth, Time and Tidal Cycle** Page 152: The clarity of the comparisons of Figure 4-99, described in the first paragraph of this section,

would be enhanced by use of logarithmic scales. For the main stem, different plot symbols should be used for the three river reaches. The last sentence of the first paragraph should be revised to state: "With the exception of Whale Creek, these data do not indicate that Cu concentrations are dependent on sampling depth in the tributaries and reference areas (limited data)".

NYC Comment 161) Page 152: As noted previously, the time series plots of Figure 4-100, described in the second paragraph of this section, should be revised to facilitate differentiation of data points collected at different sample depths and to indicate times when storm events occurred shortly before any dry weather sampling events took place.

NYC Comment 162) Page 152: Additional detail is needed with regard to the timing of sample collection over the tidal cycle for the data summarized on Figure 4-101. It is not obvious from the description provided if the sampling strategy would highlight any tidal cycle variations that may be occurring.

NYC Comment 163) Section 4.7.4.3.2 Comparison Between Round 1 and Round 2 Sampling Page 156: The difference in the results for Cu relative to TPAH and TPCB raises questions about the validity of previous interpretations and explanations of the response of the system during round 2 sampling (mixing and deposition processes), because the operative processes should be comparable for organics as well as Cu. The discussion must highlight the need for gaining an improved understanding of transport and fate processes within the Newtown Creek study area.

NYC Comment 164) Section 4.7.4.1 TPAH - Wet Weather Concentrations, on page 153, First/Second bullets: The NCG Draft RI states that the wet weather concentrations of TPAH generally follow the order of Tributaries>RM2+ > RM 1-2 > RM 0-1 and attributed this spatial variations to the influence of point source discharges. The increase of TPAH with distance upstream during wet weather does not necessary lead to the conclusion of the influence from point sources. This is because the dry weather data also show an increase of TPAH with distance upstream. This was further illustrated by evaluating the spatial variation of TPAH within each river section provided below.

NYC Figure 17a shows the spatial variation of TPAH in English Kills during dry and wet weather. Elevated TPAH concentration was observed at wet weather location EK107. Note that the location is farther away from the CSO, but close to the Former Ditmas Oil/ Gulf Oil Corporation and other private outfalls where NAPL and ebullition was observed. While data does not exist at this location for dry weather, it is likely that this location may also have elevated dry weather concentrations. Elevated concentrations cannot necessarily be attributed to wet-weather effects.

NYC Figure 17b shows the spatial variation of TPAH in Turning Basin during dry and wet weather. Dry weather location NC068 and NC070, which were located close to the former Cu smelting facility and in the middle of the Turning Basin, displayed elevated concentrations of TPAH during dry weather conditions, indicating the impacts of upland sites. Although concentrations at the two wet weather locations were high, but there was no dry weather concentrations at these locations, so there is no way to know if the dry weather concentrations were higher or lower at this specific location. To resolve this uncertainty, COPCs concentrations should be measured at least at these three locations (NC315, NC070 & NC252) for dry weather and wet weather conditions. Also, it is important to note that there were some dry weather and wet weather concentrations elevated in the Turning Basin and that there are no CSOs close by. Therefore, the elevated TPAH concentrations cannot be attributed to the CSOs.

NYC Comment 165) Section 4.7.3.1 TPCB - Dry Weather Concentrations, Page 150, all bulletins, NCG states that TPCB concentrations were generally higher in the Study Area compared to the East River locations and the Reference Area during dry weather. It was also reported that the highest concentration observed in the Study Area during dry weather was in CM 2+ (91 nanograms per liter (ng/L). In addition, the high concentrations of TPCB during dry weather at English Kills was not explained in the NCG NCG Draft RI. NCG should provide the reasons for the high TPCB concentrations in the Study Area during dry weather.

NYC Comment 166) Section 4.7.3.2 TPCB - Dry Weather Concentrations, Page 151, 3rd paragraph, NCG states that the TPCB in general had higher concentrations during the summer months at RM 0-1 and RM 1-2 and attributed this seasonal variation to the influence of the East River. However, the seasonal variation of TPCB observed in the lower creek cannot be fully explained by the influence of East River. First, the East River samples had lower TPCB concentrations than the NTC samples (Figure 4-93). Second, the magnitude of seasonal variation was different between East River and the lower creek. TPCB concentrations in the lower creek were higher by a factor of approximately 3 to 4 during the warmer months, relative to the colder winter months. In comparison, TPCB concentrations in East River during the warmer months were about 2 times of those in the colder months (Section 5.3.2). Lastly, if East River has some effects on the lower creek, the temporal variation of TPAH would be similar in the lower creek as in the East River. NCG reported that TPAH concentrations were higher in the warmer months in the East River (Section 5.3.1), but did not appear to show any clear pattern with season in the lower creek (Section 4.7.3.1.2). NCG should provide a more robust explanation on the seasonal variation of TPCB in the lower creek during dry weather periods rather than making assertions not supported by data.

NYC Comment 167) Section 4.7.4.2 TPCB- Wet Weather Concentrations, all bulletins under Section 4.7.4.2.1 (Page 154 to 155):

a. Similar to TPAH, the spatial variation on the wet weather TPCB concentrations cannot be simply attributed to the effect from point sources due to the variation of dry weather concentrations. NCG should revise text accordingly.

b. NCG pointed out that a single high concentration of 120 ng/L for TPCB was observed in CM 0 – 1 during wet weather. NCG should provide reason for this elevated concentration.

c. The NCG Draft RI indicates that wet weather TPCB concentrations in the main steam, English Kills and the other tributaries were about 1.5-2, 1.5, and 1.5-2 times higher than the corresponding dry weather concentrations. This increase of wet weather concentrations cannot be attributed to the influence of point source discharges without providing additional evidence.

NYC Comment 168) Spatial Variation of TPCB within each River Section: NCG Draft RI NYC Figure 18a presents the spatial variations of TPCB in English Kills during dry and wet weather conditions. As commented on previously, there were only two congener results during dry weather, which prevents any evaluation on the spatial variation and the dry/wet comparison. As to the wet weather data, one important observation is that the wet weather concentrations of TPCBs in the surface water by the CSO (EK022) and the location away from the CSO (EK107) are comparable. This is an indicator that CSO is not responsible for the elevated TPCBs at English Kills and instead there other sources of contamination by location EK107, which is adjacent to upland sites where PCB impacts have been documented. . To better understand what is happening in the system, additional dry weather data at similar tides and conditions to the wet weather data is necessary at the other locations.

NYC Figure 18b presents the spatial variations of TPCB in Turning Basin during dry and wet weather conditions. Dry weather station, NC070, which is located in the middle of the Turning Basin, displayed elevated concentrations of TPCB (concentrations as high as 91 ng/L). At wet weather station NC252, there were concentrations as high as 61 ng/L but there are no dry weather concentrations at this location, so there is no way to know if the dry weather concentrations are higher or lower at this specific location, which could have been as high or even higher than the wet weather concentrations. Same situation occurs for the dry weather data that does not have a corresponding wet weather measurement. To resolve this uncertainty, COPCs concentrations should be measured at least at these three locations (NC315, NC070 & NC252) for dry and wet weather conditions. Also, it can be seen that the concentrations for the two wet weather locations are comparable and elevated compared to the dry weather data but again there are no CSOs close to these locations. Therefore, the elevated concentrations during wet weather cannot be attributed to point source discharges.

NYC Comment 169) Section 4.7.3.3 Cu - Dry Weather Concentrations, Page 153-First bullet

"several higher concentration samples are found within CM 2+, which result in a somewhat higher arithmetic average concentration in this reach".

The higher concentrations within CM2+ are indicative of the sources of Cu in this area. NCG needs to provide the reasons for these elevated concentrations during dry weather.

NYC Comment 170) Section 4.7.4.3.1 Cu - Wet Weather Concentrations, all bulletins under Section 4.7.4.3. 1 (Page 155 to 156) are as follows:

a. Similar to the TPAH and TPCB, the spatial variation on the wet weather Cu concentrations cannot simply be attributed to the effect from point sources due to the variation of dry weather concentrations. For example, Cu had high concentrations at CM2+ even during dry weather period. NCG should revise text accordingly.
b. NCG indicated that wet weather Cu concentrations in the CM 1+ and tributaries were about 1.5 and 1.5-2 times higher than the corresponding dry weather concentrations. This increase of wet weather concentrations cannot be attributed to the influence of point source discharges without providing additional evidence.

NYC Comment 171) Spatial Variation of Cu within each River Section: NYC Figure 19a presents the spatial variations of Cu in English Kills during dry and wet weather conditions. One of the two wet weather stations, EK107, is located close to the Former Ditmas Oil/ Gulf Oil Corporation. This location displayed elevated concentrations of Cu (as high as 20 ug/L) during wet weather conditions. EK107 is not close to CSOs, but displayed greater concentrations of Cu (avg: 11 ug/L) than the location close to CSO, EK022 (avg: 8 ug/L), during wet weather. Therefore, the elevated Cu concentrations at EK107 cannot be attributed to the CSOs. Since there is no dry weather concentrations at EK107, so there is no way to know if the dry weather concentrations are higher or lower at this specific location.

NYC Figure 19b presents the spatial variations of Cu in Turning Basin during dry and wet weather conditions. It can be observed that the dry weather concentrations of Cu were consistently higher in the Turning Basin at locations NC068, NC070 and NC079, but there are no corresponding wet weather measurements in this most contaminated area. Moreover, the two wet weather sampling locations, located at the edges of the Turning Basin, do not have dry weather data. The data gap prevents a meaningful comparison between dry and wet weather concentrations.

NYC Comment 172) Section 4.7.5 Particle Phase concentrations, Page 157, last paragraph, *"For example, on a Study Area-wide basis, arithmetic average dry weather particulate phase TPAH, TPCB, and Cu concentrations are 3.4, 0.32, and 166 mg/kg, respectively. These arithmetic average concentrations increase to 14, 0.72, and 481 mg/kg, respectively, under wet weather*

conditions."

From this statement it is clear that the concentrations of TPAH and TPCB in the water column during dry weather and wet weather are below background levels. Measurements of COPCs on solids from CSOs and MS4s also shows that the concentrations are below background levels. Yet, the concentrations of COPCs in the sediments are elevated, in some areas significantly, when compared to background. NCG fails to discuss this observation. Presence of NAPL in the Creek from uplands sites and from subsurface sediments is not captured in NCG surface water data nor is it sampled separately. Without this data, the elevated concentrations in the sediments cannot be explained.

NCG should discuss the particle phase concentrations in detail, including the spatial and temporal variations, and the comparison between dry and wet weather concentrations. NYC Figure 20 presents the spatial variation of particle phase Cu during dry and wet weather periods. The data indicate that the concentrations of Cu were elevated during dry weather periods, mostly in the area of Turning Basin. Concentrations as high as 5700 mg/kg were measured in the Turning Basin area during dry weather conditions. NCG should present a discussion on Cu concentrations on the particles in the study area.

NYC Comment 173) General Comment, the first paragraph of this section states: "*Porewater originates as surface water from above or groundwater from below, and represents a mixture of those two waters; the relative amounts depend on rates of groundwater movement and tidal exchange."*

We agree that pore water is a mixture of surface water and groundwater and as such it is inappropriate to use pore water concentrations in calculating contaminant flux from groundwater through the sediment bed. The surface water will dilute the groundwater and the gross amount of groundwater loading will be significantly underestimated.

NYC Comment 174) Page 158, last paragraph states: *"The shallow porewater samples were collected using passive sampling methods (SPME for organics and peepers for metals, both in situ and ex situ)."*

Samples collected by SPME/peepers in a tidal system, where tidal pumping is known to occur, represent a time and flow weighted composite concentration of surface water and groundwater. Such a sample will not capture the range (especially the peak) concentrations derived from groundwater and will be dominated by the surface water. Three fatal flaw errors occur based on this flawed sampling:

a) The concentration derived from this composite concentration is later multiplied by only the

groundwater seepage (does not include tidally pumped water) to derive loading, so loading is greatly underestimated,

b) Pore water concentrations used in risk assessments do not account for the higher concentrations seen by organisms for low tide periods when groundwater is discharging. This is an issue for samples collected for triad as well.

c) SPMEs do not account for DOC associated COPCs so underestimate the COPC load being born by groundwater. This is an issue for samples collected for triad as well. DOC measured in peepers is affected by tidal pumping dilution

Because of these flaws, what is needed is low-tide groundwater samples, which will represent the greatest concentration that is arriving.

NYC Comment 175) Page 158, last paragraph: *"The mid-depth porewater samples were collected using low-flow sampling techniques from temporary wellpoints installed within the sediment at depths ranging from 2 to 9 feet below the mudline."*

No information has been given about the temporary well sampling other than 10 of the 17 temporary wells went dry and 5 had greater than 10 feet of drawdown during low flow sampling. No information is given regarding well development. The low yield of the wells and the drying out during sampling raises several concerns and makes interpreting the data impossible:

a) The low yield of the wells begs the question of what water was sampled. If low-flow sampling can dry out the well, then water in the well may have originated from above during drilling/well installation. Purge logs need to be provided so that this can be evaluated.

b) We understand that NCG sampled in sequence instead of "round-robin". If so, the last samples collected were the TSS samples. Because the wells had low yield, the TSS samples could contain significantly more suspended solids than the samples collected before them (i.e., COPC samples) in any given temporary well. This means that the TSS and COPC samples are not comparable and the TSS cannot be used for partitioning calculations. The following text from Footnote 47 on Page 162 confirms this is the case: "Sample volume limitations due to low water yield from the sediment (10 of the 17 wells went dry during low-flow sampling) precluded analysis for some constituents. Specifically, whole water chemical analyses were given priority over dissolved (field-filtered) metals and conventional parameters, including salinity and TSS"

NYC Comment 176) Section 4.8.2.1 Salinity, general comments: Shallow and potentially mid-depth pore water salinity and concentrations are sensitive to tidal fluctuations. These data are

presented without any reference to when the measurements were made with respect to tide. The history of the region includes long periods of salt water intrusion into the adjacent aquifer system. High salinity water is not unexpected in the groundwater because of the variety of travel times associated with groundwater flow in the aquifer. For this reason, more information is needed to assess if salinity is due to influence of surface water (East River as stated in the text), is simply saline groundwater being transported and discharged, or is due to tidal pumping and diffusion in upper portions of the sediment bed. Regardless, all of the locations measured (see figures 4-137 and 4-138) confirm a salinity gradient between the groundwater and the surface water showing the presence of groundwater discharge.

The City conducted an extensive low-tide survey of salinity and temperature in the pore water near the sediment bed surface (2 feet below the mud line) and surface water one foot above the mud line. These low tide measurements allowed for a direct comparison of surface water and pore water specific conductance (a measure of salinity) at low tide. NYC Figure 21 shows the specific conductivity measurements for both surface water and pore water with respect to river mile. The figure shows that at almost all locations conductivity in pore water is lower than in the surface water. For the most part where surface water and pore water are similar, the specific conductance is lower than the average surface water specific conductance in neighboring measurements. This indicates that groundwater discharging through sediment bed is of sufficient quantity to lower the conductance of the surface water.

NYC Comment 177) Section 4.8.2.2.1 TPAH Spatial Distribution: As discussed in previous comments, because the shallow samples were collected as averages of surface water and groundwater, little can be interpreted from this data. For example, it is possible and even likely that the concentrations seen in shallow pore water in English Kills are higher than elsewhere not only due to proximity to source areas, but also because groundwater discharge carrying the TPAH makes up a larger component of the pore water samples collected. Note that the other COPCs described (TPCB and Cu) suffer from the same limitations of the pore water samples.

NYC Comment 178) Section 4.8.2.3 Near-Surface Vertical Patterns: Again, the samples are composites of surface water and groundwater. Because tidal pumping is going to have a greater influence on the 0-15 cm sediment, it is likely that these samples were diluted more than the 15-30 cm samples, also the 0-15 sediments are exposed directly to the surface water, so there is a strong diffusive gradient. For these reasons, this information cannot be used to conclude that concentrations in the groundwater portion of the sample are decreasing as the water approaches the surface water (this is not stated here, but is what is concluded by NCG later).

NYC Comment 179) 4.8.3 Mid-Depth Porewater: There are major issues about the sampling

that are not discussed in the NCG Draft RI text document or in the Appendices regarding the mid depth samples, such as the number of locations did not have TSS, salinity or field filtered metals.

NYC Comment 180) 4.8.3.1 Salinity and TSS, first paragraph, last sentence: This spatial pattern is generally similar to that observed in the shallow porewater (i.e., values similar to surface water in the lower part of the main stem, with lower values in the upper tributaries).

Draft RI Figure 4-137a and b as well as 4-138 do not support the assertion that the mid-depth salinity is the same as surface water salinity. See discussion on shallow salinity as well. Salinity in the samples from this reach also is higher the shallower the sample. This suggests the salinity could easily be a function of tidal pumping and since the samples were not constrained to low tide, the interpretation of these samples is ambiguous at best.

NYC Comment 181) 4.8.3.2 Distribution of Contaminants: The upstream-downstream discussion of contaminant distribution is unimportant for groundwater and pore water; what must be discussed is proximity to potential upland sources.

NYC Comment 182) Footnote 48 - See discussion on TSS and sample collection procedures. The TSS cannot be used for partitioning because it was not collected at the same time as the COPC samples (i.e., as a round robin sampling).

NYC Comment 183) Footnote 49 - Raw data needs to be presented for all locations, including locations where no TSS samples were collected.

NYC Comment 184) Footnote 50 - NCG acknowledges the presence of NAPL and potentially acknowledge its impact on groundwater quality. They suggest that sampling induced NAPL to move with the pore water, through the well screen and that it was too small to notice in the sample collected. This is the description of a colloidal NAPL that can be transported by groundwater. The description here should note whether the concentration exceeded the solubility, however, it is also important to understand that coal tar NAPL is known to form emulsions with water which may be the case here.

NYC Comment 185) Section 4.8.1 Porewater Dataset, Page 158: The second bullet refers to a direct measurement of porewater concentrations rather than a calculation from bulk sediment. It needs to be mentioned that when SPME or peepers are used, it is necessary to calculate a total dissolved concentration (this may depend on what forms the peeper design sampled).

NYC Comment 186) Section 4.8.2.2.1 TPAH Spatial Distribution (Figures 4-113 and 4-114), Page 160: A bullet needs to be added to indicate that there is a trend of increasing

concentration in the upstream direction. In many cases the shallow and deep samples have comparable concentrations

NYC Comment 187) Section 4.8.2.2.2 TPCB Spatial Distribution (Figures 4-115 and 4-116), Page 160– 161: Add a bullet to note the comparability of 0-6 and 6-12 inch sediment porewater TPCB concentrations.

NYC Comment 188) Section 4.8.2.2.3 Cu Spatial Distribution (Figures 4-117 and 4-118), Page 161: The second sentence suggests Newtown Creek concentrations are comparable to the reference areas based on overlap of the concentration ranges. However, the average concentrations of most main stem and tributary results are much higher than the average concentrations in reference areas by factors of about 3 – 9. This needs to be mentioned in the first paragraph.

NYC Comment 189) Section 4.8.3 Mid-Depth Porewater, Page 162– 163: The presence of elevated TSS in most of these samples (average = 240 mg/L and range = 27 – 2,100 mg/L) suggests that the methods employed had significant limitations for use in Newtown Creek sediments. Reporting of whole water (unfiltered) results resulted in the need to estimate the dissolved phase concentrations (details are described in Appendix F). It appears as if the partitioning calculations for organics were based on the SPME results. If so, then the dissolved concentrations should represent freely dissolved (non DOC-complexed) concentrations. The various steps involved with estimating dissolved concentrations based on a partitioning analysis of site data introduces uncertainty into the interpretation of these dissolved concentration results. The uncertainty needs to be described and the reader cautioned about use of such information.

NYC Comment 190) Section 4.9.1 *Groundwater Dataset,* first paragraph: *"Field parameters and water levels were monitored during development and low-flow sampling, and did not indicate any evidence of short-circuiting."*

The information and methods used to determine this need to be presented. If they are presented elsewhere in the Draft RI that location needs to be cited.

NYC Comment 191) 4.9.1 Groundwater Dataset, second paragraph: *"This was unavoidable due to the well construction and sampling methods that were used in accordance with the EPA Final Groundwater Investigation Work Plan (EPA 2014a)."*

The NCG presents no evidence that methods prescribed in the Work Plan will result in high turbidity samples and they do not discuss the development of the temporary wells. The City was able to collect much less turbid samples using similar methods to what was detailed in the

Work Plan. This statement should be removed from the text.

NYC Comment 192) Page 168 last paragraph: *"Salinity values at all depths, including surface porewater, mid-depth porewater, and groundwater, between CM 0 and 1.3, are similar to surface water salinity; these data suggest potential surface water intrusion into groundwater (see Figures 4-137a, 4-137b, and 4-138)."*

This statement is incorrect and is not supported by the data presented on Figures 4-137a, 4-137b, and 4-138. In all cases, these figures show a salinity gradient between groundwater and surface water, with the groundwater being less saline than the surface water. While salinity in groundwater in the lower reaches of the creek are higher than in the upper reaches, they are still lower than the associated surface water measurement. If surface water were infiltrating the groundwater in the way that NCG suggests, then the groundwater should be the same salinity as the surface water. Since there is a gradient between the groundwater and the surface water, there must be fresh groundwater included in the water discharging at these location. Note that because of the history of salt water intrusion along Newtown Creek, there is still a likelihood that intruded salt water is still arriving at the creek bed. Tidal pumping is also expected to occur, but NCG's salt water cycling hypothesis are not supported (presented on Figure F5-6).

NYC Comment 193) 4.9.3 Distribution of Contaminants: Transport processes in the creek likely have no influence on groundwater transport below the sediment bed. For this reason the discussion of contaminant distribution should be tied to adjacent upland sites. The discussion of gradient up and downstream has little or no meaning.

NYC Comment 194) Page 169, last paragraph: *"As discussed in Section 6 of Appendix F, estimated dissolved phase TPAH concentrations at wells NC075GW (estimated dissolved phase TPAH = 8,300 µg/L), EK093GW (estimated dissolved phase TPAH = 1,300 µg/L), and NC296GW (estimated dissolved phase TPAH = 360 µg/L) may be above the actual dissolved concentrations in these samples, due to potential interferences from NAPL."*

The Draft RI does not discuss the observation of NAPL in the samples during field collection. Since the samples were collected through pre-constructed filter packs, this indicates that NAPL was mobile enough to migrate through the well filter pack under low-flow purging and that the droplets of NAPL were too small to be observed. Both of these conditions are indicative of colloidal transport of the TPAHs. The concentrations detected should not in any way be discounted or considered "conservative high estimates". Also because of the possibility that these samples indicate mobile NAPL in the environment, calculating a partition concentration may be inappropriate for assessing loading. NCG should also present the raw concentrations.

NYC Comment 195) 4.9.3.1.2 Vertical Distribution: Because the pore water samples collected in the shallow sediment are time-weighted composites of surface water and groundwater, they cannot be compared to the discrete groundwater samples. The conditions presented in this section (and for TPCB and Cu) cannot be derived from the data presented.

NYC Comment 196) Section 4.10.3 Chemical Concentrations in Tissue: Both log and linear scales are used in this section. It would be preferable if a consistent set of log scales (possibly linear in some cases) were used to facilitate visual comparisons. When combined with use of multi-panel figures (rather than spreading the pages out on a table), it would allow the graphs to be viewed collectively. More information could be conveyed in a more comprehensible manner.

NYC Comment 197) Section 4.10.3.1 TPAH (Figures 4-154 – 4-161) Page 175: *"TPAH concentrations are greater than reference area concentrations for all species".*

Although this is evident on Figure 154, the statement is somewhat of an overgeneralization, given that FSZWE has relatively high concentrations for menhaden and mummichog. It would be appropriate to discuss the implications of the first bullet, which reports that concentrations in the presumably non-resident striped bass, seems to reflect spatial gradients in exposure concentrations within the study area (NCG Draft RI Figure 4-155).

NYC Comment 198) Page 175: In the case of mummichog (bullet 4), the gradient appears to be counter to the spatial trend in exposure concentrations. Recently reviewed analyses indicate that this might be explained by the small home range and localized concentrations that mummichog are exposed to. This information and related analyses need to be presented in this section.

NYC Comment 199) Page 176: The first bullet states that the whole body dataset for blue crab is larger than the hepatopancreas/muscle (H/M) dataset, so the absence of a spatial pattern in the whole body data is judged to be the more robust finding. Mention needs to be made of the actual sample sizes for each dataset. Is it simply the number of data points shown? The consistency in the trend for the H/M should not be so readily downplayed. Recognize that further analysis or consideration is needed.

NYC Comment 200) Section 4.10.3.2 TPCB Figures 4-162 – 4-169, Page 176 and 177: The qualitative similarity across species for the box-plot spatial profiles for TPAH and TPCB is both notable (compare Figures 4-154 and 4-162) as well as cause for further consideration. The plot for mummichog needs to be presented with a log scale to improve interpretability. In the case of caged bivalves, note in the text that the gradient likely reflects the fact that the test animals are held in place and reflect an integration of water column exposures over time.

NYC Comment 201) Section 4.10.3.3 Cu, Figures 4-170 – 4-177, Page 177: It is expected that Cu will be detected in all individuals and species, given that it is a physiologically essential trace element that is well-regulated by most organisms. It needs to be mentioned and discussed in the text that the box plot (NCG Draft RI Figure 4-170) highlights what appear to be species-specific differences in tissue Cu requirements. The highest levels shown, in blue crab, probably reflect its uptake and storage in the hepatopancreas. In addition, the close agreement between study area and reference area tissue levels for each of the seven species, as well as the rather narrow ranges of tissue concentrations, further demonstrates the ability of these organisms to regulate tissue Cu levels.

NYC Comment 202) Page 177- 178: Additional species-specific points to be noted in the text include: The relative consistency in tissue Cu concentrations for both caged bivalves and polychaetes is likely a reflection of Cu essentiality, and the potential for Cu tissue levels to be physiologically regulated over limited ranges in exposure concentrations.

NYC Comment 203) Section 4.11 Air: The air investigations conducted by the NCG for the Site are deficient. Only one round of 24- hour composite sample was collected for the entire site. The sampling locations do not include any of the NCG industrial sites located along the water. These are all known source areas and could potentially have elevated air contaminants. Known sources of VOCs, including the ExxonMobil, BP, and Chevron sites and the National Grid MGP sites should be sampled to ensure sufficient evaluation of air exposures resulting from shoreline sites.

There are no sampling locations in the Turning Basin, which has been demonstrated to have the highest sediment contaminant values for most COPCs, and is a source of NAPL, which releases VOCs to the air. This area is a potential hot spot is based on the petroleum odors that are prevalent in this section of the Creek. Several additional sampling locations are needed on the water in the sampling location in order to determine potential risks to kayakers on the Creek.

A review of the data collected by NCG for the "site-specific background" locations indicates that for several VOCs, including benzene, the "background" locations have the most elevated concentrations of all the locations sampled. Two of these "background" locations, BLK2525 and BLK 2660 have the highest benzene concentrations. These two locations are located on properties in the Greenpoint neighborhood that are located directly over the Meeker Avenue plume, where millions of gallons of oil still sit under this neighborhood. Benzene is associated with gasoline, and is highly volatile. These "background" locations are located within a residential neighborhood, but they are not unaffected by the sources of contamination to the Creek. In fact they are ground zero for the contamination. It is not appropriate to use locations at the source of contamination to the Site, and treat it as "background". Different background

locations must be identified and sampled to assess true background conditions that are unaffected by the Site.

NYC Comment 204) Section 4.11.1 Background Data sources: The text suggests that NYSDEC has a background air study, when it does not. NYSDEC has a series of monitoring locations throughout NY State. There are a very small number of these stations at which VOCs are monitored. The only VOC monitoring station in Brooklyn is at JHS247, which is not in the Greenpoint neighborhood. There are no summary statistics presented.

The test suggests that NCG used their "site-specific background" data together with some NYSDEC data (unspecified) which they used to calculate a mean and 95percentile value, which they then referred to as "NYSDEC 95percentile regional background". This is in appropriate and does not follow any EPA guidance on calculation of background values. NCG has not shown what NYSDEC data were used to calculate these values. The NCG "site-specific background" locations do not represent regional background and are elevated. NCG should present the NYSDEC data and locations they used (n=3?) and how calculations of statistics were conducted, to present a mean and 95%ile value which they seem to refer to as "NYSDEC regional background". NCG needs to demonstrate how NCG's "site specific background" data was used. The text states data were compared to a "NYSDEC 95thile regional background". There is no summary data presented on the NYSDEC air monitoring web site. Only after the risk-based screening is conducted, and a background value is established, is it appropriate to screen the data against background values.

The NCG did not screen the air data against EPA risk-based screening values for ambient air. As kayaking is a recreational activity, all data should be screened against the residential risk-based screening value to determine which COPCs exceed these values and at which locations. The human health risks should be calculated for these EPCs for the receptors identified.

NYC Comment 205) Section 4.11.2 Ambient Air Results: The VOC measurements in air data did not include naphthalene, a significant component in coal tar. Given the history of MGP related wastes in the Creek, lack of naphthalene results for air samples is a data gap.

City Comments on NCG Draft RI Chapter 5 – Sources

This chapter of the Draft RI is biased and deficient in accurately describing and identifying all of the sources of ongoing significant solids and COPCs discharges to the Creek. In general Chapter 5 (i) fails to identify significant sources of contamination to the Creek, including seeps from upland sites; (ii) fails to identify NAPL as a significant source of COPCs from both seeps from upland sites and subsurface sediments; (iii) falsely states that groundwater is not a significant

source of contamination to the Creek; (iv) relies on flawed load calculations developed by NCG for point sources; (v) fails to ascertain the impact of a given source or loads from that source on the sediments; and (vi) mischaracterizes wastewater treatment plant (WWTP) treated effluent flow to Whale Creek from NCB-002. The deficiencies in this chapter as identified below must be addressed before final approval of the RI/FS.

General Comments from the City on NCG Draft RI Chapter 5

NYC Comment 206) Chapter 5 falsely states that contaminant seeps from upland sites were not observed in the Creek despite multiple videos and pictures taken by the community, the City and even NCG that document NAPL seeps from several upland sites, including NCG properties owned by ExxonMobil and National Grid. Because the text falsely claims that contaminant seeps are not occurring in the Creek, the chapter fails to identify NAPL as a significant source of contamination to the Creek anywhere in Chapter 5.

NYC Comment 207) NAPL samples from the upland sites show that NAPL contains elevated concentrations of COPCs such as PAHs, PCBs, and TPH. NAPL is also a source of organic carbon (OC) to the Creek. For example, data from the GPEC, a former MGP site, shows that the TPAH (sum of 17) concentration in NAPL from this GPEC site is as high as 160,000 mg/kg. This information indicates that NAPL could potentially be one of the largest sources of COPCs to the Creek. Because NAPL is also prevalent in the sediments of the surface and subsurface sediments, NAPL migration from subsurface sediments to the water column and surface sediments is another source of contamination to the Creek. It is wholly unbelievable that NCG did not observe seeps into Newtown Creek from upland sites; sheens on the water surface from both seeps and ebullition-facilitated NAPL migration are a daily occurrence. Failure to properly characterize and evaluate NAPL and its associated COPCs from upland sites and the sediment bed itself is a critical shortcoming of the NCG Draft RI.

NYC Comment 208) The NCG Draft RI also states that groundwater is not a significant source of COPC loads to the Creek. NCG arrives at this conclusion using inappropriate data to develop a loading calculation and flawed CSM to estimate groundwater flow to the Creek. The City has developed a groundwater model that shows that groundwater discharge to the Creek is about 2 billion gallons per year. The City's model also shows that the majority of that discharge enters the Creek horizontally from the bulkheads. Upland groundwater chemistry data is necessary to accurately estimate the COPC loads from horizontal groundwater discharge. Calculations developed by the City based on COPC measurements in groundwater from the native sediment depth show that groundwater is the largest measured source of COPCs to the Creek. NCG's baseless assertion that groundwater is not significant source of contamination is flawed and should be deleted.

NYC Comment 209) The load calculations developed by the NCG for point sources are flawed. NCG chose a method that overestimates the COPC loads from point sources. For example, NCG's method results in flawed overestimates of load for stormwater. NCG combines all sampled stormwater categories - municipal separated stormwater sewer system (MS4), overland flow and private stormwater (Category 1) to develop a composite storm water load estimate. Compositing of storm water properties across storm water categories for the purposes of load calculations is highly inappropriate. Point source categories were specifically developed in the RI Work Plan to differentiate types of point sources and assess their individual impacts. No quantitative rationale is provided in to support combining all stormwater into one load estimation group. The City has provided additional comments on this issue in Appendix E.

NYC Comment 210) Chapter 5 is largely focused on point source loads to the Creek. While discussion of loads are important, loads do not provide a complete understanding of impact of a given source on the Creek and the related human health and ecological risk posed by such sources, without a discussion of the impact of sources to the sediments. To ascertain the impact of a given source or loads from that source on the sediments, the chapter should also discuss the COPC concentrations on solids in point source flows and compare those to regional background values. Essentially, dissolved phase-borne COPCs released by point sources are removed from the Creek via tidal exchange with the East River and do not persist to continue to expose humans and biota. It is largely the particle-bound contaminants that pose the greatest human and ecological risks. The chapter should provide the geochemical analysis to discuss this process. Without such an analysis the RI is incomplete and incorrectly focused on highly dilute sources.

NYC Comment 211) The text also repeatedly mischaracterizes the treated effluent flow from the Newtown Creek WWTP that discharges to Whale Creek as receiving "some treatment." The effluent discharged from NCB-002 to Whale Creek receives treatment in accordance with the WWTP SPDES permit to meet the effluent limits set forth therein.

These deficiencies in this chapter are fatal flaws in the Draft RI report that must be addressed.

Specific Comments from the City on NCG Draft RI Chapter 5

NYC Comment 212) Chapter 5, Pages 183 – 225: The analyses that are presented have failed to include an evaluation of the magnitude of NAPL migration from seeps and from the deep sediment to surficial sediments and the water column. Also the evaluation of industrial sources is missing. These additional sources of chemical need to be measured and recognized in the NCG Draft RI and will need to be addressed in modeling efforts.

NYC Comment 213) Chapter 5, Page 184, last paragraph: NCG states that chemical sources are quantified as loads for point sources, groundwater and atmospheric deposition and qualitative loads are provided for contaminant seeps, bank erosion and overwater activities.
This approach is inadequate for the NCG Draft RI. While chemical loads are useful, they only provide an indication of the gross loads to the system. The East River, which is the largest gross load to the system due to the sheer volume of exchange with the Creek, is not discussed in the NCG Draft RI. East River loads will dwarf loads from any other sources to the Creek given the volume of daily exchange with the Creek.

While discussion of loads are important, loads do not provide a complete understanding of impact of a given source on the Creek. CERCLA process is driven by human health and ecological risk, hence it is very important to discuss how the sources impact the sediments of the Creek. To ascertain the impact of a given source on the sediments, this chapter should also discuss how the concentrations of solids in point sources and compare those to regional background values. Without such a comparison the NCG Draft RI is incomplete.

In addition to this discussion on this page falsely states that a qualitative discussion of loads from contaminant seeps is presented in the NCG Draft RI. The contaminant seeps section on page 224 makes an outright statement that contaminant seeps were not observed and are not important for the Creek. This statement is false and the NCG Draft RI should provide a robust discussion of documented seeps to the Creek such as NAPL seeps from former Pratt Oil works refinery owned by ExxonMobil, NAPL seeps from the Greenpoint Energy former MGP site owned by National Grid, seeps from Manhattan Poly Bag and many other. Upland data, characterizing COPC concentrations in NAPL, is available to provide a semi-quantitative loads for the seeps and also the levels of COPCs in the seeps. This is potentially the largest source of COPCs to the Creek and should be quantified. Without a discussion of this source, the CSM and the NCG Draft RI are incomplete.

NYC Comment 214) Section 5.1.1.2 Page 186: In this section the NCG continues to imply that the effluent from NC002 is not treated and also implies that this outfall is a CSO. The EPA, the City, and NYSDEC have sent multiple emails and have had multiple conversations with NCG

where they have stated repeatedly that the WWTP Effluent discharge to the Creek is treated effluent. Regardless, NCG continues to misrepresent this discharge to the Creek. These intentional inaccuracies in the NCG Draft RI must be deleted. The mischaracterization of NC002 amounts to deliberate misrepresentation of a source in a document which gets released to the public and has the potential to have serious ramifications. EPA should direct the NCG to refer to the WWTP effluent as treated WWTP effluent and delete any language from the entire NCG Draft RI and future documents which insinuate this discharge is a CSO.

NYC Comment 215) Section 5.1.1.3 Page 188: NCG states that in some cases direct discharge from individual sites (Category 3C) is regulated by the multi sector general permit, NCG should identify which 3C sites are regulated under this permit and include relevant data from the permit for assessment in case that site was not sampled under the point source discharge program conducted in Phase2.

NYC Comment 216) Section 5.1.2 Flow Data: NCG again is misrepresenting availability of flow data for City outfalls. EPA, NYSDEC and NCG are fully aware that the City had installed flowmeters in their outfalls, during the phase 2 field work sampling period, in an effort to calibrate the point source model which estimates flows to the Creek. NCG is using this model to estimate flows to the Creek for current and historical conditions. NCG should delete the statement in the NCG Draft RI (and all attachments and appendices) which states that, "*NYCDEP would not allow flow meters to be installed by the NCG in municipal infrastructure during point source sampling program*".

The NCG Draft RI should simply state the simple fact that flow was measured in the municipal infrastructure and was used to calibrate the point sources model used to estimate point source discharges to the Creek while no flow was measured in non-municipal outfalls.

NYC Comment 217) Section 5.1.2.1 Sources of Flow Data: The NCG states that it is not necessary to make distinction between stormwater and overland flow for load calculations because the point source model does not make that distinction. The City does not agree with the NCG. Necessity of assessing the overland stormwater and other stormwater flow is driven by the nature and magnitude of COPC concentrations in the discharge. Evaluation of measured COPC data shows that the COPC concentrations in the 3C sites are elevated. For example the Cu concentrations in solids from the National Grid Greenpoint Energy Site are on average 1,800mg/kg which is significantly higher than the concentration measured in MS4 and other stormwater discharge solids. The NCG should estimate the overland flow based on the drainage area for a given site and assess overland flow separately.

NYC Comment 218) Section 5.1.3.1, Page 193: The NCG states that the WWTP influent data were used to evaluate variability in CSO discharges and the result are discussed in Appendix E.

The City has reviewed that section and finds it deficient, similar to the main text, the Appendix also makes qualitative comparisons rather than quantitative comparisons. Please refer to City comments in Appendix E on this subject.

NYC Comment 219) Section 5.1.3.2.1 Total Suspended Solids

The NCG Draft RI analysis combines stormwater from Category 1 outfalls with regular stormwater categories. This is contrary to the RI Work Plan developed for the Site. During development of RI Phase 2 Work Plan, the NCG stated that the stormwater from the Category 1 sites gets combined with the treated groundwater effluent and the combination of the two gets discharged to the Creek. Categorizing this mixture as stormwater is inaccurate. NCG should discuss discharges from Category 1 outfalls as two separate categories, discharge during wet weather and discharge during dry conditions.

In addition NCG fails to mention that there is high uncertainty in NCG measurement of TSS in category 1 outfalls. The NCG has analyzed TSS for all point sources using two methods, ASTM D3977 and SM2540D. The results show that for Category 1 outfalls where the SM2540D method finds the TSS result ND, the ASTM results range from 6mg/L to 24 mg/L. NCG should discuss these findings in the NCG Draft RI rather than reporting results from only one method. This is a drawback in the NCG Draft RI that needs to be addressed. The City has brought this issue to the attention of EPA and NCG on multiple occasions. The NCG should discuss results from both methods in the Draft RI text and provide an explanation on the uncertainty in the measurement.

NYC Comment 220) 5.1.3.2.2 Organic Carbon

The Draft RI fails to discuss how unreliable the POC results measured in point sources are. Particulate organic carbon is critical to understanding the nature of solids in point source discharges and directly affects the dissolved/particulate partitioning of COPCs in point source discharge flows. NCG POC data has been shown to be biased low as compared to EPA split sample results. In an October 14, 2016 email from Caroline Kwan (EPA) to Jim Quadrini (Anchor QEA), the EPA detailed review and analysis of Anchor's point source POC data sets and comparison to EPA split samples. Regressions demonstrated that Anchor's POC was biased low and EPA instructed Anchor to use a step-wise approach for adjusting the POC data and evaluating its impacts on modeling results and point source loading estimates. NYC Figure 22a shows EPA's principal axis regression analyses of the POC datasets, indicating bias in NCG's dataset.

Analysis of NCG, EPA, and City POC datasets by the City also indicates that NCG POC data is biased low (NYC Figure 22b). The City used the Wilcoxon signed rank test to test if there is any

difference in the paired POC data from the split sample results. This is an appropriate nonparametric procedure for testing the null hypothesis of no difference when the experimental design is based on paired samples. The Wilcoxon Signed Rank Statistic result indicates that there is a significant statistical difference between the POC results from EPA and the NCG (p=0.009). This statistical analysis indicates that there is less than a 1 percent chance that the EPA's results and the NCG's results are equivalent. On average, the EPA values were twice those of the NCG. The City point source POC results are in agreement with EPA results, as detailed in an October 5, 2016 email from Ron Weissbard (NYCDEP) to Caroline Kwan (EPA). In response to this email, EPA stated that concerns will be taken into consideration including when reviewing the NCG Draft RI report and associated documentation. NCG has failed to acknowledge these discrepancies in their POC data that were demonstrated prior to their writing the Draft RI.

NYC Comment 221) 5.1.3.2.3 TPAH

NCG should explain the reason for the extremely high TPAH17 concentrations from the Con Edison – 11th Street Conduit (DAR No. 110) dewatering system effluent (CE11SC). Estimated concentrations on the solids are as high as 37,000 mg/kg. Such high concentration levels are usually indicative of presence of NAPL in the discharge.

NCG should also provide a table summarizing the TPAH concentrations by outfall rather than by point source category.

Page 196: The last bullet discusses groundwater effluent TPAH concentrations. It should not report an overall average concentration for the three sample locations presented, because it is clear that the three locations sampled differ markedly in concentration. Thus, it is inappropriate to use a measure of central tendency to collectively characterize such sources. Please add a qualifier regarding the representativeness of the average.

NYC Comment 222) Section 5.1.3.2.4 TPCB

NCG fails to mention that the Average TPCB concentration in solids from the treated WWTP effluent is impacted by the high TPCB value (1.8 mg/kg) measured in one of the three collected samples. The concentration in other two samples is less than 0.5 mg/kg (0.37 and 0.4 mg/kg) as per NCG data. NCG should modify the text to reflect this observation.

NCG should also provide a table summarizing the TPCB concentrations by outfall rather than by point source category.

NYC Comment 223) Section 5.1.3.2.5 Cu: Evaluation of the number of samples between Table

5-9 (Cu whole water) and Table 5-10 (Cu particulate phase), there are 25 samples for which concentrations of dissolved fraction are greater than the total, including a 3C site Hugo Neu. This raises concerns on the data quality reported by Alpha or contamination introduced by field sampling procedures.

NCG falsely states that the highest concentrations of Cu in stormwater are measured at locations MA001 and NCQ637 (average values of 420 and 490 mg/kg respectively); the highest concentrations of Cu on solids are measured at the overland flow discharge from National Grid Greenpoint Energy Site. The average concentration is 1450 mg/kg, (Range 1260 to 1723 mg/kg). NCG should revise the NCG Draft RI to report accurate results. This error is carried through to the summary section (5.1.3.3) of this chapter that also needs to be revised.

NYC Comment 224) Section 5.1.4.2 Development of Representative loads

The City has serious reservations with the methods used by the NCG to calculate loads from different point source types (CSOs, stormwater etc.). The City has provided extensive comments on the loads calculation in Appendix E. In summary NCG combines all stormwater categories (MS4s, overland flow and Category 1 stormwater) to develop loads from stormwater. Extrapolation of load calculations among stormwater categories is inappropriate. Point source categories were specifically developed in the RI Work Plan to differentiate types of point sources and assess their individual impacts. No quantitative rationale is provided in this Appendix to support combining all stormwater (Category 3A, Category 3C, and Category 1 stormwater) into one load estimation group.

While the text in Appendix E states that statistical analysis via a one-way ANOVA model was used to determine if stormwater locations were unique, the assumptions that preceded this analysis are flawed. Three stormwater locations were chosen *a priori* as representative of stormwater concentrations throughout the study area and all other stormwater locations were statistically compared to this "representative" group. Without statistical analysis to back up the assumption that these three locations are "representative," the entire basis of stormwater load calculations is flawed and cannot be accepted. The statistical analysis conducted by the City comparing the COPC concentrations in the three reference outfalls shows that the concentrations in these outfalls are not the same (see NYC Figure 55). The TPCB concentration in outfall 632B is higher than the concentration in outfalls 631 and 629 indicating a source of PCB in the watershed of 632B which is not present in the other two watersheds. This indicates that these outfalls are different and cannot be used as representative group.

Furthermore, the ANOVA comparison of individual outfalls to the NCG reference stormwater also shows that there is difference in stormwater concentrations of TSS, Cu, TPAH and TPCB

among different outfalls (see NYC Figure 56a to 56d). This clearly indicates that the Collective Data Method (CDM) used by NCG to calculate loads cannot be used to develop loads for the Site on a creek wide and reach by reach basis. This method will result in biased loading estimates which are not supported by data. This is evidenced by the CDM generally providing the highest load estimates of the four methods. Combining stormwater concentrations from all categories into one overarching stormwater grouping, downplays the significant variations in COPC concentrations in different discharges. Variations in industry type have observable impacts on concentrations of COPCs in stormwater from private sites. For example, elevated Cu concentrations are observed on solids in stormwater discharges from multiple industrial sites, including Hugo Neu, Review Avenue Development, and National Grid (see NYC Figure 58a). Elevated total PCB concentrations are also observed on solids in stormwater discharges from Hugo Neu (see NYC Figure 58b).This variation in COPC concentrations among outfalls shows that the nature of solids delivered from different stormwater outfalls is not the same. The City recommends that the loads should be calculated using the Specific Outfall Method (SOM) where the outfall specific concentrations are used to calculate outfall specific loads. Also Information contained within Appendix E is insufficient to verify loading calculations by reach.

It is not clear whether NCG is using concentrations from point source outfalls in a given reach to calculate reach by reach load or is the concentration from CDM method used to calculate reach specific loads. Use of CDM concentrations to calculate reach by reach loads is flawed given that the concentrations in stormwater vary vastly by reach.

NYC Comment 225) Section 5.1.4.2 Development of Representative Concentrations and Loads. Page 203, 1st paragraph & Tables 5-11 through 5-14. The report states that "The loads calculated using the four methods did not produce substantially differing results when summarized on a reach of Study Area basis. Results from one of those methods are presented in this section". It is not clear which method is used for the discussion. It was indicated in Appendix E that "The CDM, which generally provided the highest load estimates of the four methods, is reported in Section 5 (Sources) and used in the mass balance discussion in Section 6 (Fate and Transport) of the RI Report". Since CDM was used in the main text, estimated mean, 95% LCL and 95% UCL values should be provided. However, throughout the main text and Appendix, these important statistics are not provided. We back-calculated these parameters based on the loads and flow rates provided in Tables 5-11 through 5-14. The results are provided in NYC Table 3. Under CDM, estimated mean, LCL and UCL should be the same for CSO or stormwater among different reaches. NYC Table 3, however, shows that these statistics (are different among different reaches. NCG should provide a table for the final estimated mean/LCL/UCL used in their calculation of loads

NYC Comment 226) Section 5.1.4.2 Development of Representative Concentrations and

Loads. Page 202, 3rd paragraph, "*CSO and stormwater loads were calculated by multiplying the annual discharge predicted by the geo-neutral model by the estimates of the mean and the upper and lower 95% confidence limits of all the samples collected.*" It was indicated in Appendix E that "*Estimates for mean concentrations and 95% confidence intervals for each analyte were calculated using the modified-Cox Method for approximately log-normal data (Olsson 2005).*"

Since a small difference in the LCL/UCL concentrations of a higher volume discharge would result in a significant increase or decrease in the loads to the Study Area, it is very important to compare the methods for the calculation of LCL/UCL. There are a number of different methods for calculating LCL/UCLs. EPA guidance "Calculation upper confidence limits for exposure point concentrations at hazardous waste sites" provides a good summary on the various statistical methods to calculate the confidence limit (EPA, 2002). Some of the methods have been incorporated in the ProUCL software. ProUCL software uses various UCL calculation methods and provides the suggested value (method) for a specific data set. The suggestions made in ProUCL are based upon the extensive experience of the developers in environmental statistical methods, published environmental literature, and procedures described in various EPA guidance documents (EPA, 2013). NCG did not discuss their basis to use the modified-Cox Method for approximately log-normal data. Generally the use of a parametric lognormal distribution on a lognormally distributed data set yields unstable impractically large UCLs values, especially when the standard deviation (sd) of the log-transformed data becomes greater than 1.0 and the data set is of small size less than 30-50 (EPA, 2013). Many environmental data sets can be modeled by a gamma as well as a lognormal distribution. The use of a gamma distribution on gamma distributed data sets tends to yield UCL values of practical merit (EPA, 2013).

NYC Table 4 compared the ProUCL recommended 95% UCL values and the back-calculated 95% UCL based on NCG's Tables 5-11 through 5-14. Values with a large difference are shown in the table. The data indicate NCG's 95% UCL values are greater than EPA recommended values for TPCB in CSO effluents and TSS/TPCB/Cu in stormwater. Without providing the scientific basis to use the modified-Cox Method, the load calculation for the point source discharge is questionable.

NYC Comment 227) Section 5.1.4.2 Development of Representative Concentrations and Loads

The Collective Data Method (CDM) relies on the calculated mean and LCL/UCL, and applies them to all sampled and unsampled outfalls. This method will introduce large uncertainties if the calculation method of LCL/UCL is biased as discussed in the above comment. In addition, the use of mean is questionable due to the skewed data set. A few very high values will greatly

impact the mean, for example, high concentrations of whole water Cu were reported from two stormwater outfalls MA001 and NCQ637. The representative concentrations should be developed based on the central tendency of a data set. For a data set following log normal distribution, geometric mean or median should be used. To reduce the uncertainties introduced by mean and LCL/UCL, NCG should use a method which only uses mean and LCL/UCL on unsampled outfalls. For sampled outfalls, the calculation of load should be based on their specific measurements.

NYC Comment 228) Section 5.1.4.3.1 TSS Load: "*TSS loads from point source discharges to Dutch Kills, CM 1 - 2, and CM 2+ are slightly lower than the load to English Kills. TSS loads to CM 0 - 1 and Whale Creek are the smallest loads to the Study Area*".

Based on the TSS loads presented in Table 5-11 (assuming the values are correct), the load to Dutch Kills (77 MT/year) is similar to CM0-1 (50 MT/year) and Whale Creek (60 MT/year), but lower than CM1-2 (110 MT/year) and CM 2+ (150 MT/year). NCG also failed to mention the major contributors to the loads at Dutch Kills, Whale Creek and Main stem. Stormwater typically contributed more in these reaches than CSO. WWTP effluent overflow is the main contributor of the TSS load at Whale Creek.

NYC Comment 229) Section 5.1.4.3.2 TPAH Load: NCG states that "*Due to the discharge from the Con Edison - 11th Street Conduit (DAR No. 110) (CE11SC), TPAH load to CM 0 - 1 is higher than the load to any other reach of the Study Area. TPAH loads to Dutch Kills and Whale Creek are the smallest of all reaches*".

This spatial variation of the TPAH load is not consistent with the spatial variation of TPAH in surface sediment (NYC Figure 23). NCG should explain the reason why elevated TPAH concentrations were not observed in surface sediment in CM 0-1. Similarly, TPAH concentrations in surface sediment from Dutch Kills are greater than those from the main stem, while the TPAH load to Dutch Kills is the smallest among all reaches. It appears that the point source loads are not the main drivers for the observed surface sediment concentrations.

NYC Comment 230) Section 5.1.4.3.3 TPCB Loads :"*East Branch and English Kills receive the highest TPCB loads from point sources. The next three highest PCB loads to the Study Area are from reaches CM 2+, Maspeth Creek, and CM 1 - 2, respectively. TPCB loads to CM 0 - 1, Dutch Kills, and Whale Creek are almost an order of magnitude smaller than loads to the other reaches of the Study Area".*

Similar to TPAH, the point source load of TPCB is not correlated with the concentrations reported in surface sediment (NYC Figure 23). Specifically, load to Dutch Kills was at the lowest range, while concentrations of surface sediment TPCB at Dutch Kills (mean: 15 mg/kg) were at

the highest end. The point source loads to English Kills and CM2+ were similar to CM1-2, East Branch and Maspeth Creek, but the concentrations in the surface sediments were substantially higher than those from CM1-2, East Branch and Maspeth Creek. It appears that the elevated surface sediment concentrations are not related to point source discharge.

NYC Comment 231) Section 5.1.4.3.4 Cu Loads: "*East Branch, English Kills, and Maspeth Creek receive the highest Cu loads from point sources to the Study Area. Cu loads to CM 1 - 2 and 2+ are slightly lower than the loads to East Branch, Maspeth Creek, and English Kills. Loads to Dutch Kills, Whale Creek, and CM 0 - 1 are the lowest of the reaches*".

Again this spatial variation of loads is not correlated with the surface sediment concentrations (NYC Figure 23). High concentrations of Cu (mean: 3600 mg/kg) were reported in the surface sediments from CM2+, while the point source load to CM2+ was not greater than the upper tributaries. The data indicate that the elevated concentrations of Cu at CM2+ are not related to point source discharges.

NYC Comment 232) 5.1.5 Uncertainty Analysis

The City has concerns regarding the uncertainty analysis, detailed in Appendix E comments.

NYC Comment 233) Section 5.2 Groundwater

As discussed elsewhere, this section does not account for groundwater discharge through the banks of the creek which is 75 percent of the groundwater flow. NCG extrapolates seepage metering and discharge calculation from in-creek wells (some of which is spurious) to the extent of the creek and then multiplies this by contaminant concentrations found in the groundwater and porewater. Because discharge through the banks is unconsidered (and uncharacterized) loads which enter the Creek through the banks are unaccounted.

Section 5.2 is a summary of Appendix F, so comments and concerns regarding Section 5.2 are discussed in detail the City's comments on Appendix F:

1. The Tier 1 analyses underestimates recharge by underestimating permeable ground surface and using a highly uncertain and arbitrary regression. It also overestimates groundwater losses by misinterpreting an NYCDEP I/I report (Greeley and Hansen, 1982) to overestimate losses to sewers and the USGS groundwater modeling report's description of subway dewatering (Misut and Monti, 1999).
2. NCG uses flawed slug test data to characterize the hydraulic conductivity of the sediment bed. This results in over estimation of infiltration at locations where downward gradients were inferred.
3. NCG's porewater samples from the shallow sediment use a sampling technique which will

result in the underestimation of contaminants in the porewater (both because it represents a mixture of surface water and groundwater and because it does not capture DOC associated contaminants). Using this data in the loading analyses results in an overestimation of attenuation of contaminants being transported through the sediment bed.

NYC Comment 234) Page 207 second paragraph: *"...loads cannot be definitively linked to proximate upland sites."*

This statement is not true, groundwater discharging and contaminants being transported through the subsurface <u>are inherently connected to the adjacent upland site</u>.

NYC Comment 235) 5.2.1 *Groundwater Discharge*

This analysis uses spurious data that erroneously extrapolates surface water infiltration to areas where measurements conducted by the City confirm that groundwater discharges. As noted above, it does not account for 3/4ths (the vast majority) of groundwater discharging to the creek. This significant data gap and the use of spurious data and over-extrapolation make the findings of this analysis unusable.

NYC Comment 236) 5.2.2 Estimated Groundwater Loads

For all the reasons cited here, the loads calculated by NCG are incomplete (lack the loads from groundwater discharging from the banks) and significantly underestimate the amount contaminants loaded to the site by groundwater.

NYC Comment 237) 5.2.3 Sensitivity Analyses

The analyses presented here are of very little value and show the biased nature of NCG's groundwater evaluation. As an example, in the first bullet point, the describe changing the recharge rate in the Tier 1 analysis to 7 and 11 percent of precipitation. NYC Figure 68 shows the 95% confidence bands for the highly uncertain exponential regression that NCG use for their analyses. The range of recharge values for "77% Impervious Cover" (the value estimated by NCG) is from 2.3 to 36% of precipitation. Based on the range of likely recharge rates, NCG essentially tests the same value in their sensitivity analysis. Importantly, the calibrated USGS model (Misut and Monti, 1999) that NCG sight elsewhere simulates recharge specifically using a varied rate based on land cover type for the Newtown Creek groundwater recharge area. The average recharge for the Newtown Creek area in the calibrated USGS model is 25 percent of precipitation, which means even NCG's highest estimate of recharge is more than 2 times less than what is determined in a calibrated model of the area. Additional comments pertinent to

this section are discussed in Appendix F comments.

NYC Comment 238) 5.3 East River

NCG states that quantification of East River loads are presented in section 5 of Appendix G. The loads should be presented in the main text and in Appendix G, as NCG presents point source loads in the main text as well as in a separate appendix.

This section only summarized the analytical results for the surface water sampling at East River. Since this section is under Chapter 5 Sources. An estimate of loads from East River to the Study Area should be discussed here. The loads from East River should also include the discussion of temporal variation to support the conclusions made elsewhere. For example, in Section 4.7.3.2 NCG states that the dry weather surface water concentrations of TPCB in general had higher concentrations during the summer months at RM 0-1 and RM 1-2 and attributed this seasonal variation to the influence of the East River. NCG must include a discussion of East River loads in this section and compare it to point source loads to support the assertions made in the text.

A discussion on the TSS, POC and DOC data from the East River sampling program should be included here. NYC Figure 24 shows the temporal variations of TSS in East River data. NCG should discuss the high TSS from February, December and July events.

Page 215: The complexity of the system is not sufficient justification for combining all of the data for ebb and flood tide conditions. The results for each condition should be discussed separately and the uncertainties in the interpretation highlighted. If the interpretations using the un-pooled data are the same, then it should be presented as such. It appears that there is a contradiction in the text: "all data from the sampling transect at the mouth, regardless of tide condition, were combined" and "TPAH concentrations in surface water from the mouth transect locations under flood tide conditions". Please clarify whether the discussion of results for the mouth transect are a combination of flood and ebb tide sampling or are only for flood tide sampling and correct the contradicting text accordingly.

Page 215: NCG's measurements very close to the mouth of Newtown Creek are not necessarily representative for characterizing a delivered loading source for chemical modeling as NCG indicates. The interaction between the East River and Newtown Creek requires a more thorough and systematic assessment than NCG has presented.

NYC Comment 239) Section 5.3.1 TPAH, *"Figure 5-24, Concentrations were slightly higher during some of the warmer months, with the highest (and most variable) concentrations measured occurring in August; differences in monthly averages are generally less than a factor of two to three"*.

The RI should explain the reason for the high variability of TPAH17 concentrations from the August 2014 samples. NYC Figure 24 shows the temporal variation of TPAH17 in contrast to the statement that TPAH17 concentrations were higher in the warmer months, NYC Figure 24 shows that the TPAH17 concentrations were higher in March, June and July.

Plotting LPAH7 and HPAH10 separately (NYC Figure 25), shows a strong temporal variation for HPAH10, peaking in the warmer months (June-August). LPAH and HPAH should be discussed.

NYC Comment 240) Section 5.3.2 TPCB

Draft RI Figure 5-26 showed that one sample collected in September 2014 at NTC mouth had a very high concentration of TPCB (~21 ng/L). NCG should explain the reason for this high concentration. NCG also indicates that *"TPCB appear to vary seasonally with higher concentrations in the warmer months of June through August averaging 7.7 ng/L, as compared to the colder months of November through February with an average of 3.6 ng/L"*. Based on Figure 5-26, August and January results did not follow the above temporal variation as described by NCG. For example, samples from August had relatively low concentrations, while samples from January had relatively high concentrations. NYC Figure 24 clearly illustrates the deviations of the August and January results from the temporal trends. NCG should add the above deviations in the discussion of the temporal variations of TPCB.

NYC Comment 241) Section 5.3.3 Cu: *"Note that 38% of the samples from the East River program were non-detect for Cu"*.

Based on the data, Cu was not detected in all the samples from August, October and December, which is questionable. In addition, based on Draft RI Table 5-21 and Table 5-22, 53 out of the 87 samples had higher concentrations from the dissolved phase than the total phase. The data quality of Cu should be reviewed in detail before any conclusions can be made.

NYC Comment 242) Section 5.4.2: The text identifies BCF Oil Refining Inc. as a source of PCB to English Kills due to soil erosion and presence of NAPL in the upland site. The NCG is not presenting any data from the site to indicate what the levels of PCBs in the upland sites are and how they compare with TPCBs measured in the surface sediments of the Creek and the sediment traps. This is a gap where available data from upland sites is not discussed at all,

preventing a complete understanding of all sources to the Creek. It is clear from this section that this site is an ongoing and a historical source of PCBs to the site, however no effort is made to describe the concentrations of COPCs or develop an estimate of loads. This needs to be addressed.

NYC Comment 243) Section 5.6 Overwater Activities: NCG fails to identify recreational boats docked in a slip at the head end of English kills. The text also fails to identify sites in East Branch, and Dutch Kills where ongoing discharges have been documented by the City

The text discusses historical spills and illegal releases in this section but fails to describe the COPC concentrations in the spill and also fails to estimate the loads due to historical spills. A large illegal release was documented in Dutch Kills as recently as 2012, where more than 1,000 gallons of NAPL was discharged into the Creek, NCG has not described this in the sources section and failed to describe the concentrations and loads to the Kill due to that illegal release. This is a serious shortcoming of the Draft RI that needs to be addressed. The Draft RI is incomplete without discussion of these potentially large sources to the Creek.

NYC Comment 244) Section 5.7 Contaminant Seeps: This text in this section is a mischaracterization of sources to the Creek from NCG's properties. The City has serious concerns regarding NCG's ability to accurately characterize sources from their properties. The NCG documented a large oil seep from the ExxonMobil's Former Pratt Oil works (former refinery) upland site during their 2016 ebullition survey. The City has shared a video with the NCG/EPA and NYSDEC documenting the extent of the impact of this seep on the Creek. The oil sheen and slicks from this seep were documented more than 1,400 feet upstream of the source location. ExxonMobil is aware of this seep and have deployed oil booms (which are ineffective – as shown in the video) to contain the oil seep. For NCG to state, in this document, that they have not observed seeps and any seeps if present represent an insignificant localized source, demonstrates a lack of their credibility and their disingenuous efforts in developing a robust NCG Draft RI. It is clear that NCG will make false statements in the Draft RI in an effort to represent the conditions in the Creek in the best light for their clients and to focus on point sources.

Additional known seeps to the Creek include NAPL seeps from the GPEC former MGP Site (Turning Basin), Manhattan Poly Bag Site (middle reach English Kills) and Frito Lay Site (head end of English Kills). There are additional sites where the City has documented NAPL seeps; these are shown in NYC Figure 26. Sediments (surface and subsurface) in the vicinity of these sites do show elevated COPC concentrations likely indicative of their impact on the Creek.

NCG has not characterized seeps from these sites and has not proposed any sampling plan to

do so. Any available data from upland sites that could provide an estimate of COPCs in the NAPLs and groundwater emanating from these sites has not been included or discussed by the NCG. This is a huge and intentional data gap in the NCG Draft RI, without this information a complete RI/FS cannot be developed for the Site. This section should be rewritten by EPA with the aid of NYSDEC as NCG clearly is incapable and/or unwilling to do so.

City Comments on NCG Draft RI Chapter 6 – Fate and Transport

In the key findings and in this entire chapter, NCG fails to identify, delineate, or discuss the impact of NAPL on the Site, including on the Creek's surface sediments and on the surface and subsurface sediment concentrations of TPAH, TPCB and TPCB and total organic carbon (TOC). Furthermore the NCG Draft RI does not address the fate and transport of NAPL in the system but instead makes the makes the simplistic assumption that COPC transport in the Creek is only solids based. This is inconsistent with statements in previous chapters acknowledging the presence of petroleum products and tars as sources of OC and TPAH to the system (chapters 4 and 5) and asserting that upland sites with NAPL are a source of TOC to the system (chapter 5). However, fate and transport of NAPL in the system is not discussed at all, which is inconsistent with documented NAPL migration from subsurface sediments and from upland sites throughout the Creek. NAPL data from upland sites demonstrates that NAPL is a significant source of COPCs to surface and subsurface sediments. This failure to identify and discuss NAPL as a source of COPCs to the sediments is a fatal flaw of the CSM and fate and transport framework.

In this chapter the Draft RI states that COPC concentrations in surface sediments are declining over time due to ongoing deposition of solids with lower concentrations, however NCG has not confirmed nor quantified the rate of decline in concentrations. Cleaner solids have been coming into the Creek for years, solids coming in from CSOs and MS4s are already at background levels (Lower Passaic River data collected in the mid 2000 by EPA shows that the concentrations have been at background level for at least a decade (The Louis Berger Group, Inc. et al., 2014)), however NAPL migration from uncontrolled upland sites and from subsurface sediments is preventing recovery. NAPL seeps from both uncontrolled upland sites and from sites with some controls (Former Pratt Oil Works) have been documented as recently as December 2016. The continued migration from on-going sources means that COPC concentrations on solids may not decline, but will instead result in elevated COPC concentration in the Creek sediments.

NYC Comment 245) This chapter of the Draft RI further states that current contaminant distributions cannot be linked to proximate upland sites due to supposedly complex fate and transport processes. This statement is flawed for two reasons.
1) NCG's fate and transport model is not complex, it is based on solids transport and associated COPC transport. Rather, it simplistically associates solids transport with COPC transport and minimizes the complexity resulting from the presence of NAPL and contaminated groundwater.
2) Contaminant source areas can be easily identified and are close to the upland sites where certain COPCs would be expected. For example, the highest elevations of Cu in the surface and subsurface areas are seen in the Turning Basin adjacent to the PDRC former Cu smelter. Data also shows plumes of Cu upstream and downstream from this source area.

NYC Comment 246) Finally, NCG uses unsuitable data and unsound methodology to arrive at the incorrect conclusion that groundwater is an insignificant source of COPCs in Creek surface sediments. The City's calculations show that groundwater is the largest measured load of TPAHs and TPCBs to the Creek sediments (as further elaborated in the comments on Appendix F).

In summary, rather than discuss the fate and transport of these other important sources, NCG wrongly conflates solids loading with COPC loading. EPA should require that this entire chapter be rewritten.

Specific Comments on Draft RI Chapter 6

NYC Comment 247) Section 6.1 Introduction, page 226: The text identifies external sources of loads to the system, but does not include upland sites as a source. NAPL seeps from upland sites (for example, ExxonMobil Former Pratt Oil Works, National Grid Green Point Energy former MGP site, Manhattan Poly Bag, Frito Lay etc.) have been documented in the Creek as recently as December 2016. These upland sites are ongoing sources of COPCs to the Creek and must be identified and characterized. Failure to evaluate and control ongoing impacts from upland sites will result in an inadequate CSM and development of remedial alternatives that will fail to prevent recontamination of the Creek.

NYC Comment 248) Section 6.1 Introduction, page 226: The text fails to identify groundwater as a source of COPCs to the surface sediments.

NYC Comment 249) Page 225: Figure 6-1 is incomplete. NAPL seeps and groundwater entering the water column laterally through bulkheads and side walls are missing from the external loading sources displayed. This figure also fails to account for migration of a third phase (NAPL) from the subsurface to the surface sediments via the processes of ebullition and seepage.

NYC Comment 250) Section 6.2.1 Freshwater Flow: Groundwater is a significant source of freshwater to the Creek and NCG's estimate of 1.1 billion gallons per year is biased low. The City's calculations and groundwater measurements show that groundwater discharge is about 2.6 billion gallons per year. The text should be edited to reflect accurate inputs to the Creek.

NYC Comment 251) Section 6.3 Sediment transport: NCG makes an assertion that there has been a large decrease in the NSR (last 50 to 75 years) in the tributaries and main stem CM2+ due to a reduction in CSO loads without providing any data to support this assertion. There is no data that shows what CSO loads were during the last 50 to 75 years and these unsupported statements should be deleted from the document.

The sedimentation process described by NCG is not unique to the Creek, it is typical of the rivers and creeks connected to the NY/NJ Harbor, which have been occasionally dredged but not fully maintained. The sedimentation in the Creek, like these waterways, is driven by equilibrium with the harbor, not by CSO loads. Any dredged or deep channels will be filled up with East River solids, initially at a relatively rapid rate and which will slow down as the system approaches a dynamic equilibrium state. This change in sedimentation rate is part of the reason for the difficulty in the interpretation of the radionuclide cores in the Creek, where the Pb210 shows very slow rates, relative to the fairly deep Cs-137 peak.

NYC Comment 252) Section 6.3.2 Sediment Sources and Inputs: This section discusses sources of TOC to the Creek, and states that the TOC in East River solids is estimated to be 2-5 percent, based on surface sediment spatial distributions. This is a flawed approach to estimate the OC content of East River solids, especially when other sources of OC exist in the Creek. The NCG Draft RI states that petroleum products, tars and other NAPLs are a source of OC; these sources are ongoing due to NAPL seeps from upland sites, groundwater and NAPL migration from subsurface sediments. Instead of using Creek surface sediment data, which is impacted by these myriad sources of OC, East River surface water data should be collected to provide an estimate of OC in East River solids.

In addition, an average OC content for solids from CSOs should be presented rather than the current vague statement that the OC content is greater than 10 percent. The text should provide the percentage of fine and coarse-grained particle distributions in solids for CSOs. Measurements of the grain size distribution in solids from CSOs were conducted for the Phase 2 sampling program and should be discussed in the text.

On page 231, the document states that differential bathymetry data and modeling results show that localized accretion areas show episodic scour during a discharge event. This statement is inaccurate. Bathymetry data is available only for three years (1991, 1999 and 2011) and provides a snapshot at a given time. Bathymetry data shows consistent deposition in the East Branch CSO fork and consistent zones of no change at the head end of English Kills, shown on NYC Figure 27a and 27b. Maspeth Creek shows either no change or deposition at the head end. These observations contradict the statement that bathymetry data indicates episodic scour during discharge events. This incorrect assertion should be removed, as there is no data to support it, only modeling results. Text should be revised to be more accurate.

NYC Comment 253) Section 6.3.3 Erosion, page 232: The NCG Draft RI attributes bed scour from differential bathymetry analysis to propwash scour. A map should be provided detailing where the differential bathymetry showed scour overlain with areas likely impacted by propwash so that this can be verified.

NYC Comment 254) Section 6.3.3 Erosion, page 232, *"Propwash resuspension is a significant process, affecting sediment transport over a range of spatial scales (i.e., less than 30 feet to greater than 1,000 feet) in the Study Area"*

The statement is speculation as it is not supported in the text by any discussion of direct observations or measurements. The potential importance of scour and dispersal of sediment in the Creek by propwash has not been quantified. This section must be rewritten to make it clear that the potential importance of propwash scour, resuspension, and dispersal remains highly uncertain. Any discussion of potential spatial scales for this transport process is speculative and should be removed from the text.

The first two sentences on page 233 present a more reasonable description of potential importance, but the sentences cannot be presented as fact. These processes have not been demonstrated to occur.

NYC Comment 255) Section 6.3.4 Deposition and Net Sedimentation, page 233: *"More recent lines of evidence representing the 10- to 25-year time horizon suggest that NSRs in the tributaries have decreased over time due to reductions in solids loads from CSOs since the 1960s."*

This statement is speculation and should be removed or re-written. As explained in a previous comment, this process is typical of waterbodies connected to the NY/NJ Harbor, which had deep channels that were not maintained and is due to equilibrating processes, not CSO loads.

Reference to Figure 6-6: This figure creates a misleading perception of the East River contribution to sediment transport and deposition, because modeled NSR results upstream of CM 1.5 are biased by point-source sand deposition. Newtown Creek is generally a low-energy environment, and any sand-sized solids crossing the East River open boundary will deposit near the Creek mouth and will not be transported upstream. Consequently, the East River's contribution to sediment deposition in Newtown Creek is limited to fine, cohesive solids. In contrast, point-source loads contain approximately 10-30 percent non-cohesive sand that deposits locally. The normalized NCG model results showing the relative contribution of the East River fines deposition compared to total fines deposition show a very different picture. For example, in the Turning Basin, East River fines represent approximately 65 percent of total fines deposited, with point-source fines contributing the other 35 percent. In general, fine solids include more organic matter and are more relevant to partitioning and transport of COPCs in the Study Area. Point-source sands upstream of CM 1.5 are generally considered inorganic and result in burial and/or dilution of sorbed COPCs in the sediment. To present a more complete CSM for sediment and contaminant fate and transport in the Creek, the document needs to

separately examine and present the different distribution of fines and sands in those processes.

NYC Comment 256) Section 6.4.1 Chemical Partitioning Characteristics, page 238 and Figures 6-8a-f, 6-9a-g and 6-10: The document must quantify the dissolved chemical concentrations in groundwater and porewater that are DOC complexed rather than freely dissolved or discuss this data gap. It appears there are no measurements that capture the portion of dissolved chemical in groundwater and porewater that is DOC complexed. Both freely dissolved chemical and DOC complexed dissolved chemical concentrations are needed to define the magnitude of the concentration gradient that controls sediment-water column exchange of dissolved chemical. It will be important to properly evaluate both freely dissolved and DOC complexed chemical forms. For example, as porewater DOC increases, the total dissolved (free + DOC complexed) concentration may increase markedly (by 10X or more), even though the freely dissolved chemical may change by only a negligible amount.

NYC Comment 257) Page 238/296 and Figures 6-8a – 6-8f, 6-9a-g and 6-10: *"Complexities of sources and forms of organic carbon"* noted in the document does not justify selection of dry weight normalized rather than conventional organic carbon normalized chemical phase partitioning. Dry weight and organic carbon normalized chemical phase partitioning measurements presented by NCG show similar scatter of data and do not justify selection of dry weight normalization. Although the document states that further partitioning evaluations may be conducted during the development of the chemical fate and transport model, the partitioning relationships should be deleted until more evaluations are complete. These would need to include the development of partitioning relationships that reflect chemical sorption to natural organic matter, black/soot carbon and/or NAPL in the sediment, for the purpose of enhancing the ability of the partitioning relationships ultimately used for modeling to explain the measurements. A refined partitioning analysis should also assess the potential for use of relatively recent SPME-based measurements of K_{DOC} (e.g., Friedman et al., 2011) as an update on the work of Burkhard (2000). The approach should be checked for consistency with toxicity data, given that freely dissolved concentrations should correlate to organism response in a concentration dependent manner. Once these analyses have been completed it will be appropriate to revisit the decision to use dry weight-normalized rather than carbon-normalized particulate concentrations as the basis for representing partitioning.

NYC Comment 258) Page 238 and Figure 6-8.f: This figure for the PAH benzo(a)pyrene illustrates one of the problems with the phase partitioning approach. NCG's proposed use of an arithmetic average for dry weight normalized partitioning in surface sediments would: underestimate high dissolved phase concentrations of benzo(a)pyrene measured in porewater for Triad samples and would overestimate the corresponding measured concentrations of

benzo(a)pyrene attached to solids. Calculations of current and future benzo(a)pyrene transport and bioavailability would not be accurate. The partitioning relationships should be deleted until more evaluations are complete. It is also a concern is that the highest dissolved phase concentrations of benzo(a)pyrene measured in porewater for triad samples appear to exceed the expected aqueous solubility of pure benzo(a)pyrene. The high dissolved phase concentrations require additional consideration and discussion.

NYC Comment 259) Page 238and Figure 6-8f: This figure shows that there are discrepancies between triad and groundwater porewater measurements. The source of triad and groundwater porewater measurement differences in English Kills and CM2+ need to be addressed.

NYC Comment 260) Page. 239: Figures 6-8a-f show the relationship between analyzed contaminants' sediment vs porewater concentrations, but no R2 values are given. A quantitative relationship needs to be presented.

NYC Comment 261) Page 240, footnote: *"the CSOs represent a large current source and even larger historical source of OC that likely differs in nature from other OC sources such as East River and stormwater"*.

NYC Comment 262) The ratio of soot carbon to organic carbon in surface sediment samples did not show spatial variations across the Creek, although the values spanned about three orders of magnitude (Figure 4-14). The similar ratios of SC/OC between upper tributaries and main stem suggests that point source discharges are not strong enough to affect the nature of OC in surface sediment. In addition, historical data showed that CSO and SWO did not contain elevated OC concentrations as compared to current OC concentrations. Average OC of about 24% was measured in CSO/SWO samples collected in the NY/NJ harbor for CARP in 2000-2001 (Litten, 2003). By comparison, average OC of 28% and 22%, respectively, in CSO and MS4 wet weather samples collected in 2014-2015 by the City. NCG should provide soot carbon data and OC composition data to illustrate the nature of OC from CSO is different from other sources such as stormwater and East River and that the OC concentrations in CSOs were larger historically. Otherwise, such unsubstantiated and speculative statements must be deleted.

NYC Comment 263) Page 242, first paragraph: The report cites the article from Jonker and Koelmans 2002 to illustrate that other forms of OC (including soot carbon and TPH-associated carbon) bind these compounds more strongly than detrital OC at field sites. The Jonker paper only discusses the sorption by soot carbon. The document should explain the sorption of COPC by TPH-associated carbon.

NYC Comment 264) Page 242: If/when a phase partitioning approach is presented it will need to describe how TPH-related organic carbon will be addressed for analysis and modeling purposes and whether or not the intent is to subtract TPH-related organic carbon out from the foc values used for conventional phase partitioning purposes.

NYC Comment 265) Page 243 and Figures 6-16a-d: NCG adopted a dry weight normalization approach as the basis for partitioning computations, however, based on the cross-plots of K_d and K_{OC} vs K_{OW} that are presented on Figures 6-16a-d, the organic carbon-normalized approach may be the preferred approach to use. The organic-normalized approach seems to result in a more consistent relationship when plotted versus K_{ow}. Further analyses on the partitioning relationships are needed before deciding on the approach to be used

NYC Comment 266) Section 6.4.2.1 Dry Weather Surface Water Chemical Fate and Transport Processes: NCG used the spatial variation of dry weather surface water data to illustrate the relative importance of East River influence and porewater flux, however this approach is fundamentally flawed. The impact of East River should be assessed using concentrations in surface water from East River and comparing the concentrations with those measured in the Creek water column. The impact of porewater flux should be evaluated based on the concentration difference between surface water and porewater for diffusion exchange, and groundwater seepage rate (including tidal pumping) and porewater concentration for advection exchange.

NYC Comment 267) Page 244: The first paragraph of Section 6.4.2.1 implies that under dry weather conditions, "when stormwater and CSOs are not normally discharging," there are two primary sources of chemicals to the water column: tidal exchange with the East River and flux of chemicals from the sediment bed. This overlooks other sources of contamination, such as oil spills from vessels (such as occurred in Dutch Kills a couple years ago) and oil seeps from bulkheads along upland sources. A discussion of these dry weather sources needs to be included in the text.

NYC Comment 268) Section 6.4.2.2 Wet Weather Surface Water Chemical Fate and Transport Processes, Page 246, third paragraph: This demonstrates that the surface water concentrations during wet weather did not show any consistent relationship with rainfall duration or intensity. This observation should be discussed in the text.

NYC Comment 269) Page 247, third paragraph. The Draft RI compares the surface water concentrations of COPCs in the East River and the Creek and concludes that East River surface

water was not impacted by the point source inputs to the same degree as the Study Area. This conclusion is incorrect since the appropriate data was not collected to make a valid comparison. The East River sampling program did not target wet weather conditions, it occurred over 10 months and consequently, rainfall amount and intensity are expected to be smaller than those during the point source discharge program which targeted wet-weather and took place over only three months. NYC Table 5 compares the precipitation associated with the East River wet weather sampling events and the NC point source discharge events. Of the seven days' sampling of the East River program, three days' sampling were taken in dry periods with no rainfall in the previous 24 hours and another three days' sampling was taken after the rain had stopped. Only one day of sampling occurred during the rainfall. The timing of the sample collection during the East River sampling program did not capture the point source discharges and overland flows to the same degree as point source discharge program. The incorrect conclusion should be removed or re-written.

NYC Comment 270) Section 6.4.3.1 Dissolved Phase Sediment/Water Exchange

NCG compares the magnitude of the spatial variations of LMW PAH vs. HMW PAH, low chlorinated vs. high chlorinated PCB congeners in dry weather surface water samples to assess the impact of porewater on surface water during dry conditions. The data indicates that the spatial variation of compounds with lower K_{ow} were more evident than compounds with higher K_{ow}. Based on the fact that compounds of lower K_{ow} were more abundant than compounds with higher K_{ow} in the porewater samples, NCG concluded that porewater flux is the major source of contaminants present in the surface water during dry weather. The City has following comments regarding NCG's evaluations.

a) Using spatial variation data to illustrate the impact from porewater is not adequate. The effect of porewater flux should be further evaluated based on the concentration difference between surface water and porewater for diffusion exchange, and groundwater seepage rate (including tidal pumping) and porewater concentration for advection exchange.
b) The data provided in Table 6-5 of the report suggest that the impact of porewater for TPAH is the largest at English Kills, followed by CM2+. The impact of porewater is low at East Branch and Maspeth Creek. This spatial variation is not consistent with the spatial variation of the individual PAH concentrations in surface water during dry weather, shown in NYC Figures 28a and 28b. These figures show that the Naphthalene concentrations in surface water are impacted by porewater concentrations in all tributaries and CM2+ while the Acenaphathene concentrations in the entire Creek, including the CM0-2, appear to be significantly impacted by porewater flux. Individual PAHs must be considered while evaluating the impact of porewater on surface water.
c) Interpretation of the spatial variation of PCB homologs is confounded by the limited number

of samples. Only three samples are available at each of the upper tributaries during dry weather events. NCG cannot make any defensible conclusions on the spatial variations of PCB congener or homolog concentrations based on the small number of samples.

NYC Comment 271) Section 6.4.3.1 Dissolved Phase Sediment/Water Exchange Page 249: A statement is made in the 2nd paragraph that chemicals with lower K_{ow} values are expected to be present in porewater at relatively high concentrations (and conversely for high K_{ow} compounds). This is misleading as low K_{ow} compounds will be more soluble and water column releases may never be transferred to the sediment. The fraction that is deposited will be at a relatively high concentration in the porewater and may ultimately dissipate by diffusion from the sediment. Text in the Draft RI must be revised to reflect this.

NYC Comment 272) Page 249: The first bullet infers a considerable amount from the spatial profile of the data on Figure 6-20e. Without knowing more about the conditions at the time of sampling (e.g., what other undocumented loads may be entering the system, how much of the decrease in concentration reflects drawdown by the East River boundary, etc.), it is inappropriate to state what processes are controlling the shape of the observed spatial profile. Please remove or revise the bullet.

NYC Comment 273) Section 6.4.3.2 Particulate Phase Sediment/Water Exchange, Pages 250– 253: NCG's interpretation of sediment trap data is speculative. The study design included placement of 12 inch high traps directly on the sediment surface. This leads to a situation where a slight disturbance of bottom sediments could lead to re-suspended material being collected by the sediment trap. The possibility that this occurred is borne out by the superposition of trap particulate concentrations on surficial sediment concentrations (Draft RI Figures 6-22 to 6-24). Where deviations between the two sets of concentrations are observed (as highlighted on the cross plots, Draft RI Figures 6-25 – 6-27) it is possible that localized surficial sediment concentrations in proximity to the traps deviated from other concentrations in surface sediments within a 0.1 mile distance of the trap, the "range of influence" used by NCG to characterize surficial sediment concentrations.

NYC Comment 274) Section 6.4.3.2 Particulate phase sediment/water exchange. In this section the NCG tries to use sediment trap data to show impact of CSOs on the Creek. The NCG states that the sources of solids and COPCs to the trap consist of East River, CSOs and MS4s and resuspension. NCG fails to acknowledge NAPL as a source of COPCs to the traps despite field notes indicating extensive presence of NAPL in the traps.

NYC Comment 275) Page 251 last paragraph: NCG states that CM2+ and tributaries exhibited

larger differences between sediment trap and surface sediment concentrations, as compared to the CM0-2 data, and suggested that the point source discharges had a greater impact on sediment trap samples in CM2+ and tributaries than in CM 0-2. This statement is not correct. A greater difference between sediment trap and surface sediment is not necessarily linked to a greater impact from point source discharges. The greater difference is related to the high concentrations in surface sediments which were caused by multiple industrial sources. For example, the greatest difference between sediment trap and surface sediment for Cu was observed at CM 2+ because of the extremely high concentrations in surface sediments (median: 2600 mg/kg) as compared to sediment trap (median: 410 mg/kg). Given that the data collected for CSOs and MS4s shows that the concentrations measured in solids from these sources are much lower than what is measured in the traps, NCGs conclusion that the CSOs and MS4 had greater impact is flawed. The impact of point source discharges should be evaluated based on the chemical concentrations on point source solids and by geochemical analysis which compares the PAH and PCB concentrations and chemical distribution/patterns among point source solids, sediment trap and surface sediments to ascertain the relative importance of CSO/MS4 sources. The fact that surface sediment concentrations in reference areas with CSOs and MS4 discharges are much lower than the surface sediments in Newtown Creek, provides a basis to understand the impact of these urban background inputs in the absence of industrial inputs unique to Newtown Creek. NCG should use these observations to evaluate the impact of the CSOs and MS4s, rather than rely on unproven hypothesis not supported by the data.

NYC Comment 276) Section 6.4.3.2 Particulate phase sediment/water exchange, page 252 last paragraph: The report discusses the temporal variation of sediment trap data and concludes that the traps had higher concentrations in Q2 than the other two quarters. The NCG Draft RI further states that this seasonal variation in the traps can be connected to the greater precipitation (i.e., point source discharge) in Q2 than the other two quarters. Unlike TPAH, TPCB and Cu did not show any temporal variation, and the NCG Draft RI therefore disingenuously concludes that point source discharges had more impacts on TPAH than on TPCB and Cu.

As illustrated in comments for section 4.5 of the NCG Draft RI report, there are multiple flaws in this assertion by the NCG. First, comparison of split samples collected by the City and EPA with NCG for Q2 show that the NCG data is biased high for only for TPAHs, not for Cu or TPCBs. This provided an indication of unreliability of Q2 TPAH data. Second, if one were to consider NCG Q2 data accurate, it is still not clear how one source can preferentially deliver/impact one class of contaminants (TPAHs) over other class of contaminants (Cu and TPCB). Preferential delivery of one class of contaminants over other class from a single source is just not possible. Furthermore, spatial variation on the concentration increase from Q1 (the lowest

concentration) to Q2 (the highest concentration) for TPAH, provided in NYC Figure 29, shows that at English Kills the increase in Q2 was the largest at EK004, and gradually decreased to the head of the tributaries where CSO is located (EK086). Similarly, at East Branch the increase in the non-CSO fork (EB005) was greater than that in the CSO fork (EB042). The spatial variation of the Q2-Q1 for TPAH indicates that the increase of TPAH in Q2 is not related to point source discharges. NCG cannot simply relate the high Q2 concentrations of TPAH to point source discharges without providing evidence supported by the data. In addition to the fact that the CSO solids concentrations of TPAH and TPCB cannot explain the elevated TPAH data in the sediment trap, the composition of the PAHs were further evaluated by the City using the distribution of naphthalene concentrations, diagnostic ratio analysis, principal component analysis of the 17 PAH compounds, and principal components of PCB homologues As summarized below these analyses show that the PAH composition in the sediment trap samples is different from those measured in CSO and MS4 solids.

a) PAH diagnostic ratio and Naphthalene concentration in traps, surface sediments and CSO/MS4 solids. The impacts of point source discharges on sediment trap and surface sediment samples were evaluated by the PAH diagnostic ratio BA0/(BA0+C0)[1] and Naphthalene concentration. NYC Figure 30a and 30b present the change of these PAH source ratio and naphthalene concentration with River Mile for CSO solids, MS4 solids, sediment trap, and surface sediments. While CSOs and MS4 contribute sediments to the Creek, the data indicate that the PAH patterns in the sediments and traps are different from those measured in CSO and MS4 solids. The concentration of naphthalene is measured in very high levels in the surface sediments and traps as compared to the levels in CSO and MS4 solids. Therefore, the sources of solids to the Creek seem disconnected to the sources of COPCs in the creek sediment traps and surface sediments. The fact that the naphthalene is measured in such elevated levels in sediment trap and surface sediments relative to CSO and MS4 solids and background concentrations indicates that there is an undocumented ongoing source of Naphthalene to the Creek (likely NAPL impacts from industrial operations). NCG should include individual PAH chemical distribution and ratios to understand the role of CSO and MS4 solids and their associate background COPC in the surface sediments and sediment trap data. Furthermore, the importance of other sources must be investigated and considered when explaining the elevated levels of COPCs in the Creek.

b) PCA analysis for 17 PAHs traps, surface sediments and CSO/MS4 solids. The impacts of point source discharges on sediment trap samples were further evaluated through chemical fingerprinting analysis based on PAH composition. PAH composition most simply evaluated using histograms can provide useful information on the sources of PAHs. Two groups of samples with PAH contamination dominated by the same source will likely have similar TPAH17 composition. To further pursue this line of investigation, we compared the PAH composition

[1] BA0:Benz[a]anthracene; C0:Chrysene

among sediment trap, CSO/MS4 solids and surface sediment within 0.1 miles radius of trap samples using principal component analysis (PCA). Data from GPEC were not included because PAHs were analyzed by a less sensitive method (8270 D), which created an unreliable dataset as indicated by the highly variable LPAH/HPAH ratio (Figure 4-29). Concentrations of 17 PAHs were first normalized to TPAH17. These normalized data in fraction were used in PCA analysis. Separate PCA analysis were performed on each individual tributaries and the main stem. The PCA score plots provided in NYC Figures 31a through 31f indicate that sediment trap samples were separated from CSO/MS4 solid samples, but overlapped with surface sediment samples. In addition, the Q2 trap samples were not closer to the CSO/MS4 samples than the Q1 and Q3 samples. The highest TPAH result from the Q2 trap location EK004 was further away from the CSO/MS4 locations. PCA results indicate that PAH in sediment trap samples have similar composition to surface sediments, but are different from CSO/MS4 samples. It also indicates that the elevated TPAH concentrations in Q2 trap samples are not related to point source discharges. NCG should include and extend such forensic evaluation in the report before drawing any conclusions regarding the impact of CSOs and MS4s on the Creek.

c) PCA analysis for PCB homologs. A similar PCA analysis was performed on PCB homolog data to illustrate whether the PCB composition in the trap samples are more similar to CSO/MS4 or to surface sediments. Fractional homolog data were used in this PCA analysis. Separate PCA analysis were performed on each individual tributaries and the main stem. The PCA score plots provided in NYC Figures 32a to 32f indicate that sediment trap samples were separated from CSO/MS4 solid samples, but overlapped with surface sediment samples. The two highest TPCB results from the trap locations DK014ST (Q2) and MC027ST (Q2) were further away from the CSO/MS4 locations. PCA results indicate that PCB in sediment trap samples have similar composition to surface sediment, but are different from CSO/MS4 samples. It also indicates that the elevated TPCB concentrations in Q2 trap samples are not related to point source discharges. NCG should include this forensic evaluation in the report.

From these evaluations it is clear that there are major and likely dominant external sources of COPCs to the Creek unrelated to CSOs and MS4s. NCG's attribution of elevated COPC concentrations to CSOs and MS4s is not supported by data and needs to be deleted from the text. The Draft RI and FS related sampling should focus on finding the sources of these COPCs to the Creek. Without further investigation any remedial alternatives developed for the Site will fail.

NYC Comment 277) Section 6.4.4.2 Sources of Chemicals to the Surface Sediment:

Page 254: There may be one (or two) typographical errors on lines 9 and 10 of this paragraph. Please correct the text "0.5 to approximately 0.5 ..." to "0.5 to approximately 0.8 ...".

Page 254: The statement is made that net sedimentation in this downstream area [CM 0 – 2]

"is composed of a large fraction of solids originating from the East River, based on sediment transport modeling (see Figure 6-6)." It needs to be noted that in addition, finer particulates originating from the East River are transported further upstream and depositing out along the way, as far upstream as the Turning Basin based on NCGs sediment transport model results. NCG model results indicate that solids originating from the East River and are dominant source of fines in this area.

Page 254: Section 6.4.4.2 states that "in the upper tributaries, deposition of solids is dominated by point sources (i.e., CSOs and MS4s)… represent[ing] sources of chemicals to the surface sediment" and "in CM2+, deposition (the source of chemicals to surface sediment) originates as a mix of solids from the East River and the point sources." These statements imply that the East River and point sources, such as CSOs and MS4s, are the only source of contamination to the surface sediment. This ignores spills from vessels, spills and leaks from surrounding upland sites, and migration from the sub-surface and/or the groundwater which are significant sources of COPCs to the Creek.

NYC Comment 278) Section 6.4.4 Surface Sediment Chemical Fate and Transport Processes

There is no clear reason why Pb-210 was excluded when interpreting the depth of the sediment mixing layer. Pb-210 was measured in the high resolution cores in addition to TPAH, TPCB and Cu. Unlike TPAH, TPCB and Cu, there would be no ambiguity as to whether the lack of vertical gradient in the high resolution cores is a result of mixing or similar concentration between depositing sediments and existing surface sediment. NCG should include Pb-210 in their analysis of mixing depth in the high resolution cores.

NCG acknowledges that disturbance is likely a mixture of bioturbation and prop wash and is limited to less than 15cm. On page 256, paragraph 2, NCG states *"Mixing is a top-down process limited to a relatively shallow depth within the surface sediment (i.e., generally 15 cm [6 inches] or less); it does not move chemical or sediment mass upwards from the deeper subsurface sediment."* This statement is nonsensical. In fact, mixing necessarily required that recently deposited sediment move downward and deeper sediment move upward. This is the mixing process that homogenizes the sediment concentration within the mixing layer.

NCG states on page 256, paragraph 2, *"Sediment core profiles differ among the chemicals at some locations as well. Generally, TPAH concentrations are more variable in the upper 20 to 30 cm [8 to 12 inches] than TPCB and Cu concentrations, which often display more consistent gradients to within a few cm of the surface."* NCG provides no quantitative analysis to support this claim of generality. NCG should objectively evaluate how the sediment profiles evolved over time by considering all the processes that affect the COPC profiles including the effect of NAPL dynamics, groundwater advection and sorption of COPCs as the groundwater moves

upwards, ebullition facilitated transport, additional scavenging of non-solids input in the surface water (e.g. groundwater discharged from the sides of the channel, and NAPL seeps from upland sites). If the simple mixing hypothesis of solids from East River and point sources is responsible for elevated COPC concentrations as the NCG contends, then one would expect that elevated concentration would be observed in reference waterbodies with CSOs and MS4s. The fact that the reference waterbodies with CSOs and MS4 are at urban background concentrations, support that premise that additional sources unique to Newtown Creek are directly responsible for Newtown Creek's elevated concentrations.

NCG states on page 259, paragraph 1, "*The observations of increasing chemical concentration in the sediment core segments within the top few cm of the sediment surface in the high-resolution cores, as described in the previous subsection, further supports that deposition of solids with lower contaminant concentrations is occurring over much of the Study Area.*" However, NCG neglects to include cores that extend below the 60cm, the deepest sampling of the high resolution cores. In many of the low resolution cores that extended deeper than 60cm, the concentration of TPAH, TPCB and Cu can exhibit large fluctuations, highlights the highly disturbed nature of the sediment, and without a full analysis of depth profiles for all cores, this statement has no quantitative analysis to back up the above claim.

NYC Comment 279) Section 6.4.4.2 Sources of Chemicals to the Surface Sediment, page 254: *"in the upper tributaries, deposition of solids is dominated by point sources (i.e., CSOs and MS4s)... represent[ing] sources of chemicals to the surface sediment"* and "i*n CM2+, deposition (the source of chemicals to surface sediment) originates as a mix of solids from the East River and the point sources."* These statements imply that the East River and point sources, such as CSOs and MS4s, are the only source of contamination to the surface sediment. This ignores spills from vessels, spills and leaks from upland sites, and migration from the subsurface and groundwater.

NYC Comment 280) Section 6.4.4.4. Mixing in the surface sediment: NCG states that TPAH concentrations were more variable in the upper 8 to 12 inches of the core samples than TPCB and Cu concentrations, which often displayed more consistent gradients to within a few cm of the surface. NCG then concludes that point source TPAH loads were a more important contributor to surface sediment than TPCB and Cu loads. The variability of TPAH in the upper portion of the core samples is not necessary linked to the point source discharges. It is related to all the potential sources of the TPAHs. Point source contributions are limited for the following reasons. First, the TPAH17 concentrations on CSO&MS4 solids are significantly lower than those in the upper 8 to 12 inches of the core samples as illustrated by the Tukey-Kramer test provided in NYC Figure 33. In addition comparison of the composition of PAHs in the high resolution cores vs. the CSO and MS4 solids shows that CSO/MS4 solids have different PAH

composition from the upper core samples. Results of the PCA making this comparison are shown in NYC Figure 34. The NCG should delete the conclusion from the text which states that point source TPAH loads are an important contributor to surface sediments. To fully understand the concentrations and patterns of COPCs, NCG should assessment other processes that can affect the sediment profile including: groundwater advection, NAPL dissolution and diffusion, seeps and other ongoing industrial inputs to the Creek. Further, NCG's statement and concept ignores ebullition which has been shown to mix contaminants in the sediment column and there is no information as to what depth ebullition influences. The microbes responsible for ebullition are not depth specific, so methane generation can occur where ever (and in any strata) an organic source such as NAPL occurs.

Page 256: Section 6.4.4.4 states that "bioturbation is likely limited, due to the distressed nature of the benthic community." However, although the benthic community is stressed in that it does not have high diversity, in many places polychaetes and other stress-tolerant biota are quite numerous and could still result in substantial bioturbation. Subsurface sediment may not be as stable as described. Additionally, as the Creek is cleaned up, and other species return, this bioturbation may increase.

NYC Comment 281) Section 6.4.5.2 Losses of Chemicals from the Subsurface Sediment

Page 261: A statement is made in the first paragraph that losses from subsurface sediment due to groundwater transport of total dissolved chemical out of the layer, and degradation processes, are generally minor on short (annual) time scales relative to the large mass of chemical contained in the subsurface sediment. An assessment of the relative importance of these processes (particularly the groundwater flux) to what is happening within the surface sediment layer and the relative importance of these processes as compared to the other sources and sinks of chemical that influence the surface sediment layer (diffusive flux to water column, deep burial from the surface layer, etc.) is needed.

The assumption that groundwater works on time scales of years is incorrect. Groundwater discharges day in and day out for millennia. The arrival of contaminants to the sediment bed from groundwater is continuous over many decades and represents the most significant measured loading mechanism. Groundwater percolating through the sediment bed can mobilize and transport contaminants that were deposited there from above.

NYC Comment 282) Section 6.4.4.5 Changes in sediment concentration over time.

NCG states that the concentration in the sediments changes over time by comparing the concentration in surface sediment (0 to 15 cm) to the first subsurface sediment core segment (15 to 60 cm). The text then compares the rate of change of sediment concentrations among different river sections, and concludes that "*The rate of surface sediment concentration change*

is slower for TPAH near the mouth of the creek, based on the observation that the surface and first subsurface segments exhibit similar concentrations in this area". Because of the spatial differences in sedimentation rates in the Creek, comparison of the spatial differences in the change in concentration is not that straight forward. NYC Figure 35 shows a plot of the ratio of the TPAH17 in the first subsurface sediment to the subsurface sediment. Based on this plot NCGs assertion that rate is slower tin the mouth cannot be supported as the ratio in the CM0-1 is more variable that the other segments. The NCG should note that differences between subsurface and surface sediment are not only related to new deposition of cleaner sediments from urban background (CSO and MS4 and East River), but are affected by significant sources and fate and transport process in the subsurface sediments including: NAPL migration, groundwater upwelling and ebullition.

NYC Comment 283) Section 6.4.5.1 Sources of Chemicals to the Subsurface Sediment;
On page 260, last paragraph. NCG states that "*However, at any given location, the long and dynamic history of loading, transport, and deposition prevents the definitive linkage of observed chemical concentrations to proximate upland sites*". This assertion is flawed. NCG's assertion is that contamination cannot be linked to upland sites when the data shows contrary results in that source areas can be easily identified and are proximate to upland sites where certain COPCs are expected. For example, the highest elevations of Cu in the surface and subsurface areas are seen in the Turning Basin adjacent to a Cu smelter. Data also shows plumes of Cu upstream and downstream from this source area. NCG should correct this false statement.

On page 261, 2nd paragraph. NCG states that "*The observation that the chemical concentrations do not continue to increase to the bottom of the subsurface sediment in most locations indicates that groundwater is not a significant ongoing source to the mass of chemical in the subsurface sediment bed*". This statement is false and contradictory to many other sections in the report where NCG states that groundwater impacts subsurface sediments more than surface sediments. In addition, data provided in Tables 4-11 and 4-12 of the NCG Draft RI did not support the above statement. For example, at CM 2+ the average concentration of TPAH was 1,800 mg/kg at 500-600 cm compared to 840 mg/kg at 400-500 cm. The average concentrations of TPCB at English Kills and East Branch were also not the lowest at the bottom. NCG cannot simply make conclusions that groundwater is not a significant ongoing source based on a general statement that the concentrations in the subsurface sediments do not increase at bottom. NCG needs to evaluate the change of concentrations with depth at each subsurface sampling location, and compare this profile with the closet groundwater data from the same aquifer.

The size (necessary area) of an important groundwater load discharging to the creek is not known, so the data are insufficient to conclude that groundwater loading is unimportant. To

the contrary, groundwater loads are the largest measured load by orders of magnitude. Also note that this ignores groundwater discharge through the bank which has not been characterized or even acknowledged.

NYC Comment 284) Section 6.4.5.3 Sorption and Desorption in the Subsurface Sediment
The NCG Draft RI states *"Chemicals that migrate from groundwater within the native material into the lower portion of the subsurface sediment column subsequently partition between the sediment and porewater based on sediment characteristics and chemical properties (i.e., partition coefficients; see Section 6.4.1)."*

This statement assumes that the receptor sites available for partitioning have not already been depleted. With the presence of NAPL and the decades to potentially more than a century for contaminant transport in the sediment bed, in some locations it is likely that sediment no longer has capacity to sorb contaminants being transported through it. Like a spent carbon canister, contaminants likely have already broken through (at least at locations where long-term groundwater transported contaminant plumes have been arriving for decades or longer).

NYC Comment 285) Section 6.4.6.1 Metals Speciation and Precipitation, Page 264: The document states Cu and other metals are likely present as insoluble complexes due to the elevated concentrations of AVS relative to SEM in the study area. It needs to be recognized that formation of a metal sulfide is not the same as sorption to particulates. Hence, the evaluation of a partition coefficient for Cu (where K_d = particulate/dissolved Cu) when significant levels of AVS and SEM Cu are present provides a crude approximation, at best, for the ratio of reversibly sorbed Cu to freely dissolved Cu in porewater.

NYC Comment 286) Section 6.4.6.3.1 Biodegradation;
On page 266, 2nd paragraph. **NCG** states that "Representative Biodegradation rates for surface water and sediment are provided in Table 6-4 (presented as half-lives) for PAHs, from a literature review". Based on the data provided in Table 6-4, a single half-live value was provided for each medium (water or sediment). Because biodegradation rates are highly variable and are affected by many factors, including but not limited to physical and chemical conditions at the site, NCG should revise the table to provide the ranges for the half-live for each compound based on the literature review, not just a single value from the EPA's BIOWIN software.

NYC Comment 287) Section 6.4.6.3.1 Biodegradation: *"Fwwer reviewed documents reported biodegradation of PCBs (as compared to PAHs) and where reported, rates varied significantly—including characterizations as nondegradable in many cases. Due to the limited and inconsistent rates found in the literature, degradation of PCBs is conservatively considered negligible over the timescales relevant for the chemical fate and transport evaluations of the*

Study Area". NCG should provide biodegradation rate for PCB even if it varies significantly in the literatures. NCG cannot simply ignore the biodegradation of PCBs at the Study Area based on the limited and inconsistent rates reported in the literature. Dechlorination of PCBs in the subsurface sediments should be discussed using some dechlorination indicators, such as chlorine per biphenyl, mass weighted molecular weight, and ratio of dechlorination derived congeners to total PCB.

NYC Comment 288) Section 6.4.6.3.2 Photolysis, Page 267: Mention is made that photolysis will be considered further in upcoming fate and transport modeling. In addition, the related matter of how photo-activation may influence the toxicity of PAHs needs to be considered (e.g., Mount et al., 2001; Ankley et al., 2002).
The discussion in this section is very general and no site specific data were discussed. NCG should use site specific data to discuss the relative importance of photolysis as a pathway to reduce the chemical concentrations in surface water.

NYC Comment 289) Section 6.4.7 NAPL Fate and Transport Processes: In the beginning of this section NCG states that NAPL has been observed at residual saturation in the sediments of the Creek. This assertion by the NCG is false and should be deleted. To date, NCG has only conducted qualitative tests that are suited for determining whether or not NAPL is present in the sediments of the Creek. NCG has not conducted any tests that quantify the saturation of NAPL in the sediments or to assess its mobility. NCG should delete such unverified and unsubstantiated texts from the entire document.

NCG does not include upland sites as a source of NAPL despite documented seeps from NCG properties and other upland properties. This oversight must be addressed in the revised text.

NYC Comment 290) Section 6.4.7, Page 268: Bulleted list needs to also include dissolution and subsequent diffusive flux (or dissolved exchange) of dissolved phase between surficial sediments and surface water. (This transport mechanism is subsequently and briefly referred to on Page 270 in Section 6.4.7.3.)

NYC Comment 291) Section 6.4.7, Page 270: A decision to focus only on Category 2/3 areas may be premature, as it assumes that the study area has already been thoroughly characterized with respect to presence of NAPL. Data collected by the City (discussed in Appendix E) shows that NAPL is prevalent in the sediments of the Creek and NAPL migration from subsurface sediments and upland sites is a common occurrence in the Creek. NCGs's focus on category 2/3 NAPL areas is in adequate. NCG should add to the concluding sentence in paragraph at top of page should read "*...focus on Category 2/3 Areas* **as well as other locations found to contain NAPL**."

NYC Comment 292) Section 6.4.7.5, Page 271: *"NAPL or sheen may reach the water surface in the Study Area from a multitude of sources, including stormwater discharges (e.g., MS4s), CSO overflow discharges, parking lot and roof drains, illegal dumping, and releases from boats and barges operating on Newtown Creek, as well as by possible transfer from sediment via gas ebullition."*

These possible sources should be reordered in terms of quantity contributed and/or likelihood. Additionally, active bulkhead seeps should be added to this list; photo and video evidence show that NAPL is flowing onto surface water through bulkheads from upland areas. Finally, the word "possible" should be removed from the last phrase. There is no doubt that NAPL is being transferred from sediments to surface water given the documentation of sheen blossoms.

NYC Comment 293) Section 6.4.7.5, Page 280: *"The largest point source loads are generally in tributaries with CSOs (e.g., English Kills, East Branch, Maspeth Creek and Dutch Kills account for almost two-thirds of the total point source TPCB load)."*

The phrase "with CSOs" is unnecessary, since this is simply a list of all the tributaries in the Creek. In addition, it is misleading; just because the tributaries have high TPCBs does not mean it is coming from the CSOs.

NYC Comment 294) Section 6.4.7.5, Page 280: *"the Cu point source loads are highest in the tributaries with the largest CSOs – East Branch, Maspeth Creek, and English Kills."*

However, there are other point sources in these locations, as well as other potential sources from the upland areas surrounding these tributaries, and it is misleading to single out CSOs as the sole source or all Cu contamination.

NYC Comment 295) Section 6.4.7.4 NAPL Migration associated with Gas Ebullition: NCG cherry-picks methane gas to discuss the microbial processes that generate gas bubbles in ebullition. Dr. Rockne of the University of Chicago presented at the 2017 Battelle Sediments Conference on the types of microbes (bacteria and archaea) involved in the ebullition gas formation process. The presentation discussed many types of microbes, which generate not just methane, but also carbon dioxide in large quantities. NCG has provided no evidence of any of the specific ebullition related bacterial processes in the Creek. NCG are making unsubstantiated assumptions that ebullition is driven only by methanogenic bacteria. NCG must consider all microbial processes that cause ebullition, not just the one that they have illustrated.

NYC Comment 296) Section 6.4.7.5 NAPL movement on surface water: NCG should include

upland sites as documented source of NAPL on water surface. Also timber pilings should be added to the list. NCG in their ebullition Appendix D, identifies timber pilings as source of sheens to the Creek based on their observations.

NYC Comment 297) Section 6.5.1 Methods and Results for Inventory and Load Estimates

Text in this section is not clear on how to handle the TPCB Aroclor data in surface water in the calculation of loads. As presented in Figure 4-94, TPCB data based on Aroclor method are of large variability, ranging from non-detect to 100 ng/L in surface water samples. In contrast, TPCB data based on congener method are mostly within the range of non-detect to 20 ng/L. Such data suggests that a detailed investigation of the Aroclor-based laboratory analyses should be carried out. The Aroclor data for surface water should not be used in the calculation of loads until such an investigation has been completed and evaluated. Therefore, TPCB Aroclor data for surface water are highly uncertain and should not be used in the calculation of loads. If Aroclor data were used, NCG should revise the mass inventory for PCB in surface water (Section 6.5.1.1) and Sediment/Water Exchange processes loads (Section 6.5.1.3). Additionally, due to the limited number of congener data for surface water, an uncertainly analysis should be included.

Text in this section is not clear on how to handle the dissolved phase Cu concentrations in surface water in the calculation of loads. Many of surface water samples (both during dry and wet weather periods) reported a greater concentration of Cu in the dissolved phase than in the total phase as indicated by Tables 4-24, 4-27, 4-32 and 4-33. An investigation related to data quality and reliability is indicated. The dissolved phase concentrations of Cu for these samples are questionable and should not be included in the load calculation. NCG should revise the load calculation for surface porewater net diffusive exchange if these unreliable Cu data were used.

NYC Comment 298) Section 6.5.1.3 and Section 6.5.1.4.

NCG's discussion on the mass transfer process is based on the average concentrations. NCG should discuss the upper and lower limits as well as the uncertainties of these mass transfer annual loads.

NYC Comment 299) Section 6.5.2 Comparison of Mass Load and Inventory Estimates

This section is incomplete. The text does not discuss COPC loads from East river. Also, loads from upland sites such as NAPL are not included in the text as a line item. Without inclusion of these two load sources, text as written is incomplete. NCG should revise figures 6-28 to 6-31 and associated text to reflect missing loads.

Also, all the external loads shown in the figures are gross loads. A figure showing the net external loads should be included. This will help the reader assess the missing loads that remain to be quantified in understanding the inventory present in the surface sediments of the Creek.

NYC Comment 300) Section 6.5.2.1 TPAH-Comparison of Mass Load and Inventory Estimates This section is missing the largest load of TPAH to the system, NAPL loads from upland sites are not included in the text and associated figure. This oversight needs to be addressed.

NYC Comment 301) Section 6.5.2.2 TPCB-Comparison of Mass Load and Inventory Estimate, page 280: *"The largest point source loads are generally in the tributaries with CSOs (e.g., English Kills, East Branch, Maspeth Creek, and Dutch Kills account for almost two-thirds of the total point source TPCB load)".*

This is a biased unsubstantiated, and false statement. Based on data presented in NCG Draft RI Table 6-5, the point source load for TPCB at Dutch Kills (0.046 kg/year) is smaller than those at CM1-2 (0.13 kg/year) and CM2+ (0.17 kg/year).

The NCG Draft RI also states that *"Elevated per acre masses of PCBs in surface sediment occur at discrete locations within the Newtown Creek system, particularly within Dutch Kills and English Kills (see Table 6-5), and upland sources have not been identified".*

Table 6-5 only presents the total mass for each reach. No data are provided on a per acre basis. NCG should make the data and the text consistent.

NYC Comment 302) Section 6.6 Bioaccumulation: The data analyses presented on the referenced figures provide an overly simplified analysis and interpretation of the measurements. It is necessary to examine plots of wet weight and lipid normalized tissue concentrations versus dry weight and organic carbon-normalized sediment concentrations.

NYC Comment 303) Section 6.6.1 Lipid Normalization: More work is needed before resorting to wet-weight normalized results. It is of limited use to plot wet weight concentrations versus lipid content when the sediment concentrations are varying widely. NCG should compute the lipid normalized concentrations and then relate these results to the exposure concentrations. Analyses presented subsequently for mummichogs (Figure 6.6.2.1), for example, which relate tissue concentrations to average sediment concentrations within alternative estimates of their home range, are more useful.

NYC Comment 304) Section 6.6.2.2 Non-Resident Organisms, Pages 285 – 286: This section needs to refer back to Figures 4-155 and 4-157 which present results that were qualitatively suggestive of striped bass tissues being related to Newtown Creek spatial gradients in sediment concentrations. The implications of this observation, with respect to a non-resident species, needs to be discussed as they seem to reflect spatial gradients in exposure concentrations within the study area.

It is expected that many other exploratory data analyses have been performed for the non-resident organisms. A discussion of such alternative analyses needs to be included in this section. The analyses that are presented (NCG Draft RI Figures 6-39 – 6-42) are introduced by making an argument as to why they are not appropriate (wide-ranging migratory behavior), and then presented as if they were. Additional description and explanations are needed.

City Comments on NCG Draft RI Chapter 7 – Risk Assessments

The Baseline Human Health and Ecological Risk Assessments (BHHRA and BERA) have been submitted separately and the City has provided comments on those documents. Comments specific to the Draft RI are presented below:

NYC Comment 305) Section 7.2, Page 306: *"BERA also evaluates the effect of non-CERCLA stressors and other parameters including, but not limited to, DO, salinity, and habitat quality."*

Such evaluations were outside the scope of the BERA, and should be moved to an uncertainty analysis. Pending revisions to the BERA, this section should also be revised.

NYC Comment 306) Section 7.2, Page 306: *"The BERA uses an SQT approach consisting of benthic community analysis, sediment toxicity testing, and both sediment porewater chemistry and bulk sediment chemistry."*

This section should be revised pending the finalization of the BERA to reflect what data was actually used. Additionally, as always, this section fails to describe how all these different lines of evidence will be combined.

NYC Comment 307) Section 7.2, Page 308: Fish species may need to be updated pending finalization of the BERA.

NYC Comment 308) Section 7.2, Page 309, second paragraph: The NCG Draft RI states that research on equilibrium partitioning demonstrates that porewater is the primary rout of exposure for divalent metals and polar organic compounds and cites to EPA, 2005 and EPA, 2012. However, the text should acknowledge that there are other possible pathways of exposure, such as sediment ingestion.

NYC Comment 309) Section 7.2, Page 312: *"Rather than rely on bulk sediment chemistry to assess risks to benthic macroinvertebrates, sediment porewater chemistry was used in conjunction with sediment toxicity test data"*

It does not appear that this approach is consistent with the RI Work Plan objective. In addition, the sediment quality triad (SQT) approach is mentioned here again, but there is no explanation for how these different lines of evidence will be applied.

Finally, confounding factors analysis (OC, DO, etc.) should be removed to an uncertainty section.

NYC Comment 310) Page 312-13: The Draft RI describes the site stations as being *"less than reference area values when DO in the Study Area falls below … 3 mg/L."* But the WBI scores are categorical. Anything below 3 is "stressed" therefore, "lower" values are not necessarily any different than "higher" values if they are all below 3, which many are. This is a misinterpretation/misuse of the WBI and is carried forward to Section 7.2.6 on page 326.

NYC Comment 311) Page 313: The summary should state that the AVS-SEM data indicate that metals are not likely to be the cause of toxicity in the toxicity testing program.

NYC Comment 312) Page 314: The 28-day toxicity test results are stated, but not the 10-day results. Results from both tests should be reported and used to determine potentially toxic areas.

NYC Comment 313) Page 314-15: Lack of correlation between the low toxicity test survivals and the chemistry data prompts NCG to suggest *"other confounding constituents… in proximity to CSOs"* are causing the toxicity. But there is no mention of physical effects that may be resulting from NAPL or other separate phase product or the various other sources in the study area.

NYC Comment 314) Page 314, Footnote: A reference envelope is discussed for comparison to the toxicity tests, and Phase 2 toxicity data is used, but there is no mention of whether outliers were removed, or how this reference envelope was calculated or applied.

NYC Comment 315) Page 315: Discussion of the mineral oil to C19-C36 benchmark should be removed since it is not a valid approach (see City comments from the BERA). Additionally, the NCG Draft RI discusses urban runoff contributors to the C19-C36 fraction, but ignores all other contributors such as oil facilities and former-MGP sites.

NYC Comment 316) Page 316: The detailed discussion of geography, CSOs, and CSO volumes relative to stations with high C19 to C36 aliphatic concentrations and low toxicity makes an a priori assumption that some constituent of the CSOs are responsible for the C19 to C36 hydrocarbons without any substantiation.

NYC Comment 317) Page 316: The use of a correlation between TPAH and SEM after filtering out data from several stations based on an uncertain and unsubstantiated C19 to C36 benchmark is an arbitrary and uncertain data selection process and should not be part of the BERA discussion.

NYC Comment 318) Page 317: The last paragraph of 7.2.4.3 states that porewater TPCB HQs for mummichog ranged from 0.0.052 to 9.4, with exceedances greater than 1 at 3 stations in the Turning Basin and at 4 stations in English Kills. The NCG Draft RI states that *"incorporating the other lines of evidence, TPCB is not of concern for fish that use the Study Area",* but there is no explanation on how these multiple lines of evidence were used together, how they were weighted amongst each other to arrive at the result. This arbitrary conclusion should be removed.

NYC Comment 319) Page 317: Last paragraph: Issue of modified site use to reflect that double-crested cormorants spend some time off site. See BERA comments.

NYC Comment 320) Page 319: The introduction of a discussion of salinity as explaining differences among specific reference areas and the study area is confusing. NCG seems to contend that one or more of the reference areas are inappropriate as reference areas due to salinities that are not found in the study area, which was already considered in the reference area selection process. This section should be removed.

NYC Comment 321) Page 317-324: There are many comments in this section that mention whether risk was likely over or underestimated. It would be useful to look at a cumulative count of each risk parameter to see whether it was continually over estimated, or overestimated in one case and under estimated in another, such that it might actually come out closer to the true risk. A summary table would be appropriate here.

NYC Comment 322) Page 323: The argument that the 10-day toxicity test is biased due to lack of water change or feeding is mentioned again at the bottom of this page. However, as previously discussed in our BERA comments, this is a standard EPA-approved test, that met all the test protocols, and the results are therefore valid.

NYC Comment 323) Page 324: The final paragraph of Section 7.2.5 mentions the lack of evaluation of non-CERCLA chemicals, such as "pharmaceuticals, pathogens, and personal care products." The purpose of the Draft RI is to examine CERCLA chemicals, there are a huge number of non-CERCLA chemicals and hazards that fall outside this domain, vague statements about these emerging contaminants should be removed.

NYC Comment 324) Page 326: There is no summary of the relationship between sediment toxicity and specific COPCs. This section implies that there are various confounding factors that are preventing any such relationships, which indicates that the risk assessment is incomplete.

NYC Comment 325) Page 326: The final paragraph of Section 7.2.6 again mentions that toxicity appeared higher in areas near the four largest CSOs, but no mention is made about that the most toxic sampling stations were also locations immediately adjacent to upland industrial sources, or ongoing sources of sediment NAPL migration and ebullition. This section should be revised.

City Comments on NCG Draft RI Chapter 8 – Conceptual Site Model

The CSM forms the basis of the evaluation of remedial alternatives in the FS, and an accurate CSM is of critical importance. Accordingly, the CSM must provide a technically complete and accurate understanding of the environmental system and the physical, chemical, and biological processes that determine the transport of contaminants from sources to receptors in the Study Area. NCG's CSM, however, incorporates and summarizes the flawed and incorrect analyses, conclusions, and assertions set forth in the various technical chapters and appendices of the Draft RI. The City has submitted detailed comments on those chapters and appendices, and for the purposes of this summary, notes some of the most flawed conclusions in the CSM.

NYC Comment 326) The CSM overly emphasizes the loads from point sources and East River and minimizes the role of groundwater, NAPL, historical and other on-going industrial inputs. NCG has not described the historical activities and contaminants from upland sites. The groundwater evaluation is based on several flawed assumptions and incorrect data interpretation, resulting in a gross underestimation of the impact of this significant source of COPCs to the Creek. Failure to adequately account for these other loads results in an incomplete and indefensible CSM.

NYC Comment 327) NCG's CSM continues to rely on the same flawed assumption from the BERA that CSOs and MS4 are responsible for ecological risk in the tributaries. The data and EPA's comments on the BERA demonstrate that this assumption is incorrect.

NYC Comment 328) NCG has mischaracterized the nature and extent of surface sediment contamination and wrongly states that all reaches of the Creek are comparable to background. NCG has supported this with a statistical analysis comparing the Creek to reference area data.

Because the proposed CSM fails to account for several important loads, NCG's contaminant fate and transport evaluation focuses mainly on solids input from the East River, CSOs and MS4s. NCG hypothesizes that new input of solids from these three sources blends with previously deposited sediments. If the solids from these three sources were the only significant inputs to this system, the surface sediments would mirror the concentrations observed in the 14

reference areas, which have these inputs as well as similar histories. However, concentrations in surface sediments are elevated relative to urban background, indicating that NCG's hypothesis of blending/mixing of new input of solids from these three sources with previously deposited sediment is flawed. The inconsistency between NCG's hypothesis and in-creek observations demonstrates that there are significant ongoing contributions of COPCs from other sources, and these are major sources of contamination. The elevated concentration in the Creek, compared with the reference areas, reflects the historical and ongoing industrial discharges that are unique to the Creek.

NYC Comment 329) NCG concluded that the Draft RI data are sufficient to develop the CSM, which provides the basis for crafting remedial alternatives in the FS. This conclusion is incorrect, as there are important inputs and processes that remain to be studied and quantified, including the nature and extent of NAPL, NAPL dynamics, ebullition facilitated transport, and other ongoing industrial releases. Without an understanding of these inputs and processes, the CSM put forth by NCG is deficient and cannot support an evaluation of remedial alternatives in the FS.

<u>Specific Comments</u>

NYC Comment 330) Section 8.1, Introduction, "*The key ongoing sources of contaminants to the Study Area are point source and overland flow discharges, tidal exchange with the East River, and to a lesser extent, groundwater flow through the subsurface sediment bed (see Figure 8-1, Section 8.5, Section 5, and Appendices E and F)."*

The NCG fails to identify NAPL migration from upland sites (both controlled and uncontrolled) and from subsurface sediment (via ebullition) as one of the largest potential loads of COPCs to the Creek. Available upland data shows that NAPLs found in upland sites have elevated levels of COPCs, orders of magnitude higher than those measured in point sources. For example, data from GPEC, a former MGP site, shows that the TPAH (sum of 17) concentration in NAPL at that Site is as high as 160,000 mg/kg (16%) which is several orders of magnitude higher than the maximum concentration in the CSO and MS4 solids (max concentration of 100 mg/kg). Not identifying NAPL as a significant source of COPC loads is a clear indication that the proposed CSM from the NCG is severely deficient. Throughout the NCG Draft RI and in this chapter specifically, NCG focuses on CSOs and MS4s as a source of significant COPC loads and risks to the Creek. These assertions by the NCG are incorrect. NCG's CSM as presented is flawed and using this CSM as a basis for remedial design will result in development of a remedy that will not prevent recontamination. The sources, transport and fate of NAPL should be quantified and included as source of COPC loads and contamination to the Site.

NYC Comment 331) Section 8.1, Page 328, *"The risks to ecological communities at many locations in the tributaries are attributed primarily to significant ongoing discharges from CSOs and MS4s."*

This statement is incorrect and should be deleted from this chapter and all other sections of the NCG Draft RI. The EPA has provided significant comments to the NCG BERA and has stated in a recent email to NCG (02/17/2017) that EPA does not find NCG's assertion that CSOs are responsible for the toxicity in the tributaries to be plausible. NCG must delete this erroneous statement from the document. Reference area data collected in other waterbodies with CSOs shows that there is no toxicity to the benthic community due to presence of CSOs.

NYC Comment 332) Section 8.2, Page. 327: Figure 8-1: The Conceptual Site Model is missing NAPL seeps from upland Sites and point-sources other than CSOs (other pipes, cracks in bulkheads, etc).

NYC Comment 333) Section 8.2, Page 327 Figure 8-2: The figure only shows receptors at risk. It should be more comprehensive in showing all likely pathways and receptor groups so that the reader has a comprehensive concept of the Creek.

NYC Comment 334) Section 8.2, Page 328: NCG states that Chapter 3 of the NCG Draft RI provides a perspective of industrial activity along Newtown Creek. Chapter 3 only provides a perspective in the chronological sense of active site utilization, and does not provide information on the COPCs present and/or expected at any of the NCG properties as a result of the historical and current activities. This information is available through NYSDEC remediation efforts for almost all NCG sites. NAPL, groundwater and other on-going industrial inputs from the upland sites constitute a significant source that has not been fully characterized. This is a significant shortcoming in the CSM that needs to be addressed.

NYC Comment 335) Section 8.2, Page 328: *"The risks to the ecological communities at many locations in the tributaries are attributed primarily to significant ongoing discharges from CSOs and MS4s."*

This statement has no data to support it. Actual comparison of the reference area stations that were specifically selected to test the influence of CSOs on toxicity shows that the presence of CSOs does not affect the sediment toxicity. NAPL, which is mentioned numerous times in Figure 8-3, should be called out specifically in the text as a likely source of toxicity.

NYC Comment 336) Section 8.2, Page 331: The text states that during wet weather, the CSOs are a significant source of inflow and contain not only CERCLA hazardous substances, but also

other pollutants and contaminants. However, these CSOs have been extensively sampled during wet weather events and the concentrations of COPCs in the water discharged from these CSOs does not come close to explaining the contaminant concentrations observed in the sediments in the Creek. Therefore, the main source of contamination must be from another source. The text of this section should be revised.

NYC Comment 337) Section 8.3 Physical Characteristics of the Study Area: The objective of this section is to discuss physical characteristics of the study area, but the text focuses specifically on point sources without discussing other processes. The text discusses point sources, transport of solids from point sources and conditions in the Creek during wet weather, and the blending and mixing of older sediments with new inputs. One significant omission from this text is the location of upland sites of interest along the Creek and the impacts on the sediments adjacent to the sites. Discussing the locations of these sites in a given reach is important because it provides the reader information regarding the historical and ongoing COPC sources. For example, the Cu concentrations in the surface and subsurface sediments of the Creek are significantly elevated in the Turning Basin area, adjacent to the former Cu smelter site. Also, the PCB concentrations in Turning Basin and English Kills are elevated adjacent to upland sites with known PCB contamination. The concentrations in the Creek are significantly elevated when compared to solids from point sources and it is clear that NCG mixing model of solids based transport cannot explain these elevated concentrations. This section should be revised to include a thorough discussion of upland sites and their ongoing impacts on the Creek.

This section goes into detail about how new solids are discharged from East River and point sources and how these mix by various processes with historical solids resulting in the COPCs levels that exist in the surface today. NCG fails to indicate that several of the cores do not indicate extensive mixing in the Creek based on the profiles of radionuclides and/or COPCs. If these inputs and processes were responsible for the elevated concentrations seen in the Creek surface sediments, then the reference area waterbodies, which are tidally connected to the East River and receive CSO discharge (e.g. Westchester Creek, Flushing Creek and Steinway Creek) should contain elevated concentrations comparable to Newtown Creek. The fact that these reference waterbodies have surface sediment concentrations at background levels strongly suggests that the elevated COPC concentrations in Newtown Creek are a result of contamination specific to the Creek and unrelated to urban background inputs like CSOs.

This section also fails to discuss groundwater input to the Creek. Groundwater's freshwater discharge to the Creek is comparable to that from the CSOs and COPC loading from groundwater is much larger than point sources. This section is not complete without a discussion of groundwater.

NYC Comment 338) Section 8.4.1 Surface and Subsurface Sediment: The Draft RI states that surface sediment concentrations of TPAH, TPCB and Cu in all reaches are comparable with background. There were no statistical test performed to prove this assertion. Evaluation of whether the Creek's concentrations are comparable or significantly from background a statistically defensible comparative method should be used. Table 1 from the US Navy's Guidance for Environmental Background Analysis- Volume II: Sediment (2003) provides a list of applicable two sample hypothesis testing methods. NCG should select the appropriate statistical method to evaluate whether the concentrations from each reach of the Study Area are significantly different from those in the Reference waterbodies. In addition to considering TPAH, representative individual PAH compounds should also be tested for differences. Without such an assessment the statement assigning background levels to the contamination of sediments in CM0-1 is premature and needs to be deleted. A discussion of NAPL should be included in this section and not discussed separately. The middle reach, adjacent to former refineries, is highly impacted by NAPL. Also NAPL migration from remediated upland sites (former Pratt Oil works refinery currently owned by ExxonMobil) and from subsurface sediments has been documented and must be considered.

Text describing CM2+ area should be revised to state that this is the most contaminated reach of the study area. Concentrations for TPAH, TPCB and Cu are among the highest measured concentrations in the Creek and occur over a large area. Also, TOC is elevated in this region and needs to be discussed in the text. NAPL impacts also need to be discussed, NAPL migration from the uncontrolled former MGP site has been documented and also significant NAPL migration from NAPL impacted sub surface sediments has been documented in this reach. A discussion about NAPL is missing and must be included in the text.

The NCG Draft RI combines all tributaries into one generalized discussion. Each tributary has different impacts that cannot be accounted for in a combined generalized discussion and must be discussed separately. For example, English Kills has elevated TPCB concentrations as compared to Maspeth Creek and East Branch. As discussed in the NCG Draft RI, this elevated concentration is likely due to impact of upland sites with known PCB problems. In addition to PCBs, NAPL sources in the tributaries also vary. English Kills has documented NAPL sources from upland sites such as Manhattan Poly Bag, Frito Lay. Also NAPL migration from subsurface sediments has been documented. Even the sediment trap, surface water and surface sediment data show ongoing impact in the first bend of English Kills. Dutch Kills, has been impacted by a documented 2000 gallon illegal oil release. COPC concentration in the spill are not discussed in the text. East Branch, non- CSO fork, is impacted by NAPL. NAPL migration from sub surface sediments in this reach is significant. By combining all the tributaries into one section, NCG fails to discuss unique sources of COPCs to the tributaries.

NCG states that the elevated OC in the tributaries is primarily due to CSOs and MS4s, this statement is not well supported and the City has provided significant comments about this in chapter 4. This section fails to state that NAPL is also a source of OC to the Creek sediments and elevated OC has been documented in sediments impacted by NAPL. For example, native sediments in the Turning Basin area have TOC as high as 20% while the OC in un-impacted native materials is less than 1%. This omission by the NCG is intentional and needs to be rectified. A thorough discussion on all sources of OC is needed and must be included.

NYC Comment 339) Section 8.4.1.2 NAPL: This sections needs to be rewritten and as noted earlier, needs to be included in the discussion of other sources. NCG minimizes the importance of NAPL in the Creek by using terms such as "immobile" or "below residual saturation" when discussing presence of NAPL in the sediments. To date, NCG has not conducted <u>any meaningful</u> quantitative investigation regarding the nature and extent of NAPL, and the saturation or mobility of NAPL to arrive at these assertions. All NCG has assessed, is the presence or absence of NAPL in the sediments of the Creek using visual observations and shake tests. Even the results of these tests have been misrepresented by the NCG. Sheens are not considered by NCG as indicators of NAPL. Also NCG has categorized the shake test observations using a subjective assessment to further minimize the extent of NAPL in Creek sediments. NCG fails to account for heterogeneity of NAPL in the sediments. Single core observations form the basis of the NCG statement that NAPL extent is laterally and vertically delineated. This is neither rigorous nor acceptable.

In contrast to the poorly designed and implemented NAPL assessment presented in the Draft RI, a thorough and robust study was conducted by the City using LIF technology, a standard approach used by the industry and regulators. This comprehensive survey of the entire Site to delineate the presence of NAPL shows that LIF responses indicating the presence of NAPL like material is prevalent in the sediments over large areas of the Creek. Core logs adjacent to City LIF sample locations confirm the presence of NAPL at depths corresponding to LIF responses that are indicative of NAPL. The City's LIF study shows that there are multiple types of NAPL present in the sediment and the areas affected by NAPL are extensive.

It is clear that NCG is not interested in objectively evaluating and quantifying the impact of NAPL on the sediments of the Creek. The state agency, NYSDEC, through their comments to EPA has also indicated serious reservations regarding NCG's approach to delineate NAPL. An unbiased re-write of this section is needed and without a complete understanding of NAPL impacts the CSM is incomplete.

NYC Comment 340) Section 8.4.2 Native Material: Similar to chapter 4, the text in this section fails to accurately and quantitatively describe the COPCs in the native materials. The text states

that TPAH concentrations greater than 10 mg/kg have been measured in the tributaries and in CM2+ area. This is not an acceptable way of describing COPC concentrations in a technical document. This does not provide the reader any idea regarding the range of these elevated concentrations. For example, the concentrations in the native material in English Kills are as high as 12,000 mg/kg, orders of magnitude higher than the 10 mg/kg NCG uses to describe the native materials. The potential NAPL source of this elevated concentration should be discussed.

The text also fails to describe presence of elevated OC in the native materials in the CM2+ area adjacent to the former MGP site owned by National Grid. On average the OC in un-impacted native materials is less than 1%. In some areas of the Turning Basin the OC in native material is as high as 20% which is an unequivocal evidence of other sources of OC in the Creek. This important finding is overlooked by NCG and needs to be discussed in the text.

NYC Comment 341) Section 8.4.3 Surface Water, page 336, last paragraph, *"During wet weather, discharges from CSOs, MS4s, and other point sources produce significant loads of contaminants to the Study Area".*

Based on data presented in NCG Draft RI Table 6-5, the total point source loads for TPAH17 from CSO and MS4 is 44 kg/yr, which is less than 3% of NCG's estimated load from groundwater, which is estimated at 1700 kg/yr. Furthermore, the NCG Draft RI report has not quantified the loads from East River. Therefore, NCG's conclusion that discharges from point sources produce significant loads to the Study Area is flawed and not supported by the data.

Draft RI Table 6-5 also shows that the deposition of TPAH from suspended solids in the surface water into the sediment bed is 20 kg/yr and 50 kg/yr based on dry weather and wet weather surface water data, respectively. Assuming wet weather condition occurs in approximately 20% of the days (Section 6.5.1.1), the TPAH loads from solid deposition is 16 kg/yr and 10 kg/yr during dry and wet weather, respectively. These loads are significantly lower than the total mass deposition of TPAH, which is about 290 kg/year.

NYC Comment 342) Page 337: The first bullet under CM 0-2 again makes the argument that PAH concentrations are within the range of Reference Area results. A more complete analysis is needed to compare the concentration distributions in this reach to those at the reference area sites. Similar comparisons are made for other study area sub-reaches. The data are compared on Figure 8-11. It is clear from this graph that (i) Total PAH is much lower than the Newtown Creek data at two of four or the Phase 2 reference locations, (ii) Total PCBs are markedly lower at all four reference area locations, while (iii) Cu is the only one of the three COCs that exhibits levels that are consistently comparable to the Newtown Creek data. The text needs to be

revised to more accurately describe the comparisons. Also, what are the "general urban Cu sources" that NCG is discussing in the Creek? Such vague statements should be deleted and replaced with specific information.

NYC Comment 343) On page 337, under CM 2+, the NCG Draft RI, discussing dry weather loads states that *"Surface water concentrations in CM 2+ are generally similar to CM 0 – 2. Diffusive flux from surface sediment and resuspension, probably with contribution from wet weather point source discharges, likely contributes to surface water contamination".* This statement represents an unreasonable interpretation of the data. NCG is attributing dry weather contamination in this reach to the influence of wet weather point source discharges. If surface water in CM2+ is similar to CM0-2, then the groundwater, ebullition though the sediments and in CM2+ are responsible for the elevated surface sediments in CM2+ area. To understand elevated concentrations in dry weather discharge NCG should evaluate impact of porewater, ground water, industrial discharges, ebullition and NAPL on the dry and wet weather concentrations. This statement must be deleted from the Draft RI.

NYC Comment 344) Section 8.4.3 Surface water – Discussion of reference areas*," the four Phase 2 reference areas were selected by EPA specifically because they exhibited lower surface sediment concentrations than the other Phase 1 reference areas*" and in contrast, on page 13 the NCG Draft RI states, *"Four Phase 2 reference areas were selected to represent the range of physical, chemical, and habitat characteristics of Newtown Creek".*

Phase 2 reference areas were selected based on their land use type (industrial vs. non-industrial) and CSOs (with and without CSOs). They represent the general conditions of the urban background waterbodies in the NY/NJ Harbor area. NCG should evaluate the potential sources of TPCB in surface water during dry weather rather than arguing that the concentrations from the four phase 2 background waterbodies are lower than typical background conditions. This argument does not provide any explanation for elevated TPCB concentration in the Creek during dry weather.

NYC Comment 345) Groundwater related comments for Section 8.4.4, Section 8.5.2.3, and Section 8.6.1: NCGs data and analyses regarding groundwater are flawed and incomplete including:

a) A flawed model of saltwater cycling that is not supported by the data.
b) Extrapolation of spurious seepage data to large areas of the creek.
c) Use of composite groundwater/surface water data to characterize groundwater loads arriving at the shallow sediments and surface water. DOC complexed COPCs are also not considered, causing further underestimation of COPC loads.

d) Failure to include groundwater discharge and contaminant loading through the banks of the creek.

For these reasons, these sections are erroneous and must be re-written when the data gaps are filled, and deficiencies and errors are corrected.

NYC Comment 346) Section 8.5.1 Historical Sources: Historical sources are not adequately discussed anywhere in the Draft RI. A separate appendix similar to other sources such as (point sources, groundwater, NAPL etc.) is needed to provide a thorough discussion of historical sources to the Creek. This discussion should include information of the COPCs on each upland site, the migration pathways of contamination to the Creek, and a discussion of presence of NAPL. Without this information the NCG Draft RI is incomplete and fails to document the ongoing impacts of upland site on the Creek resulting in development of inadequate remedial alternatives.

NYC Comment 347) Section 8.5.2 Current Sources: This section is incomplete and biased towards point sources. The text describes the gross loads of COPCs from point sources but does not discuss those for East River. All point source loads to the Creek to the Creek are also going to be impacted by the tides. A significant omission in the text includes ongoing contamination from upland Sites. NAPL seeps have been documented from several sites, including NCG properties, along the length of the Creek. NAPL is a significant source of COPCs as evident in available upland data. Failure to discuss this as a source is intentional and needs to be addressed. NCG should also delete false statements from the text which state that no observable seeps were documents in Phase 1 and Phase2. Videos documenting NAPL from upland sites have been shared with the NCG, NYSDEC and EPA. ExxonMobil has instructed their contractor to deploy booms around the upland site in an effort to contain NAPL. Such egregious oversight by the NCG is a clear indication of their reluctance to investigate ongoing upland and NAPL sources to the Creek.

The magnitudes of ongoing releases of contaminants associated with seeps and other forms of releases (including contributions from groundwater, NAPL and gas ebullition-facilitated transport of deeper contaminants) need to be discussed in the NCG Draft RI. In addition, to present a more complete CSM, this section needs to acknowledge and present the dominant role of East River fine solids to total fines deposition from the mouth of Newtown Creek upstream through the Turning Basin. A figure of similar format to Figure 8-7 needs to be included to demonstrate that dominant role graphically.

NYC Comment 348) Section 8.6.1 Contaminant Fate and Transport Processes, page 346, 4th paragraph: *"Larger particles settle closer to the release point, and finer particles and particles with higher organic matter content are generally transported farther. In general, contaminants sorb more strongly to finer particles than to particles that are coarser and/or have an inorganic*

composition. This process contributes to the observed distribution of contaminants in surface sediment (see Section 4)—the generally observed increase in contaminant concentrations with distance downstream from the head of the tributaries is likely due (in part) to differential settling of fine and coarse contaminated particulate matter".

This assertion by the NCG is flawed because it assumes only solids based COPC transport and in doing so it fails to directly address the role of TOC which has a complicated and unconventional relationship to % fines in the study area. Instead, the TOC influence is glossed over in the reference to particles "that are coarser and/or have an inorganic composition." The assumption also fails to include COPC transport due to NAPL which is a free phase liquid and a source of OC and COPCs. Based on the above objections, it is not surprising to find there is lack of correlation between COPC and fines evident in the Creek sediments. To further illustrate this the City has evaluated the contamination in the three sections of East Branch. These sections are shown in NYC Figure 36a. As shown in NYC Figures 36b and 36c the COPC concentrations in the three sections are different. Average TPCB concentration in the east branch fork with CSO is 0.7 mg/kg while the average concentration in the other two sections is 2 mg/kg and 5 mg/kg, more than two times higher than the concentration in the fork with CSO and also higher than background. TPAH concentrations show a different pattern. Highest concentrations of TPAH are measured in the non-CSO fork of the East Branch with average concentration of 110 mg/kg. NAPL migration has been documented in this section of the Creek by the City and NCG. Comparatively, the average concentration in the other two sections is less than 50 mg/kg. Evaluation of organic carbon data (NYC Figure 36d) shows that all three sections are comparable. Comparison of fines concentrations (NYC Figure 36e) shows that percent fines are comparable in the two forks of the EB with elevated percent fines concentration in the reach that connects the two forks to the Turning Basin. This distribution of fines, OC and COPCs shows clearly that the patterns in COPCs are not associated with the fines or OC content. Rather the distributions show that NAPL in the non-CSO branch is a likely source of COPC which is not considered by NCG in their CSM.

NCG also fails to evaluate background waterbodies with CSO located at the head end which provide a good surrogate to evaluate the impact of CSO particles in these urban waterbody. Fresh Creek, Hendrix Creek, Spring Creek and Steinway Creek meet the above criteria and were selected for this evaluation. NYC Figures 37a to 37c depict the change of concentrations for percent fines, TOC, TPAH17, TPCB, Cu and lead in surface sediments downstream of the CSO outfall in the above selected background waterbodies. In order to synchronize the data among the four waterbodies, a reference location was identified as the sample location which was closest to the CSO outfall at the head of each waterbody. The change of concentration was presented as the ratio of the concentration at a location to the reference location. The distance

downstream was presented as the distance of a location from the reference location. The data show that concentrations of TOC, TPAH, TPCB, Cu and lead all decrease with distance from the CSO outfall. Specifically, concentrations of TOC, TPAH, TPCB, Cu and lead decrease to half of their values in about 0.6, 0.3, 0.2, 0.4 and 0.4 miles from the CSO outfall, respectively. In contrast, percent fines do not increase downstream from the CSO outfall. This is contrary to NCG's hypotheses that more contaminated fine particles are transported further downstream of the CSO outfall. The findings in reference areas support that the contention that high concentrations observed downstream of the tributaries in the Study Area are attributable to other sources and not to the transport of CSO particles. NCG cannot just state hypotheses without providing further evidence. NAPL a source of COPCs in the Creek must be included in the fate and transport section.

NYC Comment 349) Section 8.6.1 Contaminant Fate and Transport Processes Page 345, Sources to Water Column: NCG mentions the presence of dry weather point source discharges to the Creek. This discussion is not clear, NCG should provide a discussion of which outfalls discharge during dry weather. The phrase should be omitted or measurements and additional description of dry weather point source discharges need to be provided.

NYC Comment 350) Pages 347– 348, Groundwater and porewater flow and contaminant transport: NCG wrongly states that groundwater is not a significant source of contaminants to surface porewater and sediment, and therefore not a significant source to the water column. It was difficult to follow the line of reasoning in this section. In the end, is the conclusion that advection of contaminated porewater to the water column is less than the diffusive flux of porewater chemical to the water column? This seems to be what is shown on Figures 8-13 – 8-15. Is the point that the porewater seepage velocity is so low that it contributes less to transport than does the diffusive transport associated with the concentration gradient? Please clarify. Also note the comments made with regard to groundwater previously, including:

- the NCG Draft RI ignores groundwater discharge through the banks,
- the porewater concentrations are a composite of groundwater and surface water, so total water exchange must be considered, not just groundwater seepage,
- and, the NCG Draft RI does not account for DOC complexed COPCs delivered from the porewater.

All of these shortcomings cause the NCG Draft RI to significantly underestimate the loads contributed by groundwater and porewater.

NYC Comment 351) Pages349– 350, Gas ebullition: This section is focused on the process of ebullition rather than the impact of this process. NAPL migration facilitated by ebullition is of concern not ebullition by itself which is a naturally occurring process (refer to City comments on Appendix D). NCG lists all the factors that are conducive to ebullition, but fails to mention that

ebullition occurs throughout the Creek even in areas such as the middle reach where CSOs are not the source. Also, the text fails to mention that NAPL is a source of OC that will degrade and cause ebullition. NCG should map the areas where ebullition facilitated NAPL migration is occurring rather than discussing processes conducive to ebullition.

NYC Comment 352) Page 350 Processes associated with surface sediment, bottom paragraph: The implication that the historical contamination associated with subsurface sediment layers is due to CSO and MS4 (and not related to historical industrial releases) has not been demonstrated in the NCG Draft RI. Such self-serving statements by the NCG need to be removed from the document. Further, in one of only a limited number of times that NCG discusses industrial sources in the NCG Draft RI, NCG lists as a major factor as to why contaminant concentrations in surface sediments have declined over time: ***"A decrease in industrial sources due to the changing nature of industrial operations along Newtown Creek and remediation of upland sites with legacy contamination"*** [emphasis added]. It is neither credible nor possible that industrial sources did not contribute significantly to contamination in subsurface sediments.

NYC Comment 353) Section 8.6.2 Natural Recovery: NCG states that surface sediment concentrations are declining over time due to ongoing deposition of solids with lower concentrations. While this hypothesis may be true, NCG has failed to quantify the rate of decline in concentrations. It is very likely that cleaner solids have been coming into the Creek for decades, but NAPL migration from uncontrolled upland Sites and from subsurface sediments is preventing any significant recovery. NAPL seeps from uncontrolled upland sites have been documented in the Creek as recently as December 2016. NAPL seeps from sites with some controls (e.g., the Former Pratt Oil Works) have also been documented as recently as Dec 2016. This observation clearly shows that any additional decline in COPC concentrations on solids will be limited by the presence of ongoing COPC sources. Solids coming in from CSOs and MS4s are demonstrated to be already at background levels and likely have been for decades (EPA Lower Passaic River, New Jersey CSO data collected in mid-2000s (The Louis Berger Group, Inc. et al., 2014) shows that the concentrations are have been at background level for at least a decade and are comparable to concentrations measured in NY City CSOs for this NCG Draft RI). Therefore, the presence of NAPL and other industrial inputs in the system are likely responsible for the elevated COPC concentration in the Creek sediments as shown by the available NCG Draft RI data.

NYC Comment 354) Page 354: After discussing how industrial and municipal discharges have been cleaned up relative to historic inputs, Section 8.6.2 states that "although there has been a decline in loads from these sources, there are still loads due to the volume of discharge

occurring in CSO and stormwater releases and the urban contamination associated with these flows, and potentially, unremediated upland sites." That "unremediated upland sites" have been tagged onto the end of this sentence with a "potentially" downplays the continued impact other sources around the creek could have. The following paragraph then says further natural recovery may occur due to "future improvements in stormwater and CSO management", but makes no mention of additional upland site remediation or control of ongoing seeps, making it sounds like CSOs are the only source that needs to get cleaned up.

NYC Comment 355) Page. 355: *"confounding factors that appear to be influencing toxicity to the benthic invertebrates in the tributaries near CSO and MS4 outfalls."* First, there are confounding factors that may be influencing toxicity in areas that are not in the immediate vicinity of CSOs. Second, if issues like this are going to be addressed here, then other confounding factors, such as NAPL and separate phase product should be addressed as well.

City Comments on NCG Draft RI Chapter 9 – Conclusions

NYC Comment 356) Comments on Chapter 9 - Executive Summary: Because this chapter discusses the conclusions of the Draft RI, it suffers from the same deficiencies discussed throughout the City's comments. Contrary to NCG's conclusions, the NCG Draft RI in its current state is *not* comprehensive, in large part because it fails to provide an objective and thorough assessment of the historical and ongoing impacts from upland sites. The failure to evaluate historical and ongoing discharges from upland sources also prevents the NCG Draft RI from defining properly the nature and extent of contamination and from providing an accurate CSM that is necessary to guide an effective and National Contingency Plan (NCP)-compliant FS.

The deficiencies of the Draft RI, in general, and Chapter 9, specifically, are best demonstrated by the series of bullets on page 360, which purport to summarize the NCG Draft RI's conclusion on the nature and extent of contamination in the Study Area. The bulleted items focus almost exclusively on solids as the source of contamination in the Creek, ignoring multiple lines of evidence that the Creek is affected by migration of contamination from upland sources to Creek.

NYC Comment 357) Comments on Section 9.1: In the discussion on nature and extent of contaminants in the Creek, the NCG Draft RI and this chapter generally ignore the impacts of NAPL on the COPC concentrations in the surface and subsurface sediments of the Creek. The NCG Draft RI incorrectly asserts that NAPL is not present in the surface sediments of the Creek despite the fact that multiple data sets, including EPA ESI study, NYSDEC OU-6 sampling program, NCG toxicity sampling during the Phase 2 RI field work, and City sampling data, indicate the presence of NAPL in majority of the surface sediments of the Creek - including the

CM0-2 area. Ongoing NAPL migration has been documented (videos and pictures) from NCG properties and other upland properties. NCG has not included these observations in the NCG Draft RI, including Appendix C which is dedicated towards discussion of NAPL.

NYC Comment 358) Comments on Section 9.2: The Draft RI states that the COPC concentrations in the CM0-2 area are at background levels based on comparison of TPAH, TPCB and Cu concentrations compared to the reference areas. However, NCG has not conducted any evaluation of individual PAH and PCB patterns in the Creek, and such patterns indicate that additional sources of COPCs are present in the Creek, including in the CM 1-2 areas. The Draft RI also does not include any discussion of the results of the toxicity tests, which show that the CM1-2 section of the Creek has high benthic toxicity. The Draft RI needs to correct this omission.

NYC Comment 359) Comments on Section 9.3 As it does throughout the report, Draft RI includes unsubstantiated statements in Chapter 9 attributing toxicity to CSOs and MS4s. These statements are not supported by data collected for the Site and the reference areas, which were specifically selected to understand impact of CSOs on toxicity. This study clearly shows that presence of CSOs in a given waterbody does not cause toxicity in the sediments of the Creek.

As stated above, the Draft RI discussion on sources of COPCs focuses solely on CSOs and MS4s as sources of contaminants in the Creek. NCG considers groundwater, the second largest measured source of COPCs for the Site, to be an insignificant source of COPCs through the use of inappropriate data and flawed analyses. In addition, NAPL is not considered a significant source of COPCs for the Site even though it is prevalent in the surface and subsurface sediments of the Creek. NAPL migration from upland properties and subsurface sediments via ebullition has been documented by NCG, the City and the community. Despite this, the NCG Draft RI incorrectly states that seeps have not been observed, and uses a limited preliminary 2015 NCG ebullition survey to assert that NAPL migration from subsurface sediments is not occurring. NAPL, however, is a significant source to the Creek from NCG sites and other properties, and is generally ignored in the NCG Draft RI. This is a serious shortcoming of the Draft RI and this chapter.

NYC Comment 360) Comments on Section 9.4: The fate and transport process in Draft RI focuses too narrowly on solids, ignoring other factors that affect the fate and transport of COPCs in the Creek. The presence of NAPL and its impact on COPC concentrations is not even considered in this section. NCG's explanation that the dominant source of the elevated COPC concentrations in the surface sediments of the Creek are CSO and MS4 solids, and that

"historically" deposited contaminants serve as another source, is contrary to observations that impacts at the upland sites (historical and current) are affecting the surface sediments of the Creek via groundwater and migration of NAPL. This important fate and transport process is missing in throughout the NCG Draft RI and this chapter.

NYC Comment 361) Comments on Section 9.6: The NCG asserts that no additional data is needed to complete the Draft RI. However, to date no data is available or presented about the concentrations of COPCs in NAPL. Given the history of activities in the Creek, different types of NAPL bodies are present at upland sites, and the nature and concentrations in these NAPLs vary. The lack of this information is a serious data gap for the completion of the NCG Draft RI. NCG also needs to quantify and characterize NAPL released from subsurface sediments, as NAPL is a significant source of COPCs in the Study Area and remains uncharacterized. Also, NCG needs to collect and evaluate groundwater data from upland sites to calculate the concentration of COPCs in groundwater that enters the Creek horizontally. Accordingly, there are significant data gaps, and the NCG should delete text from the NCG Draft RI that assert that there are no data gaps.

NYC Comment 362) Comments on Section 9.7: Finally, NCG discusses possible remedial alternatives for the Creek, which include reduction of CSOs and MS4s, monitored natural recovery and dredging and capping alternatives. This discussion is premature as the City believes that the NCG Draft RI is incomplete NCG Draft RI for several reasons. First, NCG has not shown that CSOs and MS4s require reduction under CERCLA. Second, while NCG states that the Creek is recovering, NCG has not provided any quantitative evaluation of the rate of recovery in the Creek. It is very likely that cleaner solids have been coming into the Creek for decades, but it is also likely that NAPL migration from uncontrolled upland Sites and from subsurface sediments is preventing any recovery. Ultimately, NCG does not consider remediation of upland sites as essential for in Creek remedy. Given the observations of ongoing impacts from uncontrolled sites, upland remediation is crucial to prevent recontamination of any remedy considered for the Creek.

-

City Comments on NCG Draft RI Appendix C - NAPL Evaluation

The NAPL delineation study and interpretation of available data developed by NCG are deficient. Failing to accurately delineate NAPL in the sediments of the Creek would result in development of inadequate remedial alternatives for the Creek. Because the NCG work is deficient, EPA should develop and implement plans separately and independently or direct the City to undertake this work as a respondent to the RI/FS Consent Order.

Newtown Creek has been an industrial waterway since the mid-1800s. Known sources of NAPL, including several refineries (petroleum and kerosene) and at least two MGP plants operated along the banks and in the watershed of Newtown Creek. As a result of the industrial activity, industrial practices and documented spills[2] in the Creek and in upland areas, NAPL is present in the sediments of the Creek. Ongoing NAPL releases into the Creek from upland properties including former refineries and MGP plants have been documented. NAPL migration from the subsurface sediments via the process of ebullition is also a daily occurrence. NAPL migration from upland sites and from subsurface sediments is a significant ongoing source of chemical contamination and likely a source of benthic toxicity to the Creek. A thorough delineation of NAPL extent in the sediments is critical for the development of a RI/FS for the Creek.

Throughout the NCG Draft RI, NCG downplays the presence of NAPL in the sediments of the Creek by using localized data, misinterpreting available results of NAPL tests and making unsubstantiated assertions regarding the mobility of NAPL. NCG has not conducted a focused study to delineate the presence of NAPL - during Phase 1, NCG used visual observations to document presence of NAPL and in Phase 2 NCG conducted shake tests on a limited number of cores collected for purposes other than NAPL delineation. The limited shake tests showed that visual observations of NAPL are unreliable (locations where no NAPL was observed produced NAPL results in the shake test), and are too limited spatially (both vertically and horizontally) to be of value for NAPL delineation. Further, NCG misinterpreted the limited shake test results by excluding sheens and blebs as positive results.

NCG draws unsubstantiated conclusions that have been previously commented on by NYSDEC and EPA, by including using core intervals with no recovery, cores that are too far away, and cores that are NAPL contaminated to incorrectly bound NAPL observations. NCG has also largely ignored laterally continuous NAPL bodies as well as cores that suggest vertical NAPL migration.

[2] As an example of the catastrophic spills to the Creek, a 1919 fire at the Standard Oil Greenpoint refinery (now ExxonMobil, BP, and Texaco properties) destroyed 30 1-million gallon tanks, releasing burning oil into the Creek, which caused the fire to spread to the refineries on the Queens side of the creek (New York Times, September 14, 1919).

To understand the extent of NAPL in the sediments of the Creek, the City conducted a robust sampling program using laser induced fluorescence (LIF) technology (see NYC Figures 39a and 39b). The technology is routinely used by various state and private agencies including NYSDEC and several NCG members to delineate NAPL in upland properties. Review of upland data has shown that fluorescence results were accurate predictors of presence of NAPL and were also used by industrial parties to delineate NAPL at sites adjacent to the Creek. Results of the survey conducted by the City show that the fluorescence responses indicate extensive presence of NAPL impacted sediments throughout the Creek. These fluorescence responses indicative of NAPL have been verified by visual observations in nearby sediment cores of the Creek. The data collected by the City should be used and NCG should be directed to collect additional cores to delineate NAPL and develop a robust understanding of presence of NAPL in the Creek sediments. Guided studies will help develop a correlation between LIF responses and mobility of NAPL. The results of this study will also help in developing remedial options for the site which will prevent recontamination. The current program proposed by the NCG does not provide the necessary information to prevent recontamination from NAPL.

General Comments from the City on NCG Draft RI Appendix C

NYC Comment 363) Appendix C does not evaluate NAPL impacts to the site, it only looks at the occurrence of NAPL in the sediment bed. The Appendix does not acknowledge ebullition facilitated NAPL migration, bank seeps, groundwater hydrocarbon, or sediment hydrocarbon contamination. The conclusions are not meaningful since the NCG evaluation assumes that NAPL in sediments as inert contaminants that do not migrate and do not affect other media. Appendix D (Ebullition Evaluation) and Appendix F (Groundwater Evaluation) are not mentioned in this Appendix when they should be extensively referenced and data from each should be integrated. To be conservative it should be assumed that areas are not free of NAPL unless there is extensive evidence to demonstrate to the contrary. Currently, there are large data gaps that are assumed to have no NAPL in them. It must be assumed that any identified NAPL that is not properly bound by NAPL-free cores is a continuous body until demonstrated otherwise. NCG must use all available data to determine areas of the creek where NAPL delineation is necessary and then proceed with the delineation in a grid/stepwise pattern.

NYC Comment 364) A program with the specific intention of delineating NAPL should be developed and implemented. The cores that NCG is using to delineate NAPL were located based on a sediment chemistry program designed to understand large movements of sediment and COPCs across broad reaches of the study area not focusing directly on NAPL. The Phase 1 and 2 studies were not designed to delineate NAPL, which can introduce a large flux of COPC mass from a relatively small area. The DQOs for the Phase 1 and Phase 2 sediment program do not

include NAPL delineation as an objective, therefore the adequacy of these programs to delineate NAPL has not been evaluated. The size of the NAPL body target can be substantially smaller than the coarse-grid Phase 1 and 2 coring programs are designed to detect. In addition, the COPCs and the magnitude of the COPCs likely to be present in the NAPL is not discussed in the NCG Draft RI and no effort has been made to characterize the NAPL types present in the sediment and elsewhere (e.g., such as crude oil, refined products, and coal tar). Much of this information is available from several NCG upland sites and NYSDEC-led remediation of other sites. This is a data gap, NAPL characteristics must be investigated and included in the RI/FS.

NYC Comment 365) NCG's sediment core categorization process uses a qualitative analysis to arrive at quantitative conclusions without any technical validity. NCG's shake tests are subjective in many ways, such as choice of sample horizon to test and interpreter bias, and only test discrete depths in each core, so are incomplete assessments of the presence of NAPL. NCG's method must be replaced by a quantitative and comprehensive method that provides information on the amount of NAPL present over the entire thickness of the sediment bed and into the underlying native material, such as Laser Induced Fluorescence (LIF). LIF is an in - situ technique used to identify presence and type of NAPL using fluorescence properties of PAHs in NAPL. LIF has been used extensively at petroleum, oil, and lubricant contaminated sites since 1994. This technology is used by the NYSDEC and some NCG parties to delineate NAPL, even at upland sites adjacent to the Creek.

NYC Comment 366) The NCG Draft RI states that sheens and blebs of NAPL in the sediment are not NAPL or are non - mobile NAPL that does not warrant further delineation or concern. No data has been collected to support their assertion. This assumption is inaccurate; sheens and blebs in the sediment are NAPL of concern because:

a. NAPL as sheens and blebs can be mobilized by ebullition and other transport mechanisms as observed in NCG's 2016 and NYCDEP's 2015/2016 ebullition surveys.
b. NAPL as sheens and blebs are a source of TPH in the sediment, described in the Draft RI as a source of benthic toxicity in the Creek.
c. NAPL as sheens and blebs is a continuing source of contaminant loads to groundwater.

By not delineating the NAPL that is present as sheens and blebs, NCG is minimizing the largest potential contaminant source in the Creek. Therefore, any such unsupported statements should be removed from this Appendix and the entire Draft RI.

NYC Comment 367) Cross-sections and depth profiles as presented are confusing and difficult to interpret for the following reasons. Cross sections are not provided for Category 1A and 1B areas, instead only core locations are provided longitudinally by river mile. Also, maps and

depth profiles are combined separately, making comparisons between depth profiles (which have no indication of location) and core maps difficult. Symbology for all depth profiles and cross-sections is difficult to interpret due to similarities in both colors and shapes. Symbology must be fixed to clearly illustrate NAPL impacts. All depth profiles and cross-sections should include any upland NAPL sites to allow for comparison between upland areas and NAPL impacted sediments.

NYC Comment 368) Many cores show evidence of likely NAPL migration. An example is in NC069SC-B (Draft RI Figure C4-14b), where there is a shake test with a layer near the sediment/native interface. Moving up the core (towards the water-sediment interface), there are two shake tests with blebs. Next, the top two shake tests have sheens. Such a gradient is consistent with NAPL migration. There are similar examples of this in many cross-sections and depth profiles throughout the Creek. These data should be used as a lines of evidence indicative of NAPL migration from subsurface sediments to surface sediments.

NYC Comment 369) NCG's categorization for assessing visual observations and shake test results is flawed. Data collected to assess NAPL migration does not support the results of their categorization. NCG states that visual observations of sheens are not important and Category 1 cores (1A – sheens, 1B with blebs) are unimportant and do not require additional delineation or investigation. NCG's assertion is based on the unsubstantiated assumptions that sheens are not NAPL and that blebs are "residual NAPL", therefore immobile. For example:

a. NCG incorrectly interprets the NYSDEC guidance for conducting shake tests (Kwan 2014a). NCG uses this guidance to assert that observation of sheen is not considered NAPL (NYC Figure 41). This assertion by the NCG is false. The guidance provided by EPA actually provides information to identify and distinguish NAPL based sheens. NCG should delete this mischaracterization of EPA reference from the NCG Draft RI. The following examples clearly show that sheens are an indication of NAPL as evidenced by observations on NAPL migrations in Category 1A areas (shake test result of sheen, currently ignored by NCG)
b. NCG asserts that Category 1A areas, shake test results of sheen, have no NAPL. This is contrary to NCG's observations of ebullition facilitated NAPL migration in Category 1A areas. Sheens blossoms and ebullition are a strong indication of nearby NAPL in the sediments (these are sheens forming locally, not transported from other parts of the Creek). The observations that NAPL is migrating in Category 1A areas shows that presence of sheens in the shake test actually does identify NAPL. For example, NCG has categorized Dutch Kills and Whale Creek as Category1A areas that require no further NAPL delineation. However, NCG 2016 NAPL migration survey shows that NAPL migration from sediments is occurring in these areas (NYC Figure 40). It is clear that Category 1A areas are important given that sheens are indication of NAPL. NAPL delineation in Category 1 areas is needed during FS

sampling. NAPL that is important to the Creek and that observations of sheens needs further assessment.

c. As another example, Cores EB048SC-A, EB049SC-A and EB050SC-A are located in the Northern Fork of East Branch, a known ebullition facilitated NAPL migration hot spot (see photographs of NAPL migration taken in the North Fork of East Branch – NYC Figures 54 a to 54e). Cores in this location were categorized as "sheen only" by NCG, and excluded from further NAPL delineation for the FS (see red box in NYC Figure 43a). Given the observations of extensive NAPL migration in this area, it is clear that additional NAPL delineation is needed during FS sampling programs.
d. During Phase1, only visual observations were used to document the presence of NAPL in sediment cores. In phase 2, concurrent visual observations and shake tests were conducted in some core, and sediment where visual observation indicated no NAPL, often produced positive shake tests results of sheens and blebs (EB045SC-A and EB045SC-B in NCG Draft RI Figure C4-10h and blue box in NYC Figure 43a. The presence of blebs and sheens at locations where a visual observation of NAPL was noted, shows there is no correlation between visual observations and shake test results and that visual observations are an unreliable method of identifying NAPL in sediment cores. Therefore, visual observations cannot be used to exclude the presence of NAPL and a more comprehensive method is needed.

NYC Comment 370) NCG has not sufficiently used the available lines of evidence to identify likely NAPL areas. Information is exists on activities at upland sites, groundwater COPC concentrations, and NAPL migration due to ebullition. Specifically, NCG previously proposed that anything with >1,000 µg/L of PAHs in groundwater would be considered impacted by NAPL. However, NAPL delineation is not presented for all areas meeting this criteria (i.e., adjacent to Motiva Terminal). NCG has ignored critical EPA Comments submitted on October 26, 2015, on the October 1, 2015 NAPL Presentation (EPA in AQ, 2016) that other lines of evidence are pertinent to the evaluation of NAPL. NAPL study conclusions must be presented and evaluated in conjunction with the groundwater program analytical data and the ebullition survey observations, including:

a. Upland NAPL site proximity, core observations, shake tests (particularly Category 2/3 areas).
b. Ebullition survey observations, including coincident and non-coincident ebullition locations and sheen locations (both distribution and properties).
c. Groundwater investigation hydrocarbon data, including a temporal series of synoptic groundwater plume maps to aid in determining the presence of subsurface hydrocarbon contamination/plumes showing where elevated concentrations of gasoline range organics (GRO) and/or diesel range organics (DRO) occur in sediment and/or native material.
d. Upland NAPL sites must be identified by name when they are near NAPL impacted

sediments, rather than a vague note such as "adjacent to EPA-identified potential upland NAPL site".

e. All cross-sections parallel to shorelines and depth profiles must show upland NAPL sites.
f. All maps related to the NAPL evaluation must also have all identified NAPL sites clearly labeled (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR).

NYC Comment 371) EPA noted in their comments on NCG's February 4, 2016 Category 2/3 NAPL Evaluation presentation, *"The presentation includes a number of statements indicating that NAPL has been bounded vertically and or laterally that are not supported by the NAPL characterization data."* (EPA, 2016). Despite EPA's comment, NCG continues to make the same unsupported assertions by using core intervals with no recovery, cores that are too far away, and cores that are NAPL contaminated to incorrectly bound NAPL observations. NCG also largely ignored laterally continuous NAPL bodies, even when neighboring cores showed NAPL at approximately the same depth below mudline as the impacted core. Instead, nearby cores with possible laterally continuous impacts were either ignored or downplayed. EPA's comment continues, stating that *"gaps in the NAPL data will be clearly identified in the RI Report*" (EPA, 2016). NCG has failed to identify these gaps in the NAPL data.

NYC Comment 372) The size of a NAPL body that would be important to the CSM has not been investigated or determined. NCG has not adequately characterized the aerial and vertical extent of the discrete NAPL bodies in the sediments, and therefore the potential fate, transport and dispersion of COPCs in the NAPL bodies (due to ebullition, advection, etc.) cannot be determined for the purposes of remedial design. The potential for NAPL to deliver significant amounts of COPCs means that a relatively small NAPL body could be of great significance to COPC loading in the system. A study must determine a critical size for NAPL bodies and then determine the size of the NAPL bodies at the site. Neither of these critical exercises have been considered.

The appropriate distance between new core locations to adequately define the NAPL bodies is unknown. NCG has not attempted to integrate the data to describe potentially continuous bodies of NAPL. The NCG Draft RI states that with the exception of two areas, middle reach and English Kills, horizontal and vertical delineation of NAPL is complete. This assertion is inaccurate. There are large data gaps both laterally and vertically between cores. NCG infers that there are not any lateral impacts in these areas, however they have not undertaken any investigation of the size and lateral continuity of NAPL bodies in the subsurface. Instead, NCG simply relies on distant cores to say that the NAPL body does not extend beyond that point. In many instances the NAPL extent is only shown to be discontinuous in one direction and other directions are unbounded by any nearby data. Many of the locations were bounded in only one

direction by a single core with lower levels of NAPL present (i.e., a non - negative shake test resulting in sheens and blebs conducted in one or two horizons), and not a core completely free of NAPL. The areal or vertical extent of each discrete body is often undefined and represented only by one or two samples. The volume of NAPL that might have to be remediated cannot be defined for purposes of FS without additional data and at finer scale.

Further, NCG incorrectly assumes that NAPL is confined by stratigraphy. NAPL has a cross - cutting relationship to stratigraphy and therefore cannot be delineated simply by saying it exists in a single layer identified in only one core. Like strata, NAPL occurrence in the subsurface is not necessarily horizontal, so, NAPL from depth can find its way to the surface over some distance from where it was originally detected (which can occur between core locations). NCG incorrectly assumes that NAPL is not present if there is one core without NAPL surrounded by cores with NAPL. NAPL delineation process used by NCG is biased towards minimizing presence of NAPL in the sediments of the Creek and needs to be modified.

NYC Comment 373) The NCG Draft RI fails to discuss NAPL pathways to the Creek from upland sites and also presence and origin of NAPL in the native sediments. This discussion is of critical importance for the RI/FS and for development of remedial alternatives for the Creek. Sediment data shows that NAPL has migrated to locations in the native material beneath the sediment that are at significant distances from the shoreline. The very presence of the NAPL at these locations confirms that it has migrated and that there is a migration pathway. NCG has not identified any NAPL migration pathways and treats the presence of NAPL as if it is a static body that occurred naturally within the stratigraphy. The NAPL must have migrated from a source location on land to where it was detected. Nothing that NCG has presented demonstrates that the NAPL migration has stopped or that enough information has been collected to characterize the ongoing migration and extent of NAPL. Furthermore, ongoing NAPL seeps have been observed at upland sites. Analysis of fate and transport of this NAPL and its impact on sediments is needed.

NYC Comment 374) There are repeated instances of misleading terminology throughout the Appendix which must be deleted:

a. "Potential NAPL" must not be used to refer to blebs, as there is clear evidence that they are NAPL. There cannot be ambiguity as to the presence of NAPL in a core with bleb observations.
b. "Residual NAPL" is also used to refer to blebs. This must not be misinterpreted to mean immobile NAPL. NCG has not demonstrated that blebs are immobile and NCG's 2016 and the City's 2015/2016 ebullition surveys point to the contrary.
c. "No NAPL" is used to refer to sheen observations, despite EPA and NYSDEC comments that

presence of sheens are indicative of NAPL and indicate a source of mobile contaminants.

d. NCG must remove the term "localized area" when referring to NAPL impacts in Category 2/3 areas which the visual observations and shake tests show is extensive. This contamination must not be considered "localized" as not only does NAPL cover a large portion of those areas, but large segments of the Creek are impacted through NAPL migration.
e. If the term "laterally discontinuous" is used, it must only be used when impacts are demonstrably laterally discontinuous. The term "laterally continuous" must also be used in all areas were continuous NAPL is observed, such as in the corner of the Turning Basin.

Specific Comments on Appendix C – Section 1 - Introduction

NYC Comment 375) Page 1, 1.1 Background, Footnote 1: *"The Newtown Creek Superfund Site Study Area is described in the Administrative Order on Consent as encompassing the body of water… as well as the sediments below the water and the water column above the sediments, up to and including the landward edge of the shoreline, and including also any bulkheads or riprap containing the waterbody…"*

There are numerous piers that contain NAPL seeps where no sampling has been conducted underneath (i.e., National Grid site) that should be addressed in the RI/FS.

NYC Comment 376) Page 2, 1.1 Background, 2nd to Last Paragraph: *"'Potential NAPL' refers to sediment visual observations of possible indicators of NAPL, including sheen, blebs (discrete droplets), coating on sediment particles, or saturation in sediment pore spaces."*

This statement is not followed through in the rest of Appendix C. This text accurately states that sheen is potentially NAPL. However, in the remaining parts of Appendix C sheens are not considered NAPL. Category 1 cores (cores with sheens) are considered by NCG as not indicative of NAPL and are not considered for further evaluation. This inconsistency must be corrected. The text elsewhere in Appendix C must be revised to include sheens as an indication of NAPL where additional delineation is necessary.

NYC Comment 377) Page 2, 1.2 Objective: *"The NAPL Evaluation…also considers the locations of potential point source discharges, including combined sewer overflows (CSOs) and industrial activities on upland sites adjacent to the Study Area (other lines of evidence)."*

Upland/in-creek spills and Illegal releases are also sources of NAPL to the Creek and must be used as lines of evidence. This statement states that upland sites and point sources were considered as lines of evidence in NAPL evaluation. Review of the text does not show that upland sites were used to evaluate NAPL. The text does not identify *any upland site* where NAPL

is present and how the site location and history are being used to evaluate presence of NAPL in the sediments of the Creek. This discussion is necessary and a useful line of evidence which is missing in the document.

Specific Comments – Section 2 - NAPL Investigation and Data Collection Activities

NYC Comment 378) Page 5, 2.2 Phase 2 Investigation, end of 2nd paragraph: *"A total of 165 cores processed using Phase 2 methods were carried forward into the NAPL Evaluation, and included the following: 19 Phase 1 archive cores processed during Phase 2; 76 Phase 2 subsurface investigation cores; 70 Phase 2 groundwater investigation cores"*

The cores that NCG is using to delineate NAPL were located based on a sediment chemistry program designed to understand large movements of sediment and COPCs across broad reaches of the study area. The Phase 1 and 2 studies were not designed to delineate NAPL which can introduce a large flux of COPC mass from a relatively small area. The DQOs for the Phase 1 and Phase 2 sediment program do not include NAPL delineation as an objective, therefore the adequacy of these programs to delineate NAPL has not been evaluated. The size of the NAPL body target can be substantially smaller than what the coarse-grid Phase 1 and 2 coring programs are designed to detect. In addition, the COPCs and the magnitude of the COPCs likely to be present in the NAPL is not discussed in the NCG Draft RI, a serious data gap. This information is available from several NCG upland Sites and from NYSDEC led remediation for other sites and must be included in the RI/FS. A program with the specific intention of delineating NAPL, similar to the City LIF program, should be developed and implemented.

NYC Comment 379) Page 6, 2.2.1.1 Visual Observations of Potential NAPL, 2nd bullet: *"Sheen – A sheen is present on a portion of the surface of the sediment; however, NAPL is not observed."*

No evidence or data which supports the assertion that sheens are not indicative of NAPL has been presented. As indicated in NYSDEC MGP Guidance, the visible contaminant descriptor "sheen" is used to describe petroleum-like sheens and not bacterial sheens (NYSDEC in email from Kwan, 2014). The City, NCG, and EPA have observed NAPL arriving at the water surface through ebullition and spreading as a sheen. NCG misinterprets the NYSDEC guidance, even though it clearly considers sheens as NAPL and provides ways to identify petroleum-like sheens. In addition, shake tests conducted by NCG on sediments with a visual observation of sheens resulted in presence of NAPL blebs or layers in the jar 12% of the time. Dismissal of sheens without proper characterization is arbitrary and must be rectified.

NYC Comment 380) Page 6, 2.2.1.1 Visual Observations of Potential NAPL, 3rd bullet: *"Blebs – Discrete droplets of NAPL are present, but for the most part, the sediment is not visually contaminated. Typically, this is indicative of residual NAPL."*

a. In this section NCG considers the presence of NAPL blebs to be "typically" indicative of "residual" NAPL. In other sections NCG states that this is "residual NAPL". NCG uses the term "residual" arbitrarily, without definition, and in the main text of the NCG Draft RI states that "residual" NAPL is immobile. This assertion is not supported by any data collected for the Site and is arbitrary. Such assertions need to be deleted from the text.
b. NYSDEC MGP Guidance requires technicians investigating NAPL to report size and number of blebs, which was not done by NCG. The NYSDEC guidance document does not support the assertion that blebs or residual NAPL are not mobile. In addition, this NYSDEC guidance is for MGP contaminants and not for other NAPL (Kwan, 2014). A conservative approach should be applied and the document should treat blebs as indication of potentially mobile NAPL.

NYC Comment 381) Page 7, 2.2.1.2 Confirmation of Visual Observations by Shake Testing: *"Shake test sheen – A sheen is present on the surface of the water; however, NAPL is not observed"* **and the last paragraph in section 2.2.1.2:** *"As shown in Figure C2-4 the observation of sheen only, whether visually observed on sediment or in a shake test, is not considered NAPL."*

a. Section 2 of Appendix C states that Phase 1 terms differ from Phase 2 terms, which were based on NYSDEC shake test criteria. The NYSDEC MGP guidance document provides a distinction of petroleum based sheens and bacterial sheens and also provides a guidance on how to differentiate the two (Kwan, 2014). NCG has not followed this step in their classification and arbitrarily states that sheens are not NAPL. Dismissal of sheens without further characterization is flawed, especially since ebullition surveys in 2016 document NAPL and NAPL migration in areas arbitrarily dismissed by NCG as areas with no NAPL.
b. Both EPA and NYSEC have stated the importance of sheens:
   - *"Sheen observations can provide additional insight into the evaluation of the vertical and lateral extent of potential NAPL" and "Although shake test sheens are not considered to represent significant NAPL per the Work Plan and Category 1B evaluations, ebullition provides a transport mechanism that could mobilize the materials responsible for the sheens observed in shake tests."* (EPA, 2016)
   - *"Free phase product present as a sheen may not behave as a thick layer of NAPL but it still represents a source [of] contaminants to the study area that can be mobilized through ebullition"* (NYSDEC, 2016)

NYC Comment 382) Page 7, 2.2.1.3 Shake Test Bleb Ranking, 2nd sentence in first paragraph: *"To characterize the quantity of blebs, shake test bleb observations were assigned a ranking between 1 and 5 based on a visual estimate of the degree of bleb accumulation on shake test jar walls and water surface"* **and Page 9, 2.2.1.3.2 Bleb Ranking Process, 1st sub-bullet under "Shake test field logs":** *"Shake test field logs were reviewed for a description of the shake test result. The shake test field form is considered the best source for shake test observations because field staff worked under bright light, could inspect the shake test jar from multiple angles, and could open the shake test jar to distinguish between sediment, water, and NAPL. The field form consists of check boxes with the following options for shake test results: layer, blebs, sheen, or no observed NAPL."*

The bleb ranking process is subjective and no quantitative data were collected to confirm the objectivity of this process. This ranking was conducted by NCG office staff after reviewing pictures collected by field personnel. Based on the angle of the picture and light conditions, it is not feasible to develop an estimate of the amount of NAPL present with any certainty. Furthermore, based on the field form, NCG considers sheen to be an indicator of NAPL which is contrary to NCG's interpretation of sheens during data interpretation. This ranking system should be removed and a quantitative analysis of NAPL should be applied, such as the LIF assessment conducted by the City (see NYC Figures 39a and 39b).

NYC Comment 383) Page 7, 2.2.1.3 Shake Test Bleb Ranking, 2nd paragraph: *"The general behavior of NAPL in a shake test provides a technical basis for the appropriateness of using shake test observations for qualitatively characterizing the quantity of NAPL present in the sediment."*

NCG makes this arbitrary statement without any data to support it. NCG does not cite any literature to support their claimed technical basis. There are so few shake tests performed in any geographical area with varying results that is it unclear how NCG will use shake test results, designed only to be a litmus test for presence or absence of NAPL, to then quantify the amount of NAPL in the sediment. This statement must be deleted.

NYC Comment 384) Page 8, 2.2.1.3.1 Behavior of NAPL in a Shake Test, 1st bullet: *"The polystyrene shake test jar consists of nonpolar material."*

NCG must explain how the surface tension between NAPL and different types of plastic vary and why they selected polystyrene over other types of plastic such as polypropylene. The results of the study may have been different if polypropylene jars were used and this is another reason to include a quantitative characterization of NAPL at the Creek.

NYC Comment 385) Page 12, 2.2.2 Subsurface Investigation, end of 3rd paragraph: *"When collocated cores differed visually from the primary core, the visual observations of potential NAPL were recorded, and a shake test was performed."*

NCG must provide clear and detailed documentation of how many instances of differences between collocated cores exist. Inconsistencies of NAPL visual observations between collocated cores are important because they indicate heterogeneity of NAPL bodies.

NYC Comment 386) Pages 13-17, 2.3 Other Investigations in the Study Area

a. NGC considered data from the Nation Grid GPEC former MGP Site to fill data gaps at the request of EPA; it is also important to consider NAPL delineation data such as LIF from upland sites. These upland sites include ExxonMobil Pratt Oil Works, ExxonMobil Greenpoint Remediation Project, Scholes Holder (National Grid), BP Oil Terminal and BCF Oil Site (Texaco) in English Kills. Large data gaps could be addressed through previously acquired and readily available data.

b. Additionally, sediment NAPL data from the Apollo Street Site, the NYSDEC PDRC Draft in-Creek Remedial Investigation (OU-6) (Anchor Environmental, LLC, 2007), and the USEPA ESI (Weston Solutions, Inc., 2009) are dismissed due to what AQ/NCG claims are non-standard methods of NAPL identification. These datasets show NAPL presence in the sediments (see additional comments on Sections 2.3.3 and 2.3.4 below for details).

NYC Comment 387) Pages 14-15, 2.3.1 National Grid Investigations

National Grid likely collected photos that correspond to respective visual observations from GPEC cores. Those photos, and photos from Phase 1 and Phase 2 cores, must be included in the RI/FS.

NYC Comment 388) Page 15, 2.3.1 National Grid Investigations, 2nd sentence: *"However, a subset (approximately 10%) of the National Grid NAPL observations were described using terms not included in the Phase 2 terminology, such as stained, oil, tar, and solid tar, as defined in the GPEC (DAR No. 32) Field Sampling Plan (GEI 2009b). An experienced geologist reviewed the observations and definitions for transcription to the most similar Phase 2 terms. National Grid logging procedures did not include the use of a shake test to confirm the presence of NAPL."*

NCG must provide a detailed breakdown of how all NAPL observations from GPEC core logs were transcribed into equivalent Phase 2 terms. This breakdown must be in the form of a chart or table to make all decisions transparent and easy to follow. Multiple NAPL terms in GPEC core logs were either ignored or downplayed by NCG when transcribing these observations. Some examples of NCG's flawed transcriptions are below (this list is not completely extensive):

a. **Stained** — NCG has characterized instances of stained (which is often a paired observation with sheen) as simply a sheen. Therefore, potential NAPL impacted sediment is ignored by claiming that the observation is a "sheen" and not NAPL. An example of this is the depth interval from 2-12 feet in core GPEC-GT20 where observations that have both "stained" and "sheen" have been classified as "sheen" in NCG Draft RI Figure C4-10f. This is a misrepresentation of data and must be corrected.
b. **Tar** — Descriptions of "tar" in GPEC core logs appear to be misclassified as blebs instead of "saturated". An example of this are depth intervals 0-2 feet, 2-4 feet, and 8-10 feet for GPEC-GT12 in NCG Draft RI Table C3-6 and NCG Draft RI Figure C4-14a (also see orange box in NYC Figure 43e). In GPEC-GT14, description of "tar seams" is misclassified as "coated" instead of "saturated", making nearby cores with similar impacts at the same depth appear discontinuous.
c. **Solid ta**r — It is unclear how this description was classified by NCG based on issues with transcription of SB-series core logs.
d. **Hydrocarbon sludge** — GPEC-GT16 has continuous visual observations of hydrocarbon sludge from 2 to 22 feet in the GPEC core logs. NCG ignores any mention of hydrocarbon sludge and mischaracterizes the visual observations of "hydrocarbon sludge" as "none" in NCG Draft RI Table C3-6 and NCG Draft RI Figure C4-14a (also see red box in NYC Figure 43e). These incorrect transcriptions make the 100-foot-deep core appear uncontaminated by NAPL and results in incorrect interpretation of GPEC-GT16 as bounding the lateral extents of NAPL contamination in nearby shallow cores (GPEC-SED18 & NC072SC-B). This interval is contaminated by hydrocarbon sludge, has continuous observations of moderate/strong tar-like odors and an interval of bituminous coal fragments.
e. **Greasy** — these observations have been ignored by NCG without any justification. An example of this is in the 10 to 11.5-foot depth interval for GPEC-GT22. NCG ignores both "greasy" and "stained" sediment descriptions in the core log, resulting in a incorrectly transcribed visual observation of "none" in the NCG Draft RI Table C3-6 and NCG Draft RI Figure C4-14 (also see blue box in NYC Figure 43e).

NYC Comment 389) Page 16, 2.3.3 EPA Expanded Site Inspection, last sentence: *"Due to the lack of a standard field method for describing visual observations and uncertainty as to the depths at which the recorded observations were made, the 2009 ESI data are not included in this NAPL Evaluation."*

NCG must describe how observations of NAPL in EPA ESI core logs compare to NCG's own NAPL observations. Although these observations may not have been standardized in ESI cores, the available NAPL observations still provide important detail, both as a line of evidence and as a comparison to the NCG observations. Figures 38c and 38d show widespread NAPL observations

throughout the Creek based on the 2009 EPA ESI dataset. NYC Figure 38c shows NAPL observations in surface sediments throughout the Creek and sampled tributaries. These impacted surface sediments are in areas of the Main Stem, East Branch, and Lower English Kills, where the NCG Draft RI states NAPL is not present in the surface sediments. NYC Figure 38d shows subsurface sediments impacted by NAPL documented in the EPA ESI data. NAPL is identified throughout the Main Stem upstream of the Pulaski Bridge and in all samples in the Turning Basin, East Branch, English Kills, and Whale Creek. NCG must integrate NAPL observations from the EPA ESI dataset into this section and use the observations to identify gaps in the RI/FS.

NYC Comment 390) Page 17, 2.3.4 OU-6 Remedial Investigation, last paragraph: *"Visual observations described as "NAPL" were noted in 13 cores from 11 stations in Newtown Creek between CM 2.0 and 2.7. Visual observations of sheen were noted in 57 cores from 27 stations in Newtown Creek located between CM 1.4 and 2.8. OU-6 RI NAPL observations are generally located in areas and at depths similar to where NAPL was observed in Phase 2 and National Grid cores; however, descriptive terms beyond "NAPL" were not defined as part of the OU-6 RI work plan (Anchor 2007). Because the OU-6 visual observations lack the detailed descriptive terms used in Phase 2 and National Grid investigations, the OU-6 cores are not included in this NAPL Evaluation."*

Data from OU-6 provides additional information regarding the presence of NAPL in surface sediments. NCG should not exclude data because a "standard method" was not followed. NYC Figure 38b shows significant NAPL observations in the surface sediments (top 10 cm) of Maspeth Creek and the Turning Basin to downstream of the Kosciuszko Bridge. This observation is contrary to the NCG assertion that NAPL presence in the surface sediments of the Creek is limited to the corner of the turning basin and a small area in English Kills. NYC Figure 38b clearly shows that NAPL is widespread in the surface sediments of turning basin and Maspeth Creek. OU6 data shows that petroleum and tars are present in the surface sediments in this area. NCG must incorporate this data to draw conclusions regarding presence of NAPL in the surface sediments of the Creek.

<u>Specific Comments – Section 3 - Observations and Results</u>

NYC Comment 391) Page 20, 3.2 Sediment Lithology, 2nd to last paragraph: *"Therefore, coarse-grained sediment has more pore space per unit volume for NAPL to reside within than the same unit volume of finer-grained sediment. In addition, NAPL may have more potential to move within coarse-grained sediment, compared to finer-grained sediment, based on the comparatively higher permeability of coarse-grained sediment."*

NAPL mobility must not be discounted just because NAPL is found in fine grained materials. NAPL migration from fine grained material will occur due to processes such as ebullition. Also, COPCs will be mobilized by groundwater passing through these zones. NAPL had to migrate through fine grained material to get into the fine grained sediment in the first place. This statement should be removed.

NYC Comment 392) Page 20, 3.2 Sediment Lithology, last paragraph: *"The sediment composition was recorded on the field core logs as percentages of gravel, sand, silt, and clay. The field-recorded percentages of individual sediment components were used to generate percent coarse-grained material values for the full length of each core."*

NCG did not provide a comparison with actual sediment grain size distribution measurements or how accurately the lab determined grain size distribution compared to field visual observations.

NYC Comment 393) In Section 3.3 NAPL Observations, page 21: *"As presented in Tables C3-4 through C3-6, there may have been multiple depth intervals where NAPL was observed in a given core. There may also have been a range of visual observations of potential NAPL, with one or more visual observations confirmed through shake tests."*

NCG describes NAPL observations that are shown in the NCG Draft RI Tables C3-4 through C3-6. The information in these tables includes both shake tests and visual observations with their associated depths for all sediment cores. NCG must provide statistics of how many times a negative visual observation resulted in a positive result for shake tests. Doing so will help assess the degree of accuracy of visual observations in all cores that were not shake tested. For example: 24% of the time, a negative visual observation for NAPL in Phase 2 cores resulted in a positive shake test result (blebs or sheen). EB045SC-A and EB045SC-B are good examples of the subjectivity of visual observations. Both cores had approximately 17 feet of recovered length and penetrated native by 1 to 2 feet. There were no visual observations of NAPL in either core, yet all 10 shake tests in soft sediments had positive outcomes (9 sheens and 1 blebs). Petroleum odors were noted along much of the core intervals (see NCG Draft RI Figure C4-10h). NCG must provide a table that shows visual observations compared to shake tests, like Table C3-10, but with each shake test interval. In this section, there are various mentions of "conservative reporting" and "most notable" but no example is given. NCG must provide additional clarification as to what "conservative reporting" and "most notable" mean.

NYC Comment 394) Page 22-23, 3.3.1 Surface Sediment: *"NAPL was generally not observed in*

surface sediment (the top 15 cm [6 inches] of sediment), as indicated by the distribution of visual observations and shake test results shown in Figure C3-2...Observations of NAPL (i.e., potential visual observations and shake test results) in surface sediment are limited to 3 of 166 Phase 1 and Phase 2 shake-tested cores, and 6 of 42 National Grid cores (not shake tested; includes all cores with visual observations of blebs, coated, and saturated)"

The assertion that only nine surface sediment samples contain NAPL is inaccurate. NCG has not evaluated presence of NAPL in surface sediments with sufficient rigor. Only core tops (top 6 inches) were assessed for presence of NAPL. Documentation of NAPL in surface sediments was not conducted or provided by the NCG. Lack of NAPL assessment in surface sediments is a data gap. All available data (NCG, the City's toxicity sampling dataset, OU-6 sediment sampling program, and EPA ESI data) must be used to fill this data gap. The following comments and NYCDEP figures 38a, 38b and 38c demonstrate that NAPL in surface sediments is not only limited to the nine locations in the Turning Basin and Lower English Kills as asserted by the NCG, but is widespread in the surface sediments of the Creek.

NCG limits the presence of NAPL in surface sediments by ignoring visual observations in datasets included in the RI (Phase 1, Phase 2, and GPEC cores) while ignoring other readily available datasets.

The following observations in the datasets included in the RI (Phase 1, Phase 2, and GPEC cores) that have been ignored in this Appendix must be added:

a. NCG does not consider sheens to be NAPL nor do they consider sheens to be indicative of NAPL presence, despite NYSDEC Guidance to the contrary (NYSDEC in Kwan, 2014).
b. Stained sediments in GPEC cores are classified as sheen only, while other GPEC core visual observations have been ignored (see comment for Page 15, 2.3.1 National Grid Investigations for more details). The following cores have "stained" in the surface sediment intervals:
   - GPEC-GT14, GPEC-GT18, GPEC-GT22
c. Phase 1 cores with "oil coated", "oil wetted", and "oil stained" in surface sediment descriptions are missing from this Appendix. As a result, NCG has erroneously identified only three Phase 2 cores as containing NAPL in surface sediments, while none of the Phase 1 cores have surface sediments identified as NAPL impacted. The following cores are examples of ignored Phase 1 cores with NAPL impacts in surface sediments:
   i. Oil-Stained Ph1 Surface Sediments: MC003BSC, MC004CSC, NC048BSC, NC048CSC, NC048DSC, NC067ASC, NC068ASC, NC070ASC, NC079BSC, NC079DSC
   ii. Oil-Wetted Ph1 Surface Sediments: MC007CSC
   iii. Oil-Coated Ph1 Surface Sediments: EK004ASC, NC082BSC

<u>The following datasets provide useful information regarding the presence of NAPL in surface sediments and must be included:</u>

a. Surface grab samples are a spatially robust dataset and are critical in assessing presence of NAPL in surface sediments to which the benthic community is exposed. The presence of NAPL in surface grabs should have been noted by the sampling crew and included in the RI. NCG must explain why they did not include surface grabs collected in Phase 1 and Phase 2 programs in their NAPL delineation investigation. NAPL observations (oil) in surface sediments from the sediment toxicity program, as reported by the labs, as well as other observations from the EPA ESI, NYSDEC investigations, and any NAPL visual observations or shake test results from Phase 1 or Phase 2 surface grabs must be considered in this Appendix. See NYC Figure 38a which shows NAPL observations in sediment toxicity samples from NCG and City (USACE ERDC) labs.
b. Visual observations in surface sediments documented by studies conducted by EPA ESI program and OU6 sampling show that NAPL in surface sediments is not limited only to portions of the Turning Basin and the first bend of Lower English Kills as claimed by NCG in the Draft RI. Instead, Attached NYC Figures 38b and 38c show NAPL presence is widespread in the surface sediments of the Creek.

NYC Comment 395) Page 23, 3.3.2 Subsurface Sediment, CM2+ (Turning Basin), 2nd sentence: *"The thickest intervals of visual observations of potential NAPL and positive shake test results in subsurface sediment in this area are limited to the southwest corner of the Turning Basin, where observations range from 0.3 foot to 10 feet thick (a 10-foot thick NAPL observation was noted in cores GPEC-SB111 and GPEC-SB112)."*

This statement is incorrect, SB-111 has a 16 foot "tar saturated" interval from 35 to 51 ft. With SB-112, various forms of NAPL are noted contiguously for 15 feet (from 75 to 90 feet.)

NYC Comment 396) Pages 23-24, 3.3.2 Subsurface Sediment, CM2+ (Turning Basin), last sentence: *"Moving downstream along the west perimeter of the Turning Basin, NAPL observations in subsurface sediment decrease to thicknesses of less than 1 foot and tend to be located at or near the sediment/native material interface."*

Many of these cores, such as GPEC-SED22 have continuous sheens from the surface 5-10+ feet into the subsurface. Cores such as GPEC-GT22 and GPEC-GT20 have a NAPL layer under the continuous sheens, demonstrating that ebullition facilitated NAPL migration in this area is likely. Additionally, GPEC-GT22 has visual observations of "stained" and "greasy" which are not included in transcription. It cannot be inferred that NAPL is immobile in these sediments.

NYC Comment 397) Page 24, 3.3.2 Subsurface Sediment, English Kills, 2nd sentence: *"NAPL is generally present in thin (less than 1-foot) intervals. Most of these thin intervals are located at or near the sediment/native material interface..."*

This statement is inaccurate. Many of the Phase 1 cores in Figures C4-16a to C4-16d show contiguous intervals, sometimes longer than 10 feet, of NAPL observation. Also, just because the NAPL is near the sediment/native interface does not mean that it is immobile. Many cores with NAPL near that interface have a shallow depth to native material, and ebullition indicating mobile NAPL has been observed in these locations. Cores EK093SC-A, EK104SC-A, EK094SC-A, and EK005SC-A, shown in NCG Draft RI Figure C4-16c, have depths to native material of 3-7 feet.

NYC Comment 398) Page 24, 3.3.3 Native Material, 2nd paragraph: *"NAPL observations in the native material were generally limited to the same areas of the Turning Basin and English Kills where NAPL was also observed in subsurface sediment."*

The document must note all locations where NAPL in native material was observed, since it was observed in other areas of the Creek. Other unmentioned NAPL observations in native material include Phase 1 cores NC050ASC (adjacent to Pratt Oil Works), NC048CSC (adjacent to BP Products), NC051ASC (adjacent to Paragon Oil Terminal), and NC022CSC (in the center channel by Motiva; see NCG Draft RI Table C3-7). The presence of NAPL in native material is particularly important because it shows that the NAPL has migrated from the shoreline to the location of the core (the NAPL could not have been deposited coincident with native material that existed long before industry developed). If NAPL instead arrived by seeping downward through the sediment bed, then the sediment bed above it will be saturated with NAPL as well.

NYC Comment 399) Page 25, 3.3.3 Native Material, last sentence of last paragraph: *"The majority of NAPL located in English Kills native material was present in thin lenses...that were generally located in more coarsely grained layers."*

The NCG Draft RI must provide an additional discussion of this finding. The presence of NAPL in coarse grained lenses remote from the shoreline shows that NAPL in the native material in this area is likely mobile and originated at some other location.

NYC Comment 400) Section 3.4 Division of Cores into Categories, pages 25-36: These pages must be rewritten. As presented, the sediment core categorization process is meant to use a qualitative result to arrive at a quantitative conclusion without any technical validity. The use of shake tests is subjective in many ways, such as selection of sample horizon, interpreter bias,

and only testing a few discrete depths in each core. NCG's sediment core categorization process must be supplemented by a quantitative and comprehensive method, such as LIF, which provides an understanding of the amount of present NAPL over the entire length of the core. The integration of LIF data will provide a more robust understanding of NAPL presence in the Study Area and provide validation of the sediment core categorization process.

NYC Comment 401) Page 25, 3.4 Division of Cores into Categories, 1st bullet in 2nd paragraph: *"Category 1A cores contain no NAPL. Cores with negative or sheen shake test results were assigned to this category (see Table C3-10)."*

NCG provides a flawed assessment of sediment core visual observations and shake tests by failing to consider sheens. As per NYSDEC,sheens indicate NAPL presence (NYSDEC, 2016).

Specific Comments – Section 4.1 - Supplementary Data Used in the Draft RI NAPL Evaluation

NYC Comment 402) Page 29, 4.1.1 Potential Upland NAPL Sites, last sentence of first paragraph: *"The locations of potential upland NAPL sites were used as a line of evidence in the evaluation of the presence and extent of NAPL in sediment."*

The NCG Draft RI does not sufficiently use the presence of upland sites as lines of evidence in delineating NAPL. Upland NAPL sites must be identified by name when they are near NAPL impacted sediments, and more refined investigations must be conducted near upland sites with known NAPL present in the subsurface. Upland site information should be used in conjunction with ebullition facilitated NAPL migration, shoreline NAPL seeps, and groundwater/sediment hydrocarbon data to determine where NAPL impacted sediments are located and to more accurately delineate NAPL in those sediments.

NYC Comment 403) Page 29, 4.1.1 Potential Upland NAPL Sites, 3rd sentence of 2nd paragraph: *"EPA-identified upland sites, with the exception of the Apollo Street Site, were also identified in the DAR and DAR Addendum (Anchor QEA 2012, 2015)."*

The Apollo Street Site has not been identified in the DAR or DAR Addendum. Along with other upland sites this should be included in the RI/FS, and the impacts of upland sites should be evaluated as potential NAPL sources.

NYC Comment 404) Page 29, 4.1.1 Potential Upland NAPL Sites, 2nd sentence of 3rd paragraph: *"Although the screening of Category 1B NAPL observations relative to EPA-identified potential upland NAPL sites was performed, it is important to recognize that many factors may be responsible for, or influence, the presence and distribution of NAPL in sediment, including the*

following…"

NCG must describe how and in what ways this screening was performed. Also, NCG must give details on the findings of the screening.

NYC Comment 405) Page 30, 4.1.1 Potential Upland NAPL Sites, last bullet: *"Dynamic processes that may mobilize or transport NAPL and sediment…these include vessel traffic, surface water flow, and navigational dredging"*

NCG does not mention the biggest dynamic NAPL process, ebullition. This must be rectified. Also, NAPL present in the native material was not subjected to vessel traffic, surface water flow or navigational dredge and must be discussed in terms of the adjacent upland sites.

NYC Comment 406) Page 30, 4.1.1 Potential Upland NAPL Sites, 2nd to last paragraph: *"Close proximity between a core with NAPL observations and a potential upland NAPL site does not mean that the site is the source of the NAPL observation; additional lines of evidence were required to assess the potential origins of NAPL."*

Available data does not support this assertion. NAPL is present in sediments adjacent to upland properties with known NAPL, such as former refineries and former MGP Sites. This text is inaccurate and must be deleted.

NYC Comment 407) Page 30, 4.1.2 Physical Data, 1st sentence of 2nd paragraph: *"The Phase 1 and Phase 2 investigations included numerous surveys conducted to characterize the shoreline surrounding the Study Area."*

NCG must discuss in detail that ongoing NAPL seeps were documented at shoreline areas emanating from shoreline features (i.e. banks, bulkheads) in their 2016 ebullition survey. This includes the Manhattan Poly Bag site in English Kills and the Former Pratt Oil Works refinery in the Middle Reach. The City has documented NAPL seeps between multiple months along shoreline features in English Kills, East Branch, Turning Basin, and the Middle Reach. The City documented seeps from Manhattan Poly Bag where NAPL was observed traveling downstream more than 1,000 feet to past the 2nd bend in English Kills. The City also documented heavy sheens from the Former Pratt Oil Works seep hundreds of yards upstream towards the Kosciuszko Bridge. The City shared photos and videos of these seeps with NCG, EPA, and NYSDEC. The RI/FS should include any and all ongoing sources of NAPL.

<u>Specific Comments – Section 4.2 - Category 1A Areas</u>

NYC Comment 408) NCG provides no delineation of NAPL in either Category 1A tributaries (Dutch Kills and Whale Creek). NCG also does not provide any cross-sections of Category 1A areas. The depth profiles are provided by river mile making comparing cross-channel NAPL impacts impossible in these figures (NCG Draft RI Figures C4-4 and C4-6). The depth profiles that NCG provides for the Category 1A areas are not discussed anywhere in the Appendix. NCG must discuss these depth profiles and also must provide cross-sections of Category 1A areas which demonstrate that observations have been delineated.

NYC Comment 409) Page 31, 4.2 Category 1A Areas [Dutch Kills and Whale Creek], 3rd paragraph: *"As shown in Figure C2-4, the observation of sheen only, whether visually observed on sediment or in a shake test, was not considered NAPL. Due to the absence of NAPL in Category 1A cores, Category 1A cores were not evaluated further."*

a) NCG asserts that Category 1A areas, shake test results of sheen, have no NAPL. This is contrary to NCG's observations of ebullition facilitated NAPL migration in Category 1A areas. Sheens blossoms and ebullition are a strong indication of nearby NAPL in the sediments (these are sheens forming locally, not transported from other parts of the Creek). The observations that NAPL is migrating in Category 1A areas shows that presence of sheens in the shake test actually does identify NAPL. For example, NCG has categorized Dutch Kills and Whale Creek as Category1A areas that require no further NAPL delineation. However, NCG 2016 NAPL migration survey shows that NAPL migration from sediments is occurring in these areas (NYC Figure 40). It is clear that Category 1A areas are important given that sheens are indication of NAPL. NAPL delineation in Category 1 areas is needed during FS sampling. NAPL that is important to the Creek and that observations of sheens needs further assessment.
b) It is inappropriate to consider these areas delineated when there are large data gaps (including no cores for ~0.2 miles between DK012SC-A and DK042SC-A). DK012SC-A has continuous sheen observations for all recovered intervals between 152cm and 610 cm (NCG Draft RI Figure C4-4). Sheens in cores/shake tests must be considered, additional cores collected in a dense grid are needed in this waterbody to delineate extent of NAPL. The initial focus of the investigation can be at the head end where sheens are observed in shake tests and visually in multiple segments in Phase 2 cores (Draft RI Figure C4-4, Depth Profile). In NCG Draft RI Figure C4-4 there appears to be laterally continuous sheens between DK037SC-A and DK033SC-G (~0.2 miles). LIF logs indicate the presence of NAPL in Dutch Kills, NYC Figure 39a.

<u>Specific Comments – Section 4.3 (Category 1B Areas)</u>

NYC Comment 410) The initial categorization process needs to be revised and updated:

a) This process should be revisited to include additional upland NAPL sites (Draft RI Figures C4-1 and C4-8). All upland NAPL Sites (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR) must be considered.
b) NCG provides no delineation of NAPL in Category 1B areas and fails to consider most of these areas for further evaluation. Continuous instances of NAPL are completely ignored, such as the continuous blebs intervals in cores at the head end of Maspeth Creek (red box in NYC Figure 43b).
c) NCG does not provide any cross-sections of Category 1B areas, the depth profiles by river mile provided make comparing cross-channel NAPL impacts impossible in these figures (Draft RI Figures C4-10a through C4-10i). Discussion of the depth profiles is needed.
d) NCG has obscured the depth profiles for Category 1B areas (Draft RI Figures C4-10a through C4-10i). They are completely separate from the maps of those areas (Draft RI Figures C4-9a through C4-9i). The depth profiles are not labeled by reach/tributary and have no inset maps, making comparison between depth profiles and maps difficult.
e) NCG has failed to use any form of NAPL transport (i.e. bank seeps, ebullition) as lines of evidence to determine if certain areas require additional delineation. NCG's classification "Residual NAPL" does not mean non-mobile NAPL. NCG's NAPL evaluation procedure is insufficient and downplays sheen and bleb observations.

NYC Comment 411) Page 31, 4.3 Evaluation of Category 1B Areas, point 1: *"Initial Evaluation, where cores were screened based on: 1) location relative to EPA-identified potential upland NAPL sites [As described in Section 4.1.1, screening of Category 1B cores relative to their location to potential upland NAPL sites was performed at the request of EPA, so the screening only included upland sites identified as potential upland NAPL sites by EPA.]; and 2) the relative amount of NAPL present in each core..."*

This process is limited by only considering EPA-identified Upland NAPL Sites, which are a small subset of NCG/EPA identified upland NAPL sites (Figure C4-8). NCG/EPA have now identified many additional upland NAPL sites which are not considered in this evaluation. This is line of evidence should be considered in addition to the other lines of evidence which have been discussed previously.

NYC Comment 412) Page 31, 4.3 Evaluation of Category 1B Areas, 2nd sentence of 2nd to last paragraph: *"The Phase 1 EPA-identified cores are evaluated using the Category 1B evaluation process. However, Phase 1 EPA-identified cores lack visual descriptions and shake tests consistent with the Phase 2 field methods specifically designed to determine NAPL presence, so the cores were evaluated in context of the visual observations and NAPL shake test results in*

surrounding Phase 2 cores."

All areas except for a portion of Area E (in the Turning Basin) were not considered for further evaluation (NCG Draft RI Table C4-2). NCG must provide methodology specifics related to the following: Visual observations in Phase 1 cores, distance that was considered "surrounding", how data gaps were treated (during the Category 2/3 area evaluation these were considered uncontaminated). The conclusions in NCG Draft RI Table C4-2 are based on insufficient and biased evidence and do not consider other NAPL related lines of evidence.

NYC Comment 413) Page 33, 4.3.1 Initial Evaluation, 1st paragraph on page 33: *"The second step in the Initial Evaluation was to screen each core based on the relative amount of NAPL present using the shake test bleb rank…Category 1B cores not located adjacent to a EPA-identified potential upland NAPL site, but with a shake test rank of 3 or greater, moved forward to the Additional Evaluation (see Section 4.3.2); shake test bleb ranks 1 or 2 represent trace NAPL and did not warrant further evaluation."*

a. NCG's bleb ranking process is subjective. Quantitative data were not collected to confirm ranking system. Regardless of bleb rank, NCG has provided no evidence to show that even "trace" blebs do not migrate through processes associated with groundwater and ebullition.
b. Cores with blebs near other NCG/EPA identified NAPL sites are erroneously excluded from further evaluation.

NYC Comment 414) 4.3.1 Initial Evaluation, 1st bullet in 2nd paragraph on page 33: *"The Category 1B evaluation confirms that residual NAPL observations did not represent a more substantial area of NAPL impacts for 30 Category 1B cores and 13 Phase 1 EPA-identified cores, out of the 58 cores evaluated."*

This statement is inaccurate and cannot be verified because there is not a high enough density of cores to make this conclusion. This statement must be deleted.

NYC Comment 415) 4.3.2 Additional Evaluation, 1st full paragraph on page 34: *"These data were reviewed together to evaluate whether, based on several lines of evidence, the Category 1B NAPL may represent a more substantial area of NAPL impacts…"*

NCG did not use any data other than shake test results to delineate NAPL. NCG failed to look at other NAPL related evidence such as ebullition and sediment/groundwater hydrocarbon data in performing this assessment. Also, lithology should not be used as a screening tool or "line of evidence" since it has little bearing on the presence of NAPL or NAPL migration.

NYC Comment 416) Pages 35-36, 4.3.3.1 Further Evaluation – Area B: Additional cores must be collected in a stepwise/grid fashion, from the locations where NAPL has been identified by shake test results to delineate the extent of NAPL in this area. NAPL has not been adequately delineated here either laterally or vertically.

NYC Comment 417) Page 36, 4.3.3.1 Further Evaluation – Area B, last sentence states: *"Therefore, the Category 1B evaluation in Area B was completed with no further action required."*

a. Category 1B evaluation in this area is incomplete. NCG ignores that the layer observation in core NC271SC-B is not laterally bound by any nearby core downstream (NC161 cores are over 300 feet away and do not penetrate native material). Moreover, this core has multiple intervals of bleb observations above the layer, suggesting vertical NAPL migration. There are multiple cores in this area with significant intervals of sheen above blebs or long intervals of continuous sheen, such as NC271SC-B, NC271SC-C, NC023SC-B, NC258SC-A, NC258SC-D, NC258SC-F and NC258SC-E. NCG has inappropriately used some of these cores to bound layer and bleb observations.
b. Motiva Terminal on the south bank of Newtown Creek is a known NAPL site. Groundwater samples collected by NCG along the north bank of Newton Creek have elevated concentrations of PAHs considered by NCG to be indicative of presence of NAPL. The density of the cores in this area, especially near the Motiva Terminal, is not sufficient to delineate NAPL. Additional cores are needed to assess if NAPL is present in this area (red circle in NYC Figure 45f).

NYC Comment 418) Pages 36-37, 4.3.3.2 Further Evaluation – Area C: The City ebullition surveys have identified areas in this reach where NAPL is migrating to the surface sediments and water column. This is also an area where historical records indicate millions of gallons of oil spilled in the Creek and upland areas. Additional cores must be collected in a stepwise/grid fashion, from the locations where NAPL has been identified by shake test results, to delineate the extent of NAPL in this area. NCG has largely dismissed NAPL in this reach and has not delineated NAPL laterally or vertically.

NYC Comment 419) 4.3.3.2 Further Evaluation – Area C, 1st full sentence on Page 37 states: *"NC276SC-A, located adjacent to a EPA-identified upland NAPL site..."*

The upland NAPL Site associated with core NC276SC-A should be identified by name.

NYC Comment 420) Page 37, 4.3.3.2 Further Evaluation – Area C, last paragraph states: *"The lack of NAPL observed in NC036SC-A confirms that the NAPL observed at NC276SC-A is localized and is not associated with a more substantial area of NAPL impacts. Therefore, the Category 1B evaluation in Area C was completed with no further action required."*

There are laterally continuous NAPL observations between many of these cores, such as NAPL observations between cores NC036BSC, NC276SC-A, and NC277SC-A, which indicate that NAPL is not localized. There are no upstream cores laterally bounding NAPL observations in NC277SC-A which clearly indicates that NAPL has not been delineated in this area.

<u>Other Category 1B Areas Which NCG Should Discuss in Section 4</u>

NYC Comment 421) CM 2.2 (Figures C4-9d [Map] and C4-10d [Depth Profile])

a. The City ebullition survey identified areas in this reach where NAPL is migrating to the surface sediments and water column. NCG has largely dismissed NAPL in this reach, however historical records indicate millions of gallons of oil were spilled in this area of Creek and adjacent upland areas. Additional cores must be collected in a stepwise/grid fashion, from the locations where NAPL has been identified by shake test results, to delineate the extent of NAPL in this area (see areas circled in red in NYC Figure 45d).
b. NCG has inappropriately moved the boundary of the Category 2/3 CM 1.7 area downstream. This decision is contrary to EPA instructions and is not supported by evidence (see discussion on CM 1.7, previous comment).

NYC Comment 422) Turning Basin - Area D (Figures C4-9e and C4-10e) and Area E (AC/NCG Draft RI Figures C4-9f and C4-10f)

a. Multiple cores have continuous sheens in the surface sediment and from the surface well into the sediments. NC174SC-D has blebs observations without sediment underneath bounding it. Sample density is insufficient to consider these areas delineated. For example, NC264SC-B has multiple intervals of blebs observations but no cores nearby with adequate recoveries at those depths. NC176SC-A and NC176SC-B have laterally contiguous blebs observations but no cores bounding those observations towards Maspeth Creek.
b. Additional data is needed in the Turning Basin area to delineate the edges of NAPL extent (see areas circled in red in NYC Figure 45a). Additional cores should be collected in a stepwise/grid fashion from confirmed NAPL locations and testing for the presence of NAPL.

NYC Comment 423) Maspeth Creek - Area F (Figures C4-9g and C4-10g)

a. There are large lateral data gaps in Maspeth Creek, though existing cores demonstrate that there are also large vertical data gaps. Both MC005SC-E and MC007SC-C have continuous

intervals of blebs which are not bounded by sediment with no visual observations below. In fact, neither core reaches native material. MC007SC-C has continuous blebs observations from 30 to 388 cm while collocated MC007SC-A has continuous blebs observations below continuous sheen observations up to the surface, suggesting NAPL migration.

b. NAPL presence is also confirmed by City NAPL migration observations in this area during ebullition reconnaissance. Additional cores need to be collected in stepwise/grid pattern to delineate NAPL extent (see areas circled red in NYC Figures 45e).

NYC Comment 424) East Branch - Area G (Figures C4-9h and C4-10h)

a. Cores EB048SC-A, EB049SC-A and EB050SC-A are located in the Northern Fork of East Branch, a known ebullition facilitated NAPL migration hot spot (NYC Figure 54a-54e). Cores from this area were recorded to have sheens, which are considered by NCG as not requiring further investigation. This is one of the most active ebullition facilitated NAPL migration hot spots in the Creek (red box in NYC Figure 43a), indicating surface water sheens may be forming from NAPL sheens identified in the cores and further investigation is required.
b. There are large data gaps in East Branch such as the area adjacent to Maspeth Concrete Loading, an upland NAPL site.

NYC Comment 425) Upper English Kills - Area H (Figures C4-9i and C4-10i)

a. Blebs and sheen observations cannot be ignored in this area, especially between the Grand Street Bridge and the downstream portion of Area H. There are no cores downstream of EK083SC-C bounding the blebs observation and collocated core EK083SC-B has ~10 feet of continuous sheen observations around the blebs observation. Ebullition facilitated NAPL migration has been observed in the area by the City.
b. In addition to having limited data, most cores were not shake tested in native sediments. Further investigation is required. Additional delineation is needed in the red circled area in NYC Figure 45c, as per LIF UVOST signatures in the area showing the presence of oil-like material (see NYC Figure 39a).

NYC Comment 426) Section 4.4.1, Creek Mile 1.7 Category 2/3 Area

a. The City ebullition survey has identified areas in this reach where NAPL is migrating to the surface sediments and water column. This is also an area where historical records indicate millions of gallons of oil were spilled in the Creek and upland areas. Additional cores must be collected in a stepwise/grid fashion, from the locations where NAPL has been identified by shake test results to delineate the extent of NAPL in this area (see red circled area in NYC Figure 45d).
b. Additional cross-sections are needed to delineate this area. By including few cross sections, NCG is ignoring large data gaps. There must be more cross-channel cross sections and at

least one in the center channel.

c. Upland NAPL sites, including Pratt Oil Works, BP Products, Paragon Oil Terminal, Apollo Street Site, ExxonMobil Greenpoint Remediation Project, Quanta, and Review Avenue Development must be added to the discussion and all associated figures and tables whenever applicable.
d. The ongoing Pratt Oil Works NAPL seep must be discussed in this section.
e. The text indicates that NAPL in this area has largely been delineated, however the area of delineation is not shown on any of the maps or figures.

NYC Comment 427) Page 40, 4.4.1.1 Step 1, 1st sentence: *"Category 2/3 NAPL observations were present in three CM 1.7 cores, where the NAPL was observed in a thin, discontinuous sand layer that ranged from 1 to 3 cm thick."*

Cores NC050ASC and NC048CSC have contiguous NAPL (oil-staining) observed in large segments above the noted NAPL observation. Core NC262SC-A has multiple sheens.

NYC Comment 428) Page 40, 4.4.1.1 Step 1, 2nd sentence: *"In NC050ASC and NC262SC-A, located adjacent to the Queens shoreline…"*

This area is located adjacent to Pratt Oil Works on the Queens shoreline. If upland sites are used as a "line of evidence" they should be mentioned when sediments in the Creek adjacent to them are heavily impacted by NAPL (i.e., all of the category 2/3 areas).

NYC Comment 429) Page 40, 4.4.1.1 Step 1, 3rd sentence: *"At NC048CSC, located adjacent to the Brooklyn shoreline…"*

This location is adjacent to BP Products. Same comment as above.

NYC Comment 430) Page 40, 4.4.1.1 Step 1, 1st bullet: *"NC050ASC, a Phase 1 shake-tested core with oil coating visually observed in a 1-cm-thick sand layer at the sediment/native material interface, 8.0 feet below the sediment surface."*

The observation of ~4.5 feet of contiguous oil-stained sediment above this oil-coated observation should be noted, as shown on NCG Draft RI Figures C4-12a and b.

NYC Comment 431) Page 40, 4.4.1.1 Step 1, 2nd bullet: *"NC262SC-A, a Phase 2 core where visual blebs and a corresponding shake test layer result were observed in a 3-cm sand layer at the sediment/native material interface, 6.4 feet below the sediment surface."*

There are also sheen observations in all three shake tests above this point and a visual observation on the core of sheen, shown on NCG Draft RI Figure C4-12a.

NYC Comment 432) Page 40, 4.4.1.1 Step 1, 3rd bullet: *"NC048CSC, a Phase 1 shake-tested core with oil coating visually observed in a 1-cm-thick sand layer in sediment, 6.3 feet below the sediment surface. A yellow coating was observed on the sample spoon during core processing."*

a. The document does not mention of the contiguous NAPL visual observations from the sediment surface, past the shake test sample depth, and into the native material. This is indicative of NAPL migration to the surface sediments and surface water.
b. NCG has misclassified oil-coated sediment as oil-stained on NCG Draft RI Figure C4-12c. It is possible that A this same error occurs throughout the entire NAPL evaluation for Phase 1 cores. The core log notes that most of the intervals shown on NC048CSC are "oil-coated" and NCG only records intervals that show yellow coating on the sample spoon as "oil-coated". The rest of the interval (with the exception of the first 37 cm) is written in the core logs as "oil-coated" yet is symbolized on the figure "oil-stained".

NYC Comment 433) Page 41, 4.4.1.2 Step 2, 1st sentence: *"CM 1.7 Category 2/3 NAPL observations were limited to 1- to 3-cm sand layers located in sediment near or at the sediment/native material interface and are overlain by 6.3 to 8.0 feet of sediment with no or residual NAPL."*

By stating that the cores are overlain by 6-8 feet of sediment with no or residual NAPL, NCG is suggesting that the 6-8 feet of sediment act as a buffer between the heavily impacted NAPL lens and the surface sediment/ creek. However, much of the 6 – 8 feet of sediment is NAPL impacted, so the statement is incorrect and misleading.

NYC Comment 434) Page 41, Cross-section 1 (Figure C4-12a), 3rd sentence: *"Because NAPL was not observed in NC281SC-A, located between NC050ASC and NC262SC-A, and NC050SC-B, collocated with NC050ASC, the sand layer where Category 2/3 NAPL observations were located appears to be discontinuous and limited in extent."*

<u>Previous EPA comment has not been addressed</u>: *"NAPL around NC262SC-A is not delineated as the note on the slide concludes. There is no upstream adjacent core and the downstream adjacent core failed to recover sediment at similar elevations where shake tests were positive."* (EPA, 2016)

NYC Comment 435) Page 41, Cross-section 1 (Figure C4-12a), 4th sentence states: *"Category 2/3 observations on cross-section 1 (see Figure C4-12a) are laterally bound downstream by NC279SC-A, where the sand layer at the sediment/native material interface was observed and upstream by NC056SC-A."*

There is a large distance (~500 feet) between the cores with Category 2/3 observations and NC279SC-A and NC056SC-A, which the documents states "laterally bound" the observations downstream and upstream respectively. NC055ASC and NC055SC-B should be considered instead of NC056SC-A, since they have NAPL impacts at the sediment/native interface.

NYC Comment 436) Page 41, Cross-section 1 (Figure C4-12a), last sentence: *"Category 2/3 NAPL observations are vertically bound by underlying sediment, with no observation of NAPL within the same core."*

NC050ASC has 42 cm (1.3 feet) of recovered core below it. This is not enough core length to determine that there is no NAPL below the observation. Additionally, NC050ASC and NC048CSC only have one shake test each (applies to cross-section 2, NCG RI Draft Figure C4-12b also).

NYC Comment 437) On Page 41, Cross-section 2 (Figure C4-12b): *"Category 2/3 NAPL observations were not present in either of the collocated Phase 1 archive cores processed using Phase 2 methods (see Figure C4-12b)."*

NCG refers to Phase 1 cores NC050ASC and NC048CSC, which are collocated with Phase 2 cores NC050SC-B and NC048SC-E, respectively. The document claims that NAPL is bound laterally, however NCG arrived at this conclusion by ignoring the previously submitted <u>EPA comment:</u> *"NC048CSC has only one shake test over the entire length of the core. The collocated core has positive shake tests in three of four tests that were performed above native material and the recovery rate of the upstream core appears to be approximately 50%. The conclusion that the NAPL source is bounded laterally and vertically is premature"* (EPA, 2016).

NAPL delineation is not complete in this area. There are no other cores in the center channel in this cross section to delineate NAPL laterally across the creek andNC049SC-A is only 131 cm deep and has a continuous interval of bleb observations at 90 to 131 cm (the bottom of the core), see NYC Figure 43c. These blebs are at a similar depth as the blebs and layer from the NC048 collocated cores. NAPL migration has also been documented in this area (NYC Figures 53a to 53e). Since there is a low density of cores and a lack of both lateral and vertical data (i.e., data needed to delineate the extent of NAPL impacts in the navigation channel), additional NAPL delineation is needed in this area.

NYC Comment 438) Page 42, Cross-section 3 (Figure C4-12c), 4th sentence: *"Because the sand layer and associated Category 2/3 NAPL observations in NC048CSC were not observed in either the collocated core, or in upstream and downstream cores, the sand layer and associated Category 2/3 NAPL observations appear to be discontinuous and limited in extent."*

NC048CSC has the following issues: there is only one shake test in this core; there are no downstream bounding cores; and NCG assumes that NAPL is bound by stratigraphy despite the fact that there is a continuous oil-stained interval above a NAPL layer (see yellow box in NYC Figure 43d). NCG must remove all unsubstantiated claims and acknowledge the specific data gaps that exist.

NYC Comment 439) Page 42, Cross-section 3 (Figure C4-12c), 2nd paragraph: *"As a result of this evaluation, the upstream boundary of the CM 1.7 Category 2/3 Area was adjusted, based on the absence of Category 2/3 NAPL observation in adjacent Phase 1 cores that provided a clear boundary. This resulted in the Category 1B CM 2.2 Area boundary being extended downstream from its original location."*

The upstream boundary of the CM 1.7 Category 2/3 Area was moved downstream without cores on the Brooklyn side of the Creek to bound NC051 laterally upstream. This decision ignores significant data gaps and goes contrary to EPA instructions in the "EPA Comments Submitted on October 26, 2015, on the October 1, 2015 NAPL Presentation".

NYC Comment 440) Section 4.4.2 (Turning Basin Category 2/3 Area)

Data collection in a stepwise/grid format is needed to delineate NAPL extent throughout the Creek. Additional cores must be collected in a stepwise/grid fashion (like the GPEC cores) to more accurately delineate the extent of NAPL (areas circled in red NYC Figure 45a).

a. Additional cross-sections are needed to delineate this area. By including few cross sections, NCG misses large data gaps. Multiple additional cross-channel cross sections and at least one in the center channel (parallel to cross section 1) must be added to the Turning Basin.
b. All upland NAPL sites, especially GPEC, must be added whenever applicable to the discussion and all associated figures and tables.
c. The document states that NAPL in this area has largely been delineated, however the area of delineation is not shown on any of the maps of figures.

NYC Comment 441) Page 43, 4.4.2.1 Step 1, 1st sentence of 1st full paragraph: *"The majority of Category 2/3 NAPL observations in the Turning Basin Area are limited to cores located in the west and southwest portions of the Turning Basin (see Figure C4-14a)."*

More detail is needed regarding the cores that are outside of the west and southwest portions of the Turning Basin.

NYC Comment 442) Page 43, 4.4.2.1 Step 1, 2nd full paragraph states: *"Moving downstream along the west perimeter of the Turning Basin, Category 2/3 observations in sediment decrease to thicknesses of less than 1 foot and tend to be located at or near the sediment/native material interface (see Figure C4-14a)."*

Sheens and blebs were observed above some of these observations as well as ebullition facilitated NAPL migration in the area.

NYC Comment 443) Page 44, Cross-section 1 (Figure C4-14a), 2nd sentence in 2nd paragraph: *"The upstream lateral limit of Category 2/3 NAPL in surface and near-surface sediment is provided by GPEC-SED03, where no visual evidence of potential NAPL was observed. The downstream lateral limit is provided by GPEC-SB112, where no visual evidence of potential NAPL was observed."*

a. GPEC-SED03 does not laterally bound deeper NAPL observations in neighboring cores, including blebs and coated observations in GPEC-GT12. GPEC-SED 03 also has visible sheens from 0 to 0.33 feet.

b. GPEC-SB112, like most of the SB cores, has not been transcribed correctly on the cross-section so it is difficult to compare depths. The first interval (30-35 feet depth) starts at - 49 feet NAVD 88. This is not an appropriate core for bounding shallow observations.

NYC Comment 444) Page 44, Cross-section 1 (Figure C4-14a), 1st sentence in 3rd paragraph states: *"At the northwest (downstream) end of cross-section 1, Category 2/3 observations are present in thin, discontinuous, coarse-grained sand lenses approximately 2 cm to 3.6 feet thick located at, and within 3.5 feet of, the sediment/native material interface (GPEC-GT20, NC069SC-B, and NC069SC-A; see Figure C4-14a)"*

a. 3.6 feet is not a "thin" layer of NAPL.

b. A layer of tar coated gravel in silt is ignored in core GPEC-SB114.

NYC Comment 445) Page 44, Cross-section 1 (Figure C4-14a), 2nd sentence in 3rd paragraph: *"The downstream lateral limit of Category 2/3 observations was provided by GPEC-SED22."*

a. GPEC-SED22 has continuous sheens visible from 0 to 12.5 feet.

b. GPEC-SED22 is too shallow to adequately bound NAPL observations. NAPL observed in upstream GPEC-GT22 is deeper than the bottom of GPEC-SED22.

NYC Comment 446) Page 44, Cross-section 1 (Figure C4-14a), 3rd sentence in 4th paragraph:
"The Category 2/3 observations at depth in native material were bound laterally in the downstream direction by GPEC-GT16 and in the upstream direction by the shoreline."

a. The shoreline is not an appropriate lateral bound when it is known to be contaminated with NAPL. The City has observed NAPL seeps from the GPEC bulkhead in numerous places. EPA commented that *"GPEC-SED03 does not bound NAPL laterally as there are coated and saturated NAPL observations at greater depths in a number of cores north of GPEC-SED03"* (EPA, 2016). Instead acknowledging this data gap, this comment has been ignored and the lateral boundary has been changed to the contaminated shoreline.
b. GPEC-GT16 is too far from GPEC-SB112 to bound lateral NAPL observations.

Other EPA Comments not addressed:

c. *"The vertical extent of NAPL has not be delineated in cores GPEC-SED15, GPEC-SED12, GPEC-SED09, and GPEC-SED06. Coated or saturated observations are present at the bottom of these four cores, generally below the native contact, and adjacent or nearby cores have coated or saturated observations at greater depths."* (EPA, 2016)
d. *"Further investigation is needed to define the extent of the NAPL found at depth in cores GPEC-SB112 and GPEC-SB110 (both cores show coated and or saturated observations). Since NAPL was not observed in intervals above and below the observed NAPL, the NAPL distribution in the cores suggests lateral migration at depth. This condition has implications for evaluation of groundwater contamination. Although the observations were presented in the Overlay Presentation, this important information was not highlighted during the presentation."* (EPA, 2016)

NYC Comment 447) Pages 44-45, Cross-section 2 (Figure C4-14b)

a. There are 10 feet of contiguous sheen observations in GPEC-SB113 with no deep cores bounding the observation in either direction. Additionally, GPEC-SB113 has no recovered intervals shallow enough to adequately bound shallow NAPL observations in NC069SC-B.
b. For NC288SC-A, the upper shake test resulted in a sheen, and there are sheen visual observations from 0-412 cm (0-13.5 feet) for all recovered lengths. This could indicate a significant mass of NAPL at this location.

NYC Comment 448) Page 45, Cross-section 3 (Figure C4-14c), 2nd sentence in 1st paragraph:
"Category 2/3 NAPL observations on cross-section 3 extend approximately 320 feet from the Brooklyn shoreline out toward the center of the creek and were located at, and across, the sediment/native material interface, beneath approximately 5 to 7 feet of sediment with residual NAPL or no NAPL observations."

"Residual" or "no NAPL" observations (actually blebs and sheens) suggest vertical NAPL

transport. This area is a known ebullition facilitated NAPL migration hotspot. This statement should reflect the documented observable NAPL impacts in this area.

NYC Comment 449) Page 45, Cross-section 3 (Figure C4-14c), 3rd sentence in 1st paragraph: *"Category 2/3 NAPL observations consisted of visually coated observations ranging in thickness from 2 to 5 feet. Variability in the distribution of visual observations relative to sediment lithology (grain size) and native material interface elevations suggest that the observations are laterally discontinuous."*

This statement is not supported by NCG Draft RI Figure C4-14c. The previously submitted EPA comment still applies: *"GPEC-SED 13, GPEC-SED 14, and GPEC-SED 15 all have coated NAPL across the sediment-native interface, yet the presentation does not conclude that the NAPL is laterally continuous across these three cores."* (EPA, 2016)

NYC Comment 450) Page 45, Cross-section 3 (Figure C4-14c), 1st paragraph: *"The lateral limit of Category 2/3 observations is defined by the Brooklyn shoreline to the west and by cores with no NAPL at, and near, the sediment/native material interface to the east (NC218SC-A, NC233SC-B, and NC233SC-A; see Figure C4-14c)."*

NC233SC-B and NC233SC-A are not deep enough to adequately bound NAPL. The previously submitted EPA comment still applies: *"NC218SC-A: Only 46% recovery was achieved in this core. This rate of recovery makes any conclusions from this core suspect"* (EPA, 2016).

NYC Comment 451) Page 45, Cross-section 3 (Figure C4-14c), last sentence in 1st paragraph: *"Category 2/3 observations were vertically bound by underlying sediment where no visual evidence of NAPL was observed in the core itself or in adjacent cores."*

The previously submitted EPA comment still applies: *"The vertical extent of NAPL has not be delineated in cores GPEC-SED15, GPECSED12, GPEC-SED09, and GPEC-SED06"* (EPA, 2016).

NYC Comment 452) Page 45, Cross-section 3 (Figure C4-14c), 1st sentence in 2nd paragraph: *"At GPEC-SED14, 0.3 foot of visual blebs was observed in sediment 0.3 foot below the mudline. No visual evidence of potential NAPL was observed in surface or near-surface sediment in adjacent cores (GPEC-SED15 and GPEC-SED13; see Figure C4-14c)."*

There are sheens in a significant portion of the soft sediments in both GPEC-SED15 and GPEC-SED13. This must be acknowledged in the document since sheens are indicative of NAPL.

NYC Comment 453) Page 46, Cross-section 4 (Figure C4-14d), 1st sentence in 2nd paragraph:

"Category 2/3 NAPL observations at, and near, the sediment/native material interface were vertically bound by underlying sediment, where no visual evidence of potential NAPL was observed in the core itself or in adjacent cores."

a. This statement is incorrect. It is inappropriate for NCG to draw conclusions based on no data. This also ignores the saturated layer at the bottom of GPEC-SED09. No sediment was recovered underneath to suggest delineation.
b. There are laterally continuous Category 2/3 observations between GPEC-GT14 and NC075SC-A. These observations between cores are not considered.
c. The blebs in GPEC-SED08 have no underlying sediment to bound them.

NYC Comment 454) Page 46, Cross-section 4 (Figure C4-14d), last sentence in 2nd paragraph: *"Category 2/3 NAPL observations were laterally bound by core GPEC-SED26, which had no visual evidence of potential NAPL and penetrated 2.5 feet into the native material."*

This statement is incorrect. The first ~4 feet of this core has sheens and blebs, which are NAPL. Also, the core is too shallow to adequately bound NAPL observations that are within 10 feet of the sediment/native interface.

NYC Comment 455) Page 46, Cross-section 4 (Figure C4-14d), 3rd paragraph: *"Category 2/3 NAPL observations at depth in the native material at GPEC-SB112 were vertically bound by the underlying sediment where no visual evidence of potential NAPL was observed. Category 2/3 NAPL observations were limited in lateral extent to the north, based on no visual evidence of potential NAPL in core GPEC-SB111, located approximately 90 feet south of GPEC-SB112 (see Figure C4-13). Category 2/3 observations at GPEC-SB112 were bound by the Brooklyn shoreline on the west but are not bounded to the east."*

The lack of data to the east of GPEC-SB112 is a large data gap that must be addressed through further delineation. The document should clearly identify data gaps but fails to adequately do so.

NYC Comment 456) Page 46, Cross-section 4 (Figure C4-14d), last sentence on page: *"Observations of NAPL in surface and near-surface sediment were separated by two cores with no visual evidence of potential NAPL in surface and near-surface sediment..."*

There are sheens in surface sediments of both GPEC-SED08 and GPEC-SED07. GPEC-SED07 also has a coated interval at 3.28 feet to 6.56 feet.

NYC Comment 457) Page 47, Cross-section 5 (Figure C4-14e), 1st sentence of 2nd paragraph:

"Visual observations of NAPL and potential NAPL were present in surface and near-surface sediment in four cores (GPEC-GT12, NC298SC-A, GPEC-SED01, and NC309SC-C; see Figure C4-14e)"

Visual observations of NAPL (including sheens, which cannot be ignored) are present in every core in this cross-section with recovered intervals in the surface sediment. Some of the cores (such as NC309SC-A&B) have continuous sheen observations well into the subsurface sediments.

NYC Comment 458) Page 47, Cross-section 5 (Figure C4-14e), 2nd sentence of 2nd paragraph:
"Category 2/3 NAPL observations were present in surface and near-surface sediment only at NC298SC-A, starting at the mudline and extending 6.5 feet into the sediment."

The interval of no recovery from 6.5 to 13 feet below the continuous coated visual observations from 0 to 6.5 feet is ignored and this core is interpreted to suggest that NAPL stops at 6.5 feet into the sediment. All recovered intervals of soft sediment from 0 to 19 feet are continuously coated in NAPL. Unless it is proved otherwise, it must be assumed that there is a 19-foot interval of continuous NAPL in this core. More cores with better recoveries are needed in the immediate area to delineate this NAPL body.

NYC Comment 459) Page 47, Cross-section 5 (Figure C4-14e), last sentence of 2nd paragraph:
"Cores with visual observations of potential NAPL and positive shake tests in surface and near-surface sediment are separated by cores with no visual evidence of potential NAPL. This indicates that NAPL observations in surface and near-surface sediment were discontinuous and limited in extent."

This statement is not supported by the evidence. Large intervals of sheens in the surface and near surface sediments have been ignored and large lateral gaps exist, such as over 150 feet between GPEC-SED01 and NC309SC-C. The statement must be removed from the text.

NYC Comment 460) Page 47, Cross-section 5 (Figure C4-14e), 2nd sentence of 3rd paragraph:
"The sediment lithology where the NAPL observations were present varied, from coarse-grained native material in cores closest to the Brooklyn shoreline, to fine-grained sediment in cores located to the east, indicating Category 2/3 NAPL was localized and discontinuous (see Figure C4-14e)."

Lithology cannot be used to suggest NAPL is localized and discontinuous, especially with large data gaps. Native material was not reached in the eastern cores, the assessment is incomplete.

NYC Comment 461) Pages 47-48, Cross-section 5 (Figure C4-14e), last sentence of 3rd paragraph: *"Category 2/3 observations at, and near, the sediment/native material interface and located adjacent to the shoreline were laterally bound to the east by GPECSED01, which penetrated approximately 4 feet into the native material."*

a. This core is too shallow to laterally bound observations in NC298SC-A.
b. This is not a clean core. There are blebs and sheen observations in soft sediments through its entire length.

NYC Comment 462) Page 48, Cross-section 5 (Figure C4-14e), 4th sentence in last paragraph: *"Category 2/3 observations in both cores were vertically bound by the underlying sediment with no visual evidence of potential NAPL. Category 2/3 NAPL observations at depth in the native material and located adjacent to the shoreline were not laterally bounded to the east."*

a. This is a data gap which must be addressed.
b. The previously submitted EPA comment has not been addressed: *"The notation on GPEC-SB10, indicates that the NAPL at approximately -50 feet elevation is laterally discontinuous. The support for this statement is unclear when the core to the west (GPEC-SED03) and all of the cores east of GPEC-SB10 terminate at elevations less than -45 feet."* (EPA, 2016)
c. Coated NAPL observations appear laterally continuous between NC298SC-A, GPEC-SB110, and GPEC-GT12. Additionally, there are no cores closer to the shoreline at similar depths to GPEC-GT12 indicating that the coated observations do not continue into the shoreline. The GPEC shoreline, which is heavily contaminated, cannot be used to bound cores.

NYC Comment 463) Page 48, Cross-section 5 (Figure C4-14e), last sentence in last paragraph: *"However, given the depth of the Category 2/3 NAPL observations 35 to 50 feet below the mudline, and because the lateral limits of Category 2/3 NAPL in the overlying sediment and overlying native material were delineated, characterization of the horizontal extent of Category 2/3 NAPL in this area is complete for the purposes of the RI evaluation."*

This statement is not supported by the data. There are large data gaps which have been either ignored or downplayed.

NYC Comment 464) Section 4.4.3 (English Kills Category 2/3 Area)

a. The City ebullition survey has identified areas in this reach where NAPL is migrating to the surface sediments and water column. This is also an area where historical photographs indicate drainage channels connecting Equity Works and GPEC Former MGP Site upland areas with English Kills (see NYC Figure 42) (Texaco, 2015). Additional cores must be collected in a stepwise/grid fashion from the locations where NAPL has been identified by shake test results to delineate the extent of NAPL in this area (see red circled areas in NYC

Figure 45b). The NCG Draft RI has largely dismissed NAPL in this reach despite high LIF response of oil-like and tar-like material throughout this section of the Lower English Kills as shown in NYC Figures 39a and 39b.

b. Additional cross-sections are needed to delineate this area. By including few cross sections, large data gaps are ignored. A cross section which runs adjacent to Consolidated Carpet Trade must be added and more than one cross section heading downstream from the first bend to the mouth of English Kills must be added.
c. Upland NAPL sites, including Equity Works, BCF Oil, and Consolidated Carpet Trade must be added whenever applicable to the discussion and all associated figures and tables.
d. The document states that NAPL in this area has largely been delineated, however the area of delineation is not shown on any of the maps or figures.

NYC Comment 465) Page 48, 4.4.3.1 Step 1, sentence at bottom of the page states: *"Moving downstream, Category 2/3 NAPL observations were present in a number of cores clustered just downstream of the bend that defines the lower reach of English Kills."*

a. The geographic relationship of this NAPL hotspot to historic drainage channels from the National Grid MGP sites should be determined.
b. The document only notes Category 2/3 observations in these cores, despite widespread sheen and bleb intervals in these cores. Additionally, the City's 2015 and 2016 ebullition surveys have documented extensive ebullition facilitated NAPL migration in the immediate area. This information should be considered and shown in the document.

NYC Comment 466) Page 49, 4.4.3.1 Step 1, 1st bullet point: *"EK004ASC is a Phase 1 shake-tested core that is collocated with EK004SC-B. Oil wetting was observed in gravelly sand native material at the bottom of the core. A yellow coating was observed on the sample spoon during core processing. Phase 1 shake testing produced a layer result."*

Observations of oil-coated sediment near the top of EK004ASC have been ignored.

NYC Comment 467) Page 51, Cross-section 1 (Figure C4-16a), start of 2nd paragraph: *"Category 2/3 NAPL observations in the native material at EK080SC-A were bound laterally in the upstream direction by EK007SC-B and EK008SC-B; both cores penetrated to a similar elevation as EK080SC-A but did not contain NAPL observations. In the downstream direction, the lateral limit of Category 2/3 NAPL observations were bound by EK079SC-A."*

The area around the 2nd bend of English Kills is a known ebullition facilitated NAPL migration hotspot and must further be delineated. The previous EPA comment still applies: *"The presentation concludes NAPL in EK080SC-A is laterally and vertically bounded. However, the core*

is relatively close to the shore with no mid-channel core and upstream and downstream cores are greater than 200 feet in either direction." (EPA, 2016)

NYC Comment 468) Page 51, Cross-section 1 (Figure C4-16a), 1st sentence in 3rd paragraph: *"Category 2/3 NAPL at EK006SC-D was observed in a thin sand layer at the bottom of the core."*

This statement is incorrect. Blebs, which are not classified as Category 2/3 NAPL, were observed in the thin sand layer at the bottom of the core, from 106-107.5cm. The layer of "coated" visual observations was at 107.5-115cm and located in silt (description form the core log):

"SILT WITH SAND (ML): @107.5-115cm: Moist, medium dense, black, 80% fines, 20% sand (sandy, fine); strong petroleum-like odor; brown coated NAPL."

NYC Comment 469) Page 51, Cross-section 1 (Figure C4-16a), 2nd sentence in 3rd paragraph: *"However, Category 2/3 NAPL observations were not present in the collocated core."*

This statement is misleading. The collocated core (EK006SC-C) was not deep enough to encounter the Category 2/3 NAPL observations in EK006SC-D. This is a data gap.

NYC Comment 470) Page 51, Cross-section 1 (Figure C4-16a), last sentence in 3rd paragraph: *"Category 2/3 NAPL observations were bound laterally upstream by EK080SC-A and downstream by EK0079SC-A. The Category 2/3 NAPL observations were vertically bound by adjacent cores EK0079SC-A and EK036SC-A, which penetrated deeper than EK006SC-D, and did not contain NAPL."*

a. EK080SC-A is too far away to adequately bound EK006SC-D. Moreover, EK080SC-A is contaminated by Category 2/3 NAPL.
b. Vertical bounding must be done within the core, not by comparing nearby cores. There is a data gap for the vertical contamination below EK006SC-D.
c. Similar depth intervals all contain continuous sheens in EK006SC-C, EK006SC-D, and EK079SC-A, suggesting readily transportable NAPL. This is in line with significant ebullition facilitated NAPL migration observed in the area.

NYC Comment 471) Page 51, Cross-section 2 (Figure C4-16b), 2nd sentence in 1st paragraph: *"Category 2/3 NAPL observations were not observed in cross-section 2 cores."*

Multiple intervals of sheens and oil stained sediments were observed in these cores. These observations cannot be ignored in the discussion and evaluation of the presence of NAPL.

NYC Comment 472) Page 52, Cross-section 3 (Figure C4-16c), 3rd sentence in 1st paragraph: *"Nine of the ten cores contained Category 2/3 NAPL observations in native material beneath 3.9 to 16.6 feet of overlying sediment."*

Much of these "overlying sediment" intervals have sheens, blebs, and staining. This is misleading and suggests that the NAPL observations are beneath uncontaminated sediment. The ignored visual observations instead show NAPL migration through the sediments.

NYC Comment 473) Page 52, Cross-section 3 (Figure C4-16c), 4th sentence in 1st paragraph: *"EK093SC-A is the one core where Category 2/3 NAPL observations were present in sediment, where the NAPL was observed in a thin sand layer located 3 feet below the mudline."*

This statement is not correct. EK004ASC has an interval of oil-coated sediment starting at 14cm.

NYC Comment 474) Page 52, Cross-section 3 (Figure C4-16c), 5th sentence in 1st paragraph: *"The Brooklyn and Queens upland shorelines were the lateral limits of Category 2/3 NAPL observations."*

a. There is no Queens shoreline in English Kills. All instances of this error should be corrected. The lateral NAPL contamination stretches from EK004SC-B to the northern shoreline and from EK005SC-A to the southern shoreline and should be stated explicitly.
b. The corner of English Kills includes a cove area which used to receive channelized runoff from both the Equity Works and GPEC Former MGP sites. This area should be specifically called out and investigated. NYC Figure 39b shows continuous presence of tar-like NAPL from the surface sediment to native materials as deep as 38 feet below the sediment-water interface.
c. The document does not clearly acknowledge the presence of continuous NAPL bodies in the area, even though there is a laterally continuous layer between cores EK104SCA, EK094SC-A and EK103SCA.

NYC Comment 475) Page 52, Cross-section 3 (Figure C4-16c), 6th sentence in 1st paragraph: *"The vertical limits of Category 2/3 NAPL observations in the native material on the Queens side of the creek were defined by underlying sediment with no observations of NAPL."*

Core EK103SC-A, located on the southern side of the Creek is erroneously called the Queens side, has multiple lenses of Category 2/3 NAPL. The deepest NAPL lens is an interval of coated NAPL ending ~6 cm before the end of the core, a negligible amount of underlying material (~6 cm) that cannot be used to vertically bound a NAPL observation. The document should clearly identify the evident vertical data gap and detail how the data gap will be addressed.

NYC Comment 476) Page 52, Cross-section 3 (Figure C4-16c), end of 1st paragraph: *"The vertical extent of Category 2/3 NAPL observations in the native material on the Brooklyn side of the creek are not delineated, extending to at least -30 feet NAVD88. However, given the depth of the Category 2/3 NAPL observations in native material on the Brooklyn side of the creek, coupled with the lack of NAPL observations in native material in upstream and downstream cores that penetrate to similar elevations, the vertical characterization of Category 2/3 NAPL in this area is complete for the purposes of RI evaluation."*

It is not clear which "upstream and downstream cores that penetrate at similar elevations" are being referenced.

NYC Comment 477) Page 52, Cross-section 3 (Figure C4-16c), 2nd paragraph: *"Visual and shake test blebs were observed in sediment at the mudline at EK100SC-A. This is the only location in English Kills where NAPL was observed at the surface, and the lateral extent of NAPL in surface and shallow sediment is well delineated by surrounding cores (see Figure C4-16c) with no observations of NAPL in surface and near-surface sediment."*

This statement is incorrect. The two closest cores have impacts in the surface/near-surface sediment. EK004ASC has an interval of oil-coated sediment starting at 14 cm while EK101SC-A has continuous sheen visual observations from 0-85 cm.

NYC Comment 478) Page 53, Cross-section 4 (Figure C4-16d), 3rd sentence of 2nd paragraph: *"The vertical limit of Category 2/3 NAPL observations in cores located on the upstream end of the cross-section was defined by both underlying sediment with no observation of NAPL within the same core and by adjacent deeper cores..."*

This conclusion is not supported by the data. See previous comments from previous cross-sections which address these cores.

NYC Comment 479) Page 53, Cross-section 4 (Figure C4-16d), 1st sentence of 3rd paragraph: *"In downstream core EK003SC-B, Category 2/3 NAPL was observed approximately 9 feet below the mudline, at the bottom of the core in native material."*

There are also continuous blebs near the native/sediment interface and continuous sheens above that. This core shows that ebullition facilitated NAPL migration is occurring.

NYC Comment 480) Page 53, Cross-section 4 (Figure C4-16d), 2nd sentence of 3rd paragraph: *"Cores EK091SC-A and EK089SC-A are the downstream lateral limit of Category 2/3 NAPL observations (see Figure C4-16d)."*

These cores are too far away to laterally bound NAPL, and EK091SC-A has only a 63% recovery.

Additional Comments – Section 5 (Summary of the NAPL Evaluation) [See Attached Figures]

NYC Comment 481) Page 54, 5 Summary of the NAPL Evaluation, last sentence of 1st paragraph: *"[The NAPL Evaluation] also considered other lines of evidence, such as the locations of potential point source discharges and industrial activities on upland sites adjacent to the Study Area"*

a. NCG did not sufficiently use other lines of evidence in their NAPL evaluation. Throughout the Appendix, NCG did not use any data other than shake test and visual observations in sediment cores to delineate NAPL. The presence of upland sites needs to be addressed with more than a note that a core was "adjacent to EPA-identified potential upland NAPL site". NCG has not identified any NAPL migration pathways and treats the presence of NAPL as a static body that occurs naturally within the stratigraphy. The NAPL must have migrated from a source location on land to where it has been detected.
b. NCG has ignored multiple comments that NYSDEC and EPA gave in early 2016 related to NCG NAPL presentations. Comments include a request from EPA to add a historic drainage channel in Turning Basin [not shown in Draft RI Figure C4-14a] and to acknowledge data gaps (i.e., core intervals with no recovery or cores that are too shallow to adequately bound NAPL observations [see NYC Figure 43c]).
c. The document does not mention of NAPL bank seeps or ebullition as indications of source areas and ongoing pathways of NAPL transport despite widespread observations of both NAPL seeps and ebullition facilitated NAPL migration. Ongoing NAPL transport pathways are not used as lines of evidence, a fundamental flaw in the NAPL delineation process.

NYC Comment 482) Page 55, 5 Summary of the NAPL Evaluation, 2nd to last paragraph: *"This dataset is sufficient for completing the RI because the NAPL was observed deep in the native material (greater than 10 to 50-plus feet below the mudline). In addition, there are data for the proximal overlying soft sediment and shallower native material that vertically and laterally delineate the extent of NAPL. The characterization of Category 2/3 NAPL is complete for the purposes of the RI evaluation. Additional evaluation of NAPL for the Feasibility Study will focus on the three Category 2/3 Areas."*

a. Delineation of Category 2/3 areas is not complete. NCG does not adequately address data gaps in their evaluation of the Category 2/3 areas. One of the EPA conditions for sufficient

RI NAPL characterization was that "gaps in the NAPL data will be clearly identified in the RI Report" (EPA, 2016). NCG ignores the vast majority of data gaps in their evaluation. An example of one such instance is the lack of a lateral boundary downstream of NC048CSC NAPL observations (see red box in NYC Figure 43c). The few data gaps that NCG does acknowledge are done so briefly and with no actions to address data shortcomings. An example is in the Turning Basin on page 46 of this Appendix: *"Category 2/3 observations at GPEC-SB112 were bound by the Brooklyn shoreline on the west but are not bounded to the east."*

b. Groundwater discharges in these areas of the Creek and contacts the NAPL in the native material and sediment bed. COPCs from the NAPL can be transported by the groundwater and can contaminate relatively clean sediment above the NAPL layers and increase hydrocarbon loading to surface water and surface sediments. Additionally, ebullition facilitated NAPL migration is widespread in these areas.
c. Sheens and blebs were routinely ignored by NCG in Category 2/3 cores and downplayed in Category 1A and B cores. Both of these observations could indicate mobile NAPL. NCG instead treats sheens and blebs as non-mobile NAPL that bounds more severe NAPL observations (red box in NYC Figure 43c).

<u>Additional Comments – Tables</u>

NYC Comment 483) Table C3-6

a. GPEC core intervals and core log data were recorded in feet. NCG must add two additional columns in Table C3-6 that list start and end depths in feet. Having depths only in cm makes comparison between this table and core logs/chemistry data (in feet) needlessly difficult.
b. Depths in the core logs for all GPEC-SB11# series cores (i.e. GPEC SB-112) do not seem to match up with cross sections or tables, and are off by up to 20+ feet. This inconsistency must be addressed and relevant tables, figures, and analysis in this appendix should be updated.

NYC Comment 484) Table C3-10: The Phase 1 shake test result of sheen with an oil-wetted visual observation (shaded gray) is considered "No NAPL", it should be changed to indicate NAPL.

NYC Comment 485) Table C3-11: A column should be added noting which cross-sections/depth profiles each core appears on in order to transparently demonstrate that all cores are visually represented in a cross section/depth profile. It appears some contaminated cores are omitted from cross sections/depth profiles. An example is EK078SC-C, a core with a blebs shake test at the confluence of English Kills and East Branch. This core is left out of both

English Kills Category 2/3 Cross-section 4 (NCG Draft RI Figure C4-16d) and out of the depth-profile for Category 1B Area G (East Branch). NAPL impacted cores in Category 2/3 areas which fall between cross sections (such as cores NC073SC-A and GPEC-SED29 in the Turning Basin) are also excluded.

NYC Comment 486) Table C4-6: The "Core Observations" column cannot ignore any visual observations, including sheens. Sheens are visual observations indicative of the presence of NAPL, and should be noted in this column.

Additional Comments – Figures

NYC Comment 487) Figure C2-4 states: *"Step 4 - Is NAPL observed as a result of shake test? [Observation of sheen only is not considered nonaqueous phase liquid (Kwan 2014a).]"*

Sheens are indicative of NAPL presence, making the last balloon "Confirmed, NAPL is not present" incorrect and misleading. NYSDEC MGP Guidance has provided clear ways to identify NAPL-like sheens based on visual observation of physical properties (Kwan, 2014). Sheens are indicative of NAPL and should not be dismissed. NCG must update this Figure and all references to this Figure to accurately reflect the Guidance.

NYC Comment 488) All Maps in Figures C3-1 to C3-7

All maps should be updated to show visual observations/shake tests and NAPL categories. Also, the presence of all upland NAPL sites (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR) must be added to this figure with current name(s)/former name(s)/DAR number and historical activities.

NYC Comment 489) Figures C3-1 to C3-4

a. These maps must have insets for the Turning Basin corner and English Kills cove area (1st bend). From the level of zoom, the extent of contamination is obscured in those areas.
b. The colors used for all NAPL presence must be graduated based on severity of NAPL observation. It is difficult to determine the most severely contaminated areas when the color scheme is arbitrary. Additionally, the grays symbols are hard to differentiate.

NYC Comment 490) Figure C3-5

Shake tests with sheens should not be considered a "negative shake test". "Sheen" also cannot be lumped with "no visual evidence" for core visual observations, since sheens are indicative of NAPL.

NYC Comment 491) Figure C3-6

a. Category 3 core symbology is too similar in color to Category 1B. These similarities in color effectively hide Category 3 cores. NAPL Category Core Station symbology must be changed to a graduated scale to reflect severity of NAPL observation.
b. There must also be an inset map for the cove area (1st bend) of English Kills.

NYC Comment 492) Figure C4 Maps

a. CSOs should not be symbolized as larger and more noticeable points than "other outfalls". CSOs have not been shown to contribute significant NAPL to the creek. None of the CSO samples reported presence of sheens and any suggestions that CSOs are the source of NAPL is unsubstantiated and misleading.
b. Upland NAPL sites must be labeled on map by current name(s)/former name(s)/DAR number and historical activities.
c. Rename "Potential NAPL Upland Site" in the legend as is done in NCG Draft RI Figure C4-1. A footnote should not have to be referenced to understand what "potential interest" means. All sites on Figure C4-1 (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR sites) must be added to this figure with current name(s)/former name(s)/DAR number and historical activities.

NYC Comment 493) Figures C4-3 & C4-5 (Dutch Kills and Whale Creek): All upland NAPL sites (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR sites) must be added to the Category 1A figures with current name(s)/former name(s)/DAR number and historical activities.

NYC Comment 494) Figure C4-8 (Shake Test Bleb Ranks in Category 1B Areas)

All upland NAPL sites (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR sites) must be added to this figure with current name(s)/former name(s)/DAR number and historical activities.

NYC Comment 495) Figures C4-9a to C4-9i and C4-10a to C4-10i (Category 1B Areas)

a. Maps and depth profiles should not be combined separately. Maps and associated depth profiles should be alternated in order to make comparisons between each area easier. Having each area map and associated depth profile grouped separately makes comparison needlessly inconvenient.
b. There should also be cross-sections for Category 1B Areas. As presented this gives the impression that NAPL does not need to be delineated in these areas. NAPL appears to be laterally continuous in multiple Category 1B Areas.

NYC Comment 496) Figure C4-12c

a. It is not clear what the two unlabeled gray lines above the mudline are.
b. The cross section line on Figure C4-11 and the inset map on Figure C4-12c should stop at the NC051 collocated cores. There are no cores on the Brooklyn side upstream of NC051.

NYC Comment 497) Figure C4-13

a. The historic drainage channel from the 2/13/2014 groundwater presentation should be added (EPA, 2016)
b. Additional cross sections should be added to adequately delineate NAPL. There must be cross-sections running east-west (across the channel) between the current cross-sections 3 & 4 and 4 & 5. Adding these cross-sections will allow for delineation of cores with significant NAPL observations that have been left out of current cross sections, such as GPEC-SED10, GPEC-SED11 and GPEC-SED05.
c. Additional east-west cross-sections in the large gap between cross-sections 2 and 3 should be added. GPEC-SED17 has a saturated segment while NC073SC-A has observations of blebs.
d. Additional north-south cross-sections parallel to cross-section 1 should be added in order to delineate NAPL impacts in the navigation channel.

NYC Comment 498) Figure C4-14a: The historic drainage channel from the February 13, 2014 groundwater presentation should be added (EPA, 2016)

NYC Comment 499) Figures C4-14a to C4-14e: Depths in the core logs for all GPEC-SB11# series cores (i.e. GPEC SB-112) do not seem to match up with cross sections or tables, and are off by up to 20+ feet. This inconsistency must be addressed and relevant tables, figures, and analysis in this appendix should be updated.

NYC Comment 500) Figure C4-15

1. Additional cross-sections should be added to more completely delineate this area.
2. EK078SC-C, a core with blebs observations, has been omitted from Cross-section 4 (Figure C4-16d) as well as the depth-profile for Category 1B Area G (East Branch).
3. This map demonstrates that there is a large data gap around Consolidated Carpet Trade, where NYCDEP has documented significant ebullition facilitated NAPL migration through photos and videos (see red box in NYC Figure 7). More delineation is needed in this area. There are no side profiles of EK081SC-A or EK081SC-B.
4. Historic drainage channels from GPEC and Equity Works MGP sites identified in Texaco's DAR objection letter (see NYC Figure 5) (Texaco, 2015) must be added to this figure and all relevant cross sections.

Additional Comments — Attachments C-A, C-B, & C-C

NYC Comment 501) Identify all upland NAPL sites (2012 DAR, 2015 DAR Addendum, EPA-identified DAR and EPA-identified non-DAR) by name when applicable to cores.

City Comments on NCG Draft RI Appendix D – Ebullition Evaluation

Appendix D, as written, is insufficient to characterize the impact of ebullition facilitated NAPL migration on the Study Area due to sole focus on the 2015 study. This Appendix must be revised to include discussion of the 2016 study and conclusions drawn solely from the 2015 study must be removed. The purpose of this Appendix must be to evaluate the importance of ebullition as a COPC source to the study area and to understand fate and transport of these COPCs so that appropriate remedial options can be evaluated in the future.

Gas ebullition is a natural biological phenomenon which occurs in most waterbodies. Ebullition is also a known mechanism that facilitates NAPL migration from NAPL impacted sediments. Ebullition in Newtown Creek and its tributaries has been documented by the City, EPA, and NCG. Studies of contaminant occurrence and transport to date have focused on point sources and do not explain elevated COPCs in the Study Area. Evaluation of available data shows that other sources of COPCs to the Study Area are important and remain insufficiently characterized. One important COPC source and transport mechanism is NAPL migration, which has not been thoroughly characterized or evaluated in the NCG Draft RI. NAPL migration, ebullition facilitated and seepage from bulkheads, bank and the sediment bed, is a significant source of COPCs to the Study Area that must be evaluated. These processes must be characterized to assess their role as a COPC loading mechanism in order to understand fate and transport of COPCs in the Study Area and to support development of potential future remedies.

AG/NCG has performed two ebullition surveys. The first survey was conducted in 2015 and has numerous flaws which preclude its utility in evaluating NAPL migration in the Study Area. The 2015 survey was performed close to neap tide, where tidal differences, and thus conditions facilitating ebullition and NAPL migration were not favorable for documenting NAPL migration for the first time. An insufficient number of observers and vessels were used to survey too large of an area (120 acres). Due to these and other deficiencies in methodology, the 2015 NCG survey resulted in remarkably contradictory observations than a survey also conducted in 2015 by the City. The City survey was conducted during spring tide conditions conducive for ebullition observations. The City was more comprehensive, in part due to smaller survey areas covered by a greater density of observers. The City's survey identifying areas of ebullition facilitated migration not identified by NCG and documented significant NAPL migration in many areas of the Creek (where NCG had concluded based on their limited evaluation that ebullition facilitated NAPL migration is unimportant to the system). Attached NYC Figures 49a through 49d provide examples of the City's survey areas and the resulting ebullition facilitated NAPL migration observations in different sections of the Creek.

As a result of the discrepancy between the City's and NCG's surveys, EPA directed NCG to conduct a more comprehensive and appropriately timed survey in 2016. This survey, conducted in September 2016, is not discussed anywhere in Appendix D or in the NCG Draft RI. However, data presentations provided by NCG regarding the 2016 survey demonstrate that NCG is still downplaying the occurrence and importance of NAPL migration in the Creek. Their observations in the field documenting NAPL migration are classified largely as "static sheens" where the source of sheens is unknown. Evaluation of NCG data from the 2016 survey indicates 86 percent of the area of static sheens observed by NCG arrived during the active ebullition window, and were likely from unobserved ebullition and in some areas or from bulkhead seeps. City data from the same survey documents significant NAPL migration from the sediments and also from bulkheads and banks. The City has shared these videos with NYSDEC, resulting in deployment of booms around the former MGP site to contain NAPL migration. The NCG Draft RI attempts to minimize the importance of ebullition and other forms of NAPL migration on the Study Area.

The following comments are related to the 2015 ebullition study discussed within Appendix D and also the 2016 study data deliverables and presentations that NCG has provided to EPA and the City, which are excluded from the Appendix. Comments are also presented regarding NCG's planned study of ebullition facilitated NAPL migration for the FS (AQ presentations "2016 Field Gas Ebullition Survey Results" dated December 8, 2016 and "FS Field Investigation Gas Ebullition Objectives and Scope" dated February 2, 2017).

General Comments from the City on NCG Draft RI Appendix D

NYC Comment 502) During their 2015 and 2016 surveys, NCG identified sheens in majority of the Creek area during low tide, but made little attempt to understand the origin of the sheens, baselessly attributing them to point sources. NCG needs to confirm where sheens originate. The scale of their observations versus the scale of the processes of ebullition and other NAPL sources are mismatched. Since ebullition is a widespread, the use of a few observers surveying the entire creek is not sufficient. Both City observations during the 2016 survey and the City's review of NCG's observation data found that there were few "static" sheens on the water surface upon arriving at the survey areas before ebullition began. Videos recorded by the City of the survey areas prior to the start of the survey periods and observable ebullition confirm lack of "static sheens" on the water surface. This means the sheens that were observed, whether documented from ebullition or not, arrived at the water surface predominantly during the survey and were not pre-existing. NCG assigned the sheens they did not see arriving at the water surface to the category "static sheen." Evaluation of NCG's data deliverable shows that 86 percent of the area of static sheen observations arrived during the survey window (i.e., 2 hours before and after low tide), shown on NYC Figures 50a to 50c. NCG's videos document numerous instances of their field teams observing sheen appearing on the water surface,

discussing it, and then deciding to categorize it as "static sheen", confirming that these sheens actually were observed by NCG to be occurring during the survey. In their data presentation to EPA, NCG implied that "static sheen" was resident on the water surface prior to the survey, which is not the case. NCG's flawed observation methodology led to observers covering areas that were too large to identify the sheen generation when it was occurring, and thus characterizing sheens generated from ebullition while their team was elsewhere as "static sheen." The mischaracterization and misuse of the term "static sheen" leads to concerns regarding the surveys that were undertaken by NCG and their planned evaluation of ebullition:

a. NCG has not reconciled the scale at which ebullition facilitated NAPL migration should be documented, and therefore they did not adequately characterize its occurrence. For this reason, their planned FS study does not adequately capture the breadth of ebullition facilitated NAPL migration. Their surveys covered too much area by any individual survey team. As a result, the areas where they documented ebullition facilitated NAPL migration are under-represented. NCG only saw a portion of these instances of ebullition facilitated NAPL migration before moving on, and attribute everything that occurred while they were elsewhere to "static sheen".
b. With careful observation and documentation, the sources of many "static sheens" are detectable, however, NCG made little attempt to discern or document where "static sheens" originated. As noted above, much of the static sheen originated from ebullition while the NCG team was elsewhere (as documented by the City's observers who surveyed much smaller areas). The City's also documented several other sources of sheens such as NAPL seeping from the banks at Pratt Oil on the Middle Reach of the Main Stem, in the northern fork of East Branch, and at Manhattan Poly Bag in Upper English Kills. Some of these sources were also noticed by NCG based on their videos, but the seep sources were not documented or reported to EPA. The point of the surveys is not to solely identify where bubbles occur, but rather where NAPL, a source of COPCs, is originating. NCG has not proposed to characterize these known seeps of NAPL under any RI/FS program, which will leave these sources of COPCs as unquantified data gaps.

NYC Comment 503) During the 2015 survey, inadequate observer time was spent surveying the Study Area and too broad of an area was covered by too few observers. NCG conducted their survey using five boats to survey 120 acres or 70 percent of the Study Area. The 2015 NCG survey was a qualitative survey, taken at <1 knot in tributaries and <2.5 knots in the main stem over a 2 to 3-hour period that included low tide. Only two passes in each area were typically conducted. For example, with the exception of the Turning Basin, the GPS track lines for the NCG survey show only one pass per bank during each low tide survey (see NYC Figures 47a and 47b). This is an insufficient level of evaluation, given the variable nature of ebullition from tide to tide and reach to reach. The survey was not comprehensive enough to assess ebullition

adequately or quantify the amount of COPCs being transported in the creek by this mechanism. The survey is not sufficient to understand the variability of ebullition facilitated NAPL migration, and failed to identify the source of static sheens. The spatial resolution of NCG's survey is far too coarse to capture the mechanisms at play: sheen formation on the water surface was observed by NCG, but the survey did not have sufficient observers to identify how and where those sheens were generated. These shortcomings should be acknowledged in the Appendix as a reason for the few ebullition observations in 2015.

NYC Comment 504) In other Appendices (i.e., Appendix E, Point Sources), NCG used external datasets such as LMS (1992) and CARP (Litten, 2003) to draw conclusions regarding COPC concentrations in CSOs. However, for ebullition, NCG fails to consider 2015 and 2016 City surveys as external datasets. EPA used the City data as a reason for further ebullition investigation after NCG's inadequate 2015 survey. All the City surveys were performed by trained observers, followed an SOP, and made observations of ebullition facilitated NAPL migration in areas which NCG has not adequately characterized. NCG should use the City surveys in the RI/FS as an additional line of evidence to document NAPL migration.

NYC Comment 505) NCG also makes repeated unsubstantiated claims either directly stating or insinuating that outfalls are the source of the sheens to the surface water of the Study Area. These claims run counter to the state of the knowledge of ebullition and bank seeps as known mechanisms for NAPL transport and sheen presence on the water surface.

NYC Comment 506) The 2015 survey was conducted close to neap tide, conditions with the smallest amount of tidal fluctuation and therefore minimal ebullition was expected. Bubble generation from the sediment is largely driven by change in overlying water pressure. The maximum rate of ebullition occurs during spring tide (5 to 6 day periods occurring twice a month around either the full or new moon, total of 10 to 12 days per month, or roughly 1/3 of the time), when the greatest pressure drop between high and low tide occurs and the tides reach their lowest elevations. Conversely, during neap tide (time around quarter moons), the smallest amount of head change occurs and the low tides are at their highest level, so ebullition is expected be less productive. NCG's survey was done within two days of the neap tide that had the smallest difference between high and low tides during the summer of 2015 (August 17 and 18), as shown in NYC Table 6. The head drop at the time of NCG's survey was about 3.5 to 4.5 feet. The minimal head drop during NCG's survey yields a minimum amount of gas release from sediment, explaining NCG survey observations of minimal NAPL migration and ebullition.

NYC Comment 507) NCG ignored critical EPA Comments Submitted on November 19, 2015, on the October 22, 2015 Ebullition Presentation. EPA comment Number 6 states *"Other lines of*

evidence are pertinent to the evaluation of ebullition. Current ebullition survey results should be presented and evaluated in conjunction with the groundwater program analytical data and the NAPL study conclusions…" NCG's response was that *"a presentation was developed and provided to EPA on January 8, 2016"* (AQ, 2016). However, NCG has not included a comparison of the groundwater program in the ebullition evaluation in Appendix D.

NYC Comment 508) The focus of both the 2015 and 2016 NCG surveys were to observe NAPL migration due to the process of ebullition. It is much more important to survey areas that are near known NAPL upland sites than near CSOs where previous studies have indicated little to no NAPL presence. The purpose of the survey is to assess NAPL migration, and not solely bubble generation. NAPL is also a source of organic carbon (OC) that can sustain ebullition (especially after decades to more than a century of microbial growth associated with the NAPL), yet NCG did not attempt to evaluate a relationship between OC in Creek sediments and known upland NAPL sites. NCG continues to make unsupported assumptions that CSOs are the sole source of OC to the Study Area, even though no studies of biological processes that result in ebullition have been undertaken. Ebullition occurs in most aquatic environments and has been observed to be vigorous in areas of Newtown Creek that are remote from any CSO. It is incorrect to attribute the source of ebullition or OC in the sediments to CSOs.

NYC Comment 509) There are locations where ebullition facilitated NAPL migration was documented by both NCG and the City, but are not being considered for the ongoing characterization. These include areas in the middle reach of the main stem and in the northern fork of East Branch. These locations must be included in further characterization. The middle reach is lacking in data collection. The City has documented sheen blossoms here (see attached NYC Figures 53a to 53f) and NCG 10-day toxicity tests show poor survival rates, potentially from NAPL in sediments. There are also multiple Category 2/3 NAPL observations in sediment cores in this area. Despite these lines of evidence, NCG provides no explanation for sheen observations and benthic toxicity. In the northern (non-CSO) Fork of East Branch, NCG has observed continuous intervals of sheens in cores in shallow sediments. Both NCG and the City have documented sheen blossoms throughout that fork (see NYC Figures 54a to 54e). NCG is not proposing to conduct any investigation in this area, which will result in a serious data gap.

In addition to lack of data collection in areas where widespread NAPL migration has been documented, the proposed sampling plan by NCG is deficient in its ability to measure gas generation and collect representative NAPL samples. Due to the widespread and variable nature of ebullition, sampling for characterization must be performed in arrays, not single locations as is currently proposed. NCG plans to use samplers at single discrete locations at the few locations where they will conduct further evaluation. The process of ebullition is very point

specific and can be highly heterogeneous on small scales. Therefore, small changes in the location of the sampler can have large impacts on the results of the characterization. Note that because of the currents, the exact location where bubbles and NAPL escape the sediment is not known, so the likelihood that the sampler is in the correct location to capture the migration is low. The only way to overcome the scale issue is to use arrays of samplers and to use samplers that cover large areas.

NYC Comment 510) There are repeated instances of misleading terminology throughout the Appendix. These instances must be deleted or corrected:

1. "Apparent gas ebullition" should be renamed "gas ebullition". NCG has observed the process of gas ebullition. Categorizing these observations as "apparent" casts doubt to the source of observed bubbles and minimizes the significance of these observations.
2. "Organic compounds" and "organic matter" are terms used by NCG to attribute OC to CSOs. The document should state that NAPL is a significant source of OC, and that it is present in surface and subsurface sediments throughout the creek. The National Grid GPEC Former MGP site has OC in soils at levels as high as 31%.

<u>Specific Comments on Appendix D, Section 1 - Introduction</u>

NYC Comment 511) Page 1, Section 1.1 Background, last sentence of 2nd paragraph: *"Portions of the Study Area (i.e., the tributaries) are high in organic matter due to CSO inputs, and as a result have a higher potential for gas ebullition (Viana et al. 2012)."*

The Viana et al. (2012) paper does not tie CSO discharges to sediments with a higher potential for ebullition. The City has observed the presence of ebullition across the entirety of the Study Area in 2015 and 2016 surveys and not solely in CSO areas. The misinterpretation of this citation in the unsupported statement in the NCG DRAFT RI should be removed from the text. NCG appears to use this citation to make unverified statements about the impacts of CSOs on the OC levels and ebullition rates throughout Appendix D. All unverified statements should be removed from the Appendix.

NYC Comment 512) Section 1.1 Background, 2nd sentence in last paragraph of Page 2: *"The field survey was based on visual inspection of the water surface for bubbles and, to the extent allowed by the clarity of the water, observing the bubble rising through the water column to the water surface."*

Clarity of the water has nothing to do with the ability to document gas bubbles on the water surface. Moreover, Tables D3-3a to D3-3c show that over the course of the three survey days,

the smallest depth of Secchi Disk reappearance was 0.7 feet, while the average reappearance depth was 2.3 feet. Even the minimum observed water clarity depth of 0.7 feet should not impede ebullition observations. NCG should remove their statement, and should instead note that water clarity was not a significant impediment to ebullition observation.

NYC Comment 513) In Section 1.2 Objective, Page 3: NCG states that their first of two overall objectives of the ebullition survey is to *"Characterize the presence and extent of apparent gas ebullition based on the observation of gas bubbles in surface water in the Study Area, as well as the observation of sheen on surface water, and evaluate whether the sheen was associated with apparent gas ebullition."*

"Apparent" should not be used when gas ebullition is actively observed. Additionally, NCG must mention that sheens on the water surface are due to NAPL migration via ebullition. There is no focus on NAPL impacted areas in this section. Ebullition by itself is a natural process that does not cause spread of contamination. Ebullition serves as a transport mechanism when the process occurs in areas where sediment is impacted by NAPL and other COPCs.

NYC Comment 514) In Section 1.3 Overview of Gas Ebullition, Page 3: NCG notes that they developed methods for the ebullition survey, however the purpose of the reconnaissance survey was to identify areas where NAPL migration is occurring due to ebullition and then study these areas further to characterize NAPL that gets released to the sediments and impacts the Creek.

NYC Comment 515) Overview of Gas Ebullition (Section 1.3, pages 3-5) and Figure D1-1: NCG focuses on methane gas to discuss the bacterial processes that generate gas bubbles in ebullition. As a result figures which show methanogenesis are biased. Dr. Rockne of the University of Chicago presented at the 2017 Battelle Sediments Conference on the types of microbes involved in the ebullition gas formation process. The presentation discussed many types of microbes (mostly archaea), which generate not just methane, but also carbon dioxide in large quantities. NCG has provided no evidence of any of the specific ebullition related bacterial processes in the Creek and makes unsubstantiated assumptions that ebullition is driven only by methanogenic bacteria. Section 1.3 also fails to explain how NAPL entered the Study Area historically and how NAPL continues to enter the Study Area in the present day. NCG must consider all microbial processes that cause ebullition, not just the one that they have illustrated.

NYC Comment 516) The last paragraph on Page 5, Section 1.3 Overview of Gas Ebullition: *"Once a gas bubble forms, its buoyancy must overcome the cohesive strength of the surrounding*

sediment and the pressure of the overlying water in order to move upward through the sediment and water column to the water surface. Therefore, gas ebullition tends to be more common in soft sediment, particularly sediment with labile organic matter, in the summer months during low water conditions."

Although ebullition tends to be more common under the conditions mentioned, that does not mean that ebullition fails to occur when less favorable conditions exist. Gases generated in the sediments will be eventually released. The City has documented gas ebullition and NAPL migration in December 2016, where water temperatures were around 8° C. Other examples ebullition occurring in cold waters exist. NYC Figures 52a and 52b (photographs provided by Ted O'Connell of TRC Environmental). These figures show gas bubble streams encased in ice on the Fond du Lac River in Wisconsin. NYC Figure 52c, from the 2013 Walter Anthony and Anthony study, shows different classes of ebullition that the authors assigned based on the visible patterns of bubbles trapped in ice on Alaskan lakes. It is evident that ebullition still occurs in waterbodies in low water temperatures and where CSOs are not present, the Appendix should reflect that.

During the ebullition studies, NCG set limits and collects measurements that likely have little importance to observing NAPL migration such as:

1. Water depth
2. Water salinity
3. Sediment thickness
4. Water temperature
5. Water clarity
6. Proximity to CSOs

While missing factors that likely do have an *influence on observing* NAPL migration such as:

1. Wind speed, direction, and water surface chop
2. Cloud cover
3. Sun angle
4. Proximity to known upland NAPL contaminated sites
5. Known NAPL (including sheens and blebs) in the sediment bed
6. Observation angle and height above the water
7. Maximum observable area for an observation team
8. Duration of ebullition facilitated NAPL migration and size of area surveyed

NCG postulates that a rain event had an impact on the amount of observed sheens on the last day of their 2016 survey. However, rain itself likely will not cause additional ebullition or NAPL

migration. It may obscure observations of ebullition if it occurs at the same time. There seems to be an implication that sheens are being generated at point sources during rain events, however specific observation of sheens being produced by point sources has not been documented.

Section 2 – Gas Ebullition Field Survey and Data Collection Activities

NYC Comment 517) Page 6, Section 2.1 Survey Approach, 2nd sentence of 2nd paragraph: *"In some cases, bubbles originating from biota (e.g., crabs and fish) were observed rising through the water column. In those cases, because the source of the bubbles was apparent, the observation was recorded but not considered to be apparent gas ebullition."*

Observations of bubbles from biota do nothing to determine the occurrence of sheens or ebullition facilitated NAPL migration in the Study Area. NCG should not be recording instances of bubble occurrence from biota, and must remove these observations since they are unrelated to ebullition.

NYC Comment 518) Page 6, Section 2.1 Survey Approach, 4th sentence of 2nd paragraph: *"In areas where low water clarity limited the degree to which bubbles could be observed rising through the water column, the appearance of bubbles on the surface of the water were conservatively considered as an inferred presence of gas ebullition in sediment, unless another potential source of bubbles (e.g., boat traffic or aeration system operation) was observed nearby."*

These observations should not be considered "conservative." As stated in elsewhere in the comments, Draft RI Tables D3-3a to D3-3c show that over the course of the three survey days, the smallest depth of Secchi Disk reappearance was 0.7 feet, with an average reappearance depth of 2.3 feet. Even with a visibility of 0.7 feet, bubbles rising through the water column are clearly visible. Classifying these observations as "conservative" implies uncertainty in the observations. NCG should remove their statement, and should instead note that water clarity was not a significant impediment to ebullition observation.

NYC Comment 519) Section 2.1 Survey Approach, Pages 6-8: There is no discussion on how many vessels were present for each survey day. The number of observers conducting the survey is critical to contextualizing the number of documented observations. A list of how many vessels were used for each day, type of vessel (observation height above the water), and how many observers were on each should be included. In addition, NCG notes *"Site conditions that could disturb the sediment were noted where observed (e.g., nearby spudding, construction, pile driving, sediment sampling, or other activities that could disturb bottom sediment)." NCG* must

provide evidence of these activities or delete this statement and all similar statements throughout the Appendix. These statements are irrelevant and cast unnecessary doubt as to the origin of the observed sheens.

NYC Comment 520) Section 2.2.1 Field Methods, Pages 8-10: NCG has a section for gas bubble observations greater than 100 bubbles per minute. This is impossible to count in the field. It is unclear how this metric was documented and what purpose it serves. This information does not account for bubble size, the area that was considered, and if the vessel moving at the time of observation.

While such quantitative metrics give the appearance of a rigorous study, they do not provide information to characterize NAPL migration. The goal of the survey is to identify where NAPL migration due to ebullition is occurring. Once identified, these smaller areas must be studied with high rigor. It is outside the scope of the reconnaissance survey and should be deleted.

This section also states that sheens were also described using ASTM 2006 terms based on color. Given that many rainbow sheens become silvery or metallic sheens as they expand and the thickness of the sheen decreases, this metric is not useful.

NYC Comment 521) Section 2.1.3 Selection of Survey Areas, Pages 10-11: This section should clearly state that the presence of NAPL facilitated ebullition should be the primary focus of the study. NCG notes *"proximity of the area to organic material sources"* as one of their criteria, however proximity to upland NAPL sites or NAPL sources is not included as a criterion. Another criterion was to survey "a*reas where anecdotal (i.e., not characterized in detail or quantified) observations of gas bubbles had been previously reported."* The City has provided NCG, NYSDEC, and EPA with photos and videos clearly demonstrating ebullition facilitated NAPL migration in multiple sections of the Study Area.

NYC Comment 522) Section 2.1.3 Selection of Survey Areas, Page 11: *"The survey areas covered approximately 120 acres (70% of the total Study Area) and captured a wide range of conditions."*

This statistic has been inflated to make it appear that ebullition survey covered most of the Creek area. NCG defines the area surveyed as the total acreage within the boundaries of the survey areas instead of the total observable area covered. For example, much of the Main Stem had only two passes per day (NCG Draft RI Figures D3-1a to D3-1c and Table D2-1). The City experience demonstrates that the distance and angle of observation is an important factor in sheen observation. The City has demonstrated that sheens are best observed from close

proximity (within 10 to 20 feet) and at low angles. Sheens that are more distant can easily be missed or overlooked (NYC Figures 51a and 51b). Both 2015 and 2016 NCG surveys were conducted mostly from workboats, while the City conducted their surveys from kayaks and jon boats, providing a lower viewing angle between observer and water surface. This also allowed the City to get closer to areas with difficult access to observe sheens which NCG might have missed. The surveyed area statistic should be updated to represent the viewable area (within 10 to 20 feet of the boat).

NYC Comment 523) 2.1.4 Survey Timing, 1st sentence on Page 13: *"In 2015, 33% (233/705) of low tide events met both of the following conditions: 1) Surface water temperatures in excess of 15° C, the temperature above which research shows gas ebullition is most active; 2) Lower low tide elevations (less than 0.52 foot MLLW) than those surveyed during the gas ebullition field survey."*

The City observed ebullition facilitated NAPL migration during a December 2016 survey, where water temperatures were around 8° C. NCG should also provide a statistic for the percentage of events which had a greater tidal delta, since the City surveys in 2015 and 2016, conducted during spring tides, indicate that tidal head difference is more important than water temperature.

NYC Comment 524) Page 15, 2.2.3 Other Environmental Data, end of paragraph: *"Tidal elevations were observed from nearby tidal gauges. Atmospheric temperature and pressure were recorded from the weather station located at the Greenpoint Energy Center (DAR No. 32), at the beginning and end of each survey."*

NCG must share these data with all parties.

<u>Section 3 – Survey Results</u>

NYC Comment 525) Section 3.2.1 Gas Bubble Observations (Pages 16-17): NCG notes that there were 45 observations of gas bubbles recorded. However, only 38 of those observations were ebullition.

This is a very small number of observations for a 3-day survey which NCG claims is an extensive survey. Additionally, the seven gas bubble observations not attributed to ebullition should not be included in the survey. The addition of these observations does not add anything of substance to this Appendix.

AG/NCG also notes that *"Where gas bubbles were observed, the boundaries of the area were mapped, and the frequency that gas bubbles were observed within the mapped area over a 5-minute period was quantified and then characterized accordingly as either moderate-high frequency, low-moderate frequency, or trace-low frequency (see Section 2.1.1 for more details)."*

It is unclear how these areas were delineated, whether it was a subjective basis or if the edges of the boundary logged using GPS. The polygons in the maps in NCG Draft RI Figures D3-2a through D3-6c (all maps of ebullition and sheen observations from the 2015 survey) seem to be very coarse and subjective, often times covering the whole segment of the Creek or tributary where the observation was made. Compared to NYC Figures 49a to 49c, which show more detailed polygons in NCG's 2016 Survey. It is evident that different methods were used to delineate polygons between NCG's 2015 and 2016 surveys. NCG must explain the difference in methods and justify the use of the coarser 2015 survey polygons.

NYC Comment 526) Section 3.2.2 Sheen Observations, Pages 20-21: *"Sheen blossoms were observed in one location at the head of English Kills only during Low Tide Survey No. 1 and were adjacent to timber piles. Turning Basin sheen blossoms were observed in three locations, only during Low Tide Survey No. 2. No sheen blossoms were observed during High Tide Survey No. 1."*

The text should reference upland NAPL sites in all instances when such information is pertinent.

NYC Comment 527) Section 3.2.2 Sheen Observations, Pages 20-21: *"For High Tide Survey No. 1 and Low Tide Survey No. 1, larger sheens were observed in the tributaries, more so than in the main stem. For Low Tide Survey No. 2, larger sheens were observed in the Turning Basin, more so than in the tributaries."*

The report acknowledges the presence of widespread sheens yet no data were collected to understand the source of the sheens, the COPCs in them, or the impact of the COPCs on the Study Area. This is a large data gap that must be acknowledged and addressed.

NYC Comment 528) Section 3.4 Other Environmental Data, Pages 23-25: *"Environmental and anthropogenic conditions have the potential to affect apparent gas ebullition observations or be a false indicator of gas ebullition."*

These are unsubstantiated statements tying conditions on the Creek to ebullition and sheen observations. Unless these conditions were observed and noted, NCG has no basis to claim that there are false indications of gas ebullition. Additionally, biota should not be considered an environmental condition for ebullition as biota do not cause ebullition.

NYC Comment 529) Section 3.4 Other Environmental Data, Pages 23-25: *""Low Tide Survey No. 1. A parked barge was observed in English Kills during the two low tide surveys. During Low Tide Survey No. 2, a sheen was observed around the barge. At the time of the sheen observation, the barge was being loaded with scrap metal. Other than the sheen observation around this barge, vessel movements were limited and did not likely influence survey observations."*

This portion of English Kills is a Category 2/3 area which has significant NAPL in the shallow sediments and the presence of specific upland NAPL sites in the area should be noted. This portion of English Kills regularly has sheens on the water surface regardless of the presence of barges. Significant ebullition facilitated NAPL migration has been observed in this area by the City in both 2015 and 2016 surveys, and suggesting that loading a barge with scrap metal could be the source of sheens is an unsupported claim. These claims are speculative and unsubstantiated and must be deleted.

<u>Section 4 – Evaluation and Interpretation</u>

NYC Comment 530) Section 4.1 Summary of Survey Results, Pages 26-27: *"No consistent relationship was observed between apparent gas ebullition and surface water sheen observations."*

These observations of a lack of correlation between ebullition and surface water sheens are contrary to those from NCG's 2016 survey and all of the City's surveys.

The sheen blossom that was observed towards the head end of English Kills is claimed by NCG to originate from a piling: *"Note that the sheen blossom in English Kills likely did not originate from sediment (no NAPL was observed in sediment at this location) but may have been associated with creosote-treated timber piles along the shoreline (California Coastal Commission 2012)."* It is not clear how the NCG is assuming that the sheen blossom did not arrive from the sediment, but from the timber pilings. Sheen blossoms are dynamic and are documented by NCG observers. If NCG believes that the sheens are from timber pilings, then the bulkheads must be considered a source of NAPL to the Creek. NAPL originating from the timber pilings must be characterized for COPCs. The COPCs in these sheens and their impact on the Study Area should be characterized.

NYC Comment 531) Section 4.2.1 Hydrostatic Pressure and Tidal Elevations, Page 29: *"In general, gas ebullition is more likely in shallower portions of the Study Area during low tide (in*

particular during lunar low tides) and when hydrostatic pressure is lowest."

While this might be the case, the City has documented the occurrence of gas ebullition even during high tide conditions. The report should acknowledge that ebullition still occurs when tides are not optimal (such as during the 2015 survey).

NYC Comment 532) Section 4.2.2 Surface Water Temperature, Page 29: *"The degree that gas ebullition occurs is expected to peak in the summer when sediment temperatures are highest and decrease to nearly no occurrence in the winter, when lower temperatures result in less microbial activity."*

This statement is refuted by the City gas ebullition and NAPL migration observations in December 2016, when water temperatures were around 8° C.

NYC Comment 533) Section 4.2.3 Interpretation of the Gas Ebullition Field Survey Relative to Annual Study Area Environmental Conditions, Page 30: Unsupported assumptions are used to dismiss and downplay the importance of NAPL migration. Specifically:

1. There is no evidence that water depth limit ebullition.
2. There is no evidence that water temperature "*decrease* (NAPL migration) *to nearly no occurrence in winter*". Surface water temperature may have little impact on sediment bed temperature which could be controlled by groundwater temperature.
3. There is no data presented to support the importance of tide fluctuation height ranges.

NYC Comment 534) Page 30, 4.3 Additional Lines of Evidence, 1st sentence: *"The potential gas ebullition NAPL to surface water migration pathway was evaluated based on the gas ebullition field survey observations, supported by evaluation of additional lines of evidence."*

The report should include upland sites where NAPL is entering and/or has historically entered the Creek as an important line of evidence.

NYC Comment 535) Section 4.3.1 Sediment Organic Material Inputs, Page 31: CSOs are not the only source of OC. High levels of OC have been documented in upland sites such as the National Grid (GPEC) Former MPG Site (up to 31 percent OC in borings) and are also associated with NAPL itself. As shown in comments on Chapter 4 of the NCG Draft RI, GPEC cores have high levels of OC in native material. OC in the native material cannot be attributed to CSOs, if CSOs were the only source of OC the levels of OC in the sediments of the Creek would be similar to levels in CSO reference area sediments.

NYC Comment 536) Section 4.3.2 Physical Data, Pages 32-33: *"Physical data include physical characteristics of the Study Area, including the following: Bathymetry (water depth); CSOs and other outfalls, which represent potential sources for NAPL and other materials with high TOC concentrations; Shoreline structures (e.g., timber piles); Booms".*

This list fails to state that proximity to upland NAPL sites and known NAPL seeps are pertinent physical features as is the presence of known NAPL in the sediment bed (including sheens and blebs). Those features should be listed and integrated into the Appendix. There is also no evidence that CSOs are sources of NAPL to the Study Area.

NYC Comment 537) Section 4.3.2 Physical Data, Page 33: "*As timber piles age and deteriorate, these substances may be released and cause sheens to appear. This area will be further evaluated during subsequent field investigations."*

Proposals for sampling these sources in any of their FS presentations to date. NCG must propose sampling of shoreline features including timber pilings.

NYC Comment 538) Section 4.3.2 Physical Data, Page 33: *"In particular, sheens were observed on the upstream (CSO) side of the Maspeth Creek boom. Sheen blossoms were not observed in Maspeth Creek during the survey, indicating the sheens were likely not associated with gas ebullition."*

A source cannot be assigned to sheens that were not seen to arrive at the water surface. This conclusion that the sheens originated at the CSO is baseless. It indicates that sheen blossom formation upstream of the Maspeth boom was missed, not that ebullition facilitated NAPL migration is not occurring. NCG 2016 surveys and the City's 2015 and 2016 surveys show that ebullition facilitated NAPL migration is occurring upstream of the Maspeth Creek boom.

The only outfall where NCG has documented NAPL seeps is a stormwater outfall that runs through the former MGP site owned by National Grid, which indicates that upland sites with NAPL impacts could impact outfall pipes. NCG does not note this observation in the text.

NYC Comment 539) Section 4.3.3 Evaluation of Lines of Evidence for NAPL Migration, last sentence on Page 34: *"During a literature search, information could not be found that evaluated gas ebullition as a transport pathway for sediment with NAPL observations consistent with the less extensive (compared to Category 2/3 Areas) NAPL observations in Category 1B Areas."*

This literature review has extremely critical gaps and is incomplete. The absence of evaluations in the literature regarding ebullition facilitated NAPL migration from sediments in Category 1A/1B Areas (*i.e.,* sediments with sheens/blebs) is not a sufficient reason to ignore this transport pathway for such sediments. Rather, field data from 2015 Surveys by the City and 2016 Surveys by both the City and NCG show that these sediments do produce ebullition facilitated NAPL migration. Observations of ebullition facilitated NAPL migration in Category 1A/B areas such as Dutch Kills and the Northern Fork of East Branch suggest that NAPL in these areas is mobile. While ebullition facilitated NAPL migration may have been more readily apparent in Category 2/3 areas (such as the Turning Basin), numerous field observations of gas bubbles and associated sheen blossoms were also recorded in Category 1A/B areas.

NYC Comment 540) Section 4.3.3 Evaluation of Lines of Evidence for NAPL Migration, paragraph at top of Page 35: *"Sheen blossoms were not observed in the Study Area during the gas ebullition field survey except for isolated sheen blossoms associated with gas bubbles (which could potentially be indicative of NAPL transport with gas ebullition) at discrete locations in the Turning Basin and English Kills (see Figure D3-8). These sheens were observed over approximately 0.02 acre…this represents less than 0.02% of the total surface of the Study Area."*

The survey did not have sufficient observation time or coverage to give a statistic such as 0.02% of the Study Area has sheen blossoms. This statistic is meaningless and must be deleted. It is likely most instances of the formation of sheens on the water surface from ebullition facilitated NAPL migration were missed. Sources of static sheens, which covered a lot of the surveyed area, have not been identified beyond the four identified sheen blossoms. It should clearly be stated that most observations of sheens are of unknown origin because of survey limits, and not because the sheens did not originate from gas ebullition processes. Additionally, sheen blossoms from gas bubbles are indicative of NAPL transport via gas ebullition, not "potentially" indicative. NCG should remove the word "potentially", since ebullition facilitated NAPL migration was observed.

NYC Comment 541) Pages 35-36, Section4.3.3 Evaluation of Lines of Evidence for NAPL Migration, end of last paragraph: *"The effect of significant NAPL migration to surface water from sediment would typically be observed as sheens on surface water, or could be observed as increased concentrations of NAPL constituents, such as TPAH or TPH, in surface water samples at times favorable for gas ebullition."*

Sheens were observed on the water surface but samples of water from near where the surface sheens reside were not collected; therefore, there is no understanding of the elevated levels of TPH or TPAH in surface water. This entire text should be deleted, it appears to minimize NAPL

impacts before data designed to quantify or understand such impacts has been collected.

NYC Comment 542) Section 4.3.3.1 Comparison of Potential NAPL Sediment Observations – Category 1A/1B Areas (Pages 36-37): The appendix appears to blame CSOs and other outfalls or insinuates that they are responsible for static sheen observations across most of these areas. Unless the actual generation of sheen is observed, the presence of sheens of unknown/undocumented origin should not be attributed to any particular mechanism. Because the NCG survey is of the origination of sheens and NAPL migration, there should be no speculation as to the origin of existing sheens. Despite the fact that the 2015 surveys were performed in dry weather, NCG still blames outfalls (which were not discharging) for the presence of static sheens of the water surface.

NYC Comment 543) Maspeth Creek (1st bullet on Page 37 (emphasis added): *"Some combination of four pipes that are located downstream of the regulator of the Maspeth Creek CSO may discharge during dry weather and may have been a potential source for the sheens (**note that sheens were not directly observed discharging from the pipes**)."*

This speculation and all other completely unsubstantiated statements tying outfalls to static sheens must be removed. If many sheens are arriving at the surface when the survey crew is elsewhere, then the survey is too coarse and has too few observers to capture the process being surveyed and the survey must be refined to smaller areas with more observers.

NYC Comment 544) Page 38, Section 4.3.3.1 Comparison of Potential NAPL Sediment Observations – Turning Basin: *"It is possible the sheen blossom originated in an area other than the immediate vicinity of the sheen blossom observation and drifted with flow to the point where the sheen blossom was observed. Based on the findings of the August 2015 gas ebullition field survey, NAPL transport via gas ebullition is limited to sheen blossoms in three discrete areas observed during one of three surveys near the time of low tide."*

This statement is nonsensical and should be removed, a sheen blossom is a dynamic activity that the observers on the boats are watching occur. Sheen blossom observations in the Turning Basin should be tied to known NAPL contaminated sediments and discussed regarding the proximity of these observations to the adjacent GPEC Former MGP Site.

NYC Comment 545) The entire section of 4.3.3.2 Comparison of Surface Water Chemistry (Pages 39-41): This section is not relevant should be deleted. Surface water samples were collected at three feet below the water surface (Anchor QEA, 2014b), not the actual water surface, where sheens form and spread. In order to understand the impact of sheens on

hydrocarbon loading to the Study Area, a sampling plan to measure the hydrocarbons in the actual sheens should be developed. To date, no such program has been conducted and NCG have not proposed a program for the FS sampling phase.

Section 5 – Summary of the Gas Ebullition Evaluation

NYC Comment 546) The entire Section 5 Summary of the Gas Ebullition Evaluation (Pages 42-43) should be rewritten. No meaningful conclusions can be drawn from a limited 2015 survey. NCG bases their summary off of data gaps and deficiencies even when there is well-established contradictory evidence (i.e., the 2016 NCG survey and all 2015 and 2016 City surveys).

NYC Comment 547) Page 43 in the Summary, *"No consistent relationship was observed between apparent gas ebullition and surface water sheen observations and the distribution of NAPL in sediment."*

The lack of an established relationship between ebullition, sheens on the water surface, and NAPL in the sediments based on NCG's 2015 survey further shows that the 2015 survey is inadequate. City observations in 2015 and 2016 and NCG observations from 2016 directly contradict this statement. This statement and all other statements similar to it throughout Appendix D must be removed and replaced with direct acknowledgements of survey shortcomings and plans for future adequate investigations.

Additional Appendix D Comments – Tables

NYC Comment 548) In Table D2-1 NCG notes that in the tributaries, *"High organic input is assumed based on the presence of CSOs"*. These claims are not supported by the data. Also, NAPL as a source of OC should be discussed. Uplands data from NCG sites show OC levels as high as 31% (National Grid GPEC Former MGP Site). In contrast, native materials in the Turning Basin exhibit OC levels greater than 5% and as high as 20%.

NYC Comment 549) Table D2-2 (Survey Dates and Times) shows that NCG started the survey at 6:00 AM on 8/19/2015 while sunrise was at 6:10 AM and low tide was at 6:53 AM. This was not an appropriate day to properly observe ebullition given that there was not enough daylight before low tide to adequately assess initial conditions. The 2015 City survey observed that very active NAPL migration occurs for about an hour on either side of low tide, and ceases shortly thereafter (NYC Figure 48). City data shows that if more observers were present, the number of ebullition observations would increase in the observation areas.

NYC Comment 550) Under "Potential Source of Gas Bubbles" in Table D3-1: "Unknown, therefore inferred apparent gas ebullition" should just be described as "ebullition".

NYC Comment 551) Table D2-3, Page 20 of main text: 14 observations of sheens are circumstantially linked to floatables and surface scum (Page 20), while floatables and surface scum are noted as "Potential Sources of Sheen" in Table D2-3. Only observed instances of sheen generation should be recorded. The origin of sheens cannot be assumed if not directly observed. Additionally, known sources of sheens to the Study Area, such as bank seeps, have been left out of Table D2-3.

Additional Appendix D Comments – Figures

NYC Comment 552) NCG should provide all parties with all the shapefiles associated with their 2015 Ebullition Survey. NCG provided their 2016 shapefiles, but a description regarding how the data package was constructed was not provided. NCG should make sure to provide an explanation for both 2015 and 2016 survey shapefile data packages.

NYC Comment 553) All Maps in Figures D3-5a to D3-6c

a. All Maps showing sheens should clearly differentiate between static sheens and sheens from ebullition facilitated NAPL migration (sheen blossoms).
b. An explanation for why observations from the 2015 survey appear coarser and more arbitrary than those from the 2016 survey should be noted. Methodology for delineating polygon observations is clearly different between NCG's 2015 and 2016 surveys.

Specific Comments on the 2016 Ebullition Survey Data Package

For the 2016 ebullition survey, NCG assigned sheens they did not see arriving at the water surface to the categories "static sheen" and "static sheen and ebullition". Most of the static sheens arrived during the survey time (NYC Figures 50a to 50c). 86 percent of the static sheen area was observed during the survey time, when sheens are expected from ebullition facilitated NAPL migration and bulkhead NAPL seeps. This is an attempt to perform both a qualitative and quantitative analysis of ebullition in the Creek and indicates the area covered was too large for each workboat. Observers ended up missing significant instances of ebullition facilitated NAPL migration. By the time NCG arrived at some areas, sheens identified as static were either recently formed or formed in the immediate area of the workboat, but were not properly documented by NCG observers. Additionally, the time that it took to record each observation due to extraneous parameters, along with the collection of water quality parameters led to missing sheen blossoms.

NYC Comment 554) The NCG ebullition survey was conducted in workboats while the City used jon boats and kayaks. Workboats have several key disadvantages when compared to the boats that the City used. Workboats provide a limited viewpoint. Sheens that are not visible from workboats due to viewing angle, sun glare, or height of observation are more easily viewed when closer to the water surface. Workboats have limited access to shallow areas, especially around low tide (the time of the survey). Workboats also cannot navigate easily with a paddle, especially to stay in place. Additionally, work boats can get stuck in shallow areas for extended periods of time. When workboats do access shallow areas, they often disturb surface sediments. They are larger than jon boats and have a deeper draft. On numerous occasions, NCG stirred up sediment while navigating through shallow areas and hopping booms. The City's photos/videos DSCF0430 through DSCF0435 show an NCG workboat hopping the NYCDEP boom in East Branch on 9/16/2016 (Low Tide Survey 1 [LT1]), resulting in stirred up sediments. NCG video EB_LT2_20160917_172405.mp4 shows the same issue on 9/17/2016 (LT2).

NYC Comment 555) In some areas, NCG seems to have traveled too quickly to adequately make observations. An example of this is the City's video DSCF0280.mov, taken on 9/17/2016 near the Pulaski Bridge. It shows an NCG boat patrolling the area making fast passes across the creek. The speed the workboat is traveling would make it difficult to accurately make observations on the water surface.

NYC Comment 556) There are multiple issues in the Data Package related to sheen observations. These issues include the incorrect documentation of sheens, a needlessly complicated data collection process, and sheen observations that were filmed or photographed but never documented in the Ebullition Table. These need to be corrected before the proposed FS sampling plan can be approved. Examples of these types of errors are as follows:

a. On 9/16/2016 (LT1), NCG recorded a video in the northern fork of East Branch (EB_LT1_20160916_145047.mp4). The narrator notes a continuous rainbow sheen with sporadic ebullition, but no blossoms. Contrary to this observation, bubbles transporting sheens to the water surface can be seen between 3 to 5 seconds and 9 to 13 seconds in the video. Since the observer failed to notice the sheen blossoms, the observations are misclassified in the Ebullition Table as "static sheen and ebullition, with an unknown sheen source". This error demonstrates that NCG observations in the Ebullition Table need to undergo a thorough QC and that observers need training.
b. Also on 9/16/2016 (LT1) in Turning Basin 2 (Corner), at 13:17 the City's video DSCF0233.mov shows an NYCDEP observer conducting a pre-survey reconnaissance in the corner of the Turning Basin. The NYCDEP observer states that the water is clear with no sheen or ebullition present. Around an hour later, NCG conducted a survey in the same area. Pictures taken by NCG during this timeframe show sheens which NCG document in the Ebullition

Table as "static rainbow sheens from an unknown source". At 14:22, about 10 minutes after NCG left the area, NYCDEP video DSCF0242.mov shows blossoming sheens in the corner of the Turning Basin. This timeline suggests that NCG misidentified sheen blossoms as static sheens.

c. On 9/17/16 (LT2) in Turning Basin 2 (Corner), NCG has a 5-minute video (TB2_LT2_20160917_142657.mp4) in which the formation of sheen blossoms can be seen throughout the video. The corresponding Ebullition Table entry (TB2-LT-20160917-142134) states "rainbow sheen blossoms from gas ebullition" while the following entry (TB2-LT-20160917-142916) notes a "contiguous dark rainbow static sheen from an unknown source". NCG observers watched the formation of multiple sheen blossoms in the area resulting in widespread sheen coverage. Therefore, it is inappropriate to document these sheens as static sheens. While many observations were made in the video (such as the blossom forming at time 2:33, which the EPA observer verbalizes), these multiple observations are not noted in the Ebullition Table.
d. On 9/19/2016 (LT4) in Whale Creek, NCG has a video clearly showing a blossoming sheen at 2 seconds (CM0p57-CM0p93_WC_LT4_20160919_171751.mp4). The closest observation to this video was made 7 minutes prior and states "static sheen" (entry CM057093-LT-20160919-171032 in the Ebullition Table). On 9/19/2016, there were no entries of blossoming sheens in Whale Creek in the Ebullition Table.

NYC Comment 557) Despite having two NCG observers on each boat, it appears that taking photos and videos and recording observations were done separately, or without adequate communication. On 9/16/2016 (LT1) in Turning Basin 2 (Corner), no observations were documented in the Ebullition Table during a nearly six-minute video that NCG took of heavy ebullition facilitated NAPL migration (TB2_LT1_20160916_154801.mp4). Observations in the Ebullition Table were only made before and after this video. NCG must add all observations to the Ebullition Table which were recorded through photos and videos.

NYC Comment 558) NCG downplays NAPL present in other phases (such as free product, tar blobs, or floating NAPL saturated sediment) as sheens. For example, NCG video UEK_LT2_20160917_145737.mp4 shows NAPL emanating from the Manhattan Poly Bag bulkhead. However, the Ebullition Table does not identify the seep as NAPL. Instead, the seep is identified as a "dark rainbow sheen from other origin". Tar blobs were also documented near the GPEC Former MGP Site bulkhead by NCG in photo TB2_LT3_20160918_163925.jpg. This observation was not entered into the Ebullition Table. NAPL on the water surface should not be characterized as a sheen. NCG must integrate all NAPL observations into their Ebullition Table in a manner that clearly differentiates between sheens and all other forms of NAPL.

NYC Comment 559) NCG identifies sheens emanating from bulkheads as "static sheens".

However, these sheens cannot be considered static by definition, given that the NCG observers are seeing them actively develop. NCG makes little attempt to identify or discuss the source of sheens from bulkheads, with the exception of the Pratt Oil Works seep.

a. NCG video UEK_LT2_20160917_145737.mp4 of the Manhattan Poly Bag Seep, first observed by NCG on 9/17/2016. In the video, widespread sheen formation is clearly visible as NAPL emanates from the wooden bulkhead. This observation is not included in the in the Ebullition Table as a seep. The next day (9/18/2016), NCG made observations of contiguous silvery sheens in the area between Bayside Terminal and Manhattan Poly Bag. NCG Video UEK_LT3_20160918_173832.mp4 shows the sheen in close proximity to the bulkhead where the NAPL seeps were previously observed. NCG did not document the seep, nor did they investigate the source of the sheen in the video. NYCDEP observations in the same area on 9/18/2016 show both the NAPL seep from Manhattan Poly Bag and widespread continuous rainbow sheens on the water surface (see NYCDEP photos/videos DSCF1728 through DSCF1733).
b. On 9/17/2016, NCG observers took two videos along the dilapidated wooden bulkhead in the northern fork of East Branch where NYCDEP observers had seen NAPL seeps (NCG videos EB_LT2_20160917_181107.mp4 & EB_LT2_20160917_181746.mp4). In the videos, NCG observers note continuous sheens along the bulkhead. Sheen origin should be discussed.
c. NCG photo UEK_LT3_20160918_145207.jpg, clearly shows a brown substance coming from the pilings of Consolidated Carpet Trade on 9/18/2016. In the Ebullition Table, NCG identifies it as a "static sheen of unknown origin". NCG's identification is incorrect, the origin of the brown substance is very clear, and should not be considered unknown.

NYC Comment 560) In the TABLE_CODE_EXPLANATIONS tab of the Ebullition Table, column Z (SHEEN_POTENTIAL_SOURCE) lists "Bulkhead" as a category. However, the only sheens NCG attributed to bulkheads were sheens seen emanating from the Former Pratt Oil Works refinery bulkhead. Other bulkhead seeps which NCG observed, such as at Manhattan Poly Bag and Consolidated Carpet Trade, were categorized as "Other". The "Other" category is defined by NCG as "Observation coincident with upstream source or presence of bulkhead". NCG must remove ambiguous categories such as "Other" which obscure NAPL observations.

NYC Comment 561) According to the TABLE_CODE_EXPLANATIONS tab of the Ebullition Table, sheen blossoms are defined as "*observations of a sheen area (less than 3 feet in diameter) developing when a gas bubble breaks on the water surface*". NCG must note how blossoms greater than 3 feet in diameter are recorded.

NYC Comment 562) On 9/19/2016 (LT4), NCG attributes sheens on the water surface to three outfalls in different areas of the creek (Lower English Kills, Middle Reach, and Dutch Kills). These

Ebullition Table observations do not explain the widespread presence of sheens across the Study Area on that day. As demonstrated by the examples below, these observations are incorrect or have been greatly exaggerated and cannot be directly attributed to outfalls.

a. In Dutch Kills, at 15:30 on 9/19/2016, NCG claims in their Ebullition Table that the outfalls BB-609/BB-610 were a source of "silvery dark streaks". However, NCG provides no photo or video evidence to back up this claim. NCG has a video taken 10 minutes earlier, at 15:20, (DK2_LT4_20160919_152020.mp4) showing of a hose hanging over the adjacent NYCON site bulkhead actively discharging water directly over the BB-609/BB-610 discharge point. The NYCDEP observer in the area took a video at 15:17 (DSCF0822.mov) showing a large discharge coming out of the hose from NYCON. NCG did not document that this hose was actively discharging during the survey period. The unknown nature of this discharge is a confounding factor on observations in this area and does not allow for the assertion of sheens emanating from BB-609/BB-610.
b. In NCG's "Observation Areas" shapefile, observations of sheens attributed to outfalls are greatly exaggerated, and sheens emanating from bulkheads are largely ignored. The sheen NCG attributes to BB-609/BB-610 is 0.26 acres. Meanwhile, the sheen NCG attributes to NCQ-637 covers 2.19 acres and stretches for 0.7 miles from downstream of Pratt Oil Works to the Kosciuszko Bridge. Attributing this 0.7-mile-long sheen to an outfall is unsubstantiated. This observed sheen area overlaps with a known uncontrolled oil spill from the Pratt Oil Works site which was observed by NCG seeping out of the bulkhead throughout their 2016 ebullition survey.
c. Sheens that NCG attributes to outfall NCB-638 on 9/19/2016 in the "Observation Areas" shapefile are 0.80 and 0.58 acres in area, respectively. NCB-638 potentially drains portions of the GPEC Former MGP Site, Equity Works Former MGP Site, BCF Oil Refining, and Former Ditmas Oil Site. All of these properties are upland NAPL sites.
d. Sheens that NCG tie to outfalls in the "Observation Areas" shapefile range from 0.26 acres to 2.19 acres in area. A comparison of these areas to the area NCG likely attributes to the Manhattan Poly Bag seep (Polygon_ID UEK-LT-20160917-145617) exhibits a bias in sheen extent determination, as the Manhattan Poly Bag seep is 0.0025 acres.

NYC Comment 563) As noted in the TABLE_CODE_EXPLANATIONS tab of the Ebullition Table, NCG identifies multiple "sources" of ebullition in the column EB_POTENTIAL_SOURCE. These "sources" include biota, aeration system operation, and vessel movement. This categorization of different "sources" of ebullition makes no sense, since none of these sources cause ebullition. An example is NCG video LEK_LT1_20160916_133253.mp4, in which the NCG observer notes a crab on a bulkhead piling and says that it is possibly contributing to ebullition.

NYC Comment 564) In NCG's "Observation Areas" shapefile, the polygons vary significantly in

size and shape and are very subjective. An example of the subjective delineation process can be found at the 0:55 mark in NCG video UEK_LT4_20160919_165834.mp4, where NCG observers seem to apply an arbitrary method of delineation. In addition, delineation of large polygons appears to only be accurately achievable when there is an observation that is bound on multiple sides by shoreline, and the viewer is taking a GPS point from the outward extent of the observation (as viewed in the aforementioned video).

NYC Comment 565) NCG's "Ebullition Survey Tracks" shapefile has a field called "Track Type" which includes two categories: "Estimated" and "Survey". NCG should provide an explanation for how these tracks were estimated. If some of the workboats did not have a GPS with continuous tracking turned on, this should be clearly stated.

City Comments on NCG Draft RI Appendix E – Point Source Evaluation

Appendix E is insufficient for the development of a comprehensive RI and must be revised for the following reasons; the Appendix 1) Lacks the level of detail that is expected necessary to provide a complete understanding of specific point source concentrations measured for the RI/FS, 2) Inappropriately combines all stormwater categories (MS4s, overland flow and Category 1 stormwater) to extrapolate loads from stormwater, 3) Relies on a flawed assessment of ancillary data used to assess CSO concentrations, 4) Mischaracterizes the treated effluent from NCB-002 to Whale Creek, 5) Discusses only a small subset of the analytical suite and 6) Engages in inappropriate finger-pointing that has no place in a technical document.

Appendix E lacks the level of detail necessary to provide a complete and accurate understanding of specific point source concentrations. Details on concentration data is lacking overall, with the exception of comparison of concentrations in selected point sources and in-creek sediment and surface water results.

<u>General Comments from the City on NCG Draft RI Appendix E</u>

NYC Comment 566) Specifically, Section 2.3 titled "Phase 2 Point Source Sampling Program Results," summarizes the number of samples collected and locations sampled, yet fails to adequately discuss concentration results from point sources in sufficient detail as would be expected in an Appendix to the NCG Draft RI. The level of analysis in Section 2.3 of Appendix E is insufficient as it only provides cross-references to the figures and tables contained in Attachment A and a qualitative discussion of observed variability of analyte concentrations in the different point source categories. There are no references to concentration result referenced in this section

NYC Comment 567) Where the NCG Draft RI does provide concentration results in Attachment A using 890 tables and 890 figures, the information contained is insufficient for accurate and easy visualization of the areal and temporal sources of COPCs in the various point sources and incomplete in terms of representing loading. The figures provided are difficult to use due to convoluted symbology and a failure to identify individual point sources associated with the results. The lack of individual sample results in the tables of Attachment magnify this issue. The tables are summary statistic tables for each analytical parameter, grouped by point source category. Additionally, this attachment does not include any dissolved phase sample results.

Appendix E must be revised to include a quantitative discussion of point source concentrations for all sampled point sources for TPCB, TPAH, and Cu. Attachment A to Appendix E must be revised to provide tables of concentrations for all analytes for each point source sample collected.

NYC Comment 568) The analysis in Appendix E inappropriately combines all stormwater categories (MS4s, overland flow and Category 1 stormwater) to develop loads from stormwater. Extrapolation of load calculations among stormwater categories is inappropriate. Point source categories were specifically developed in the RI Work Plan to differentiate types of point sources and assess their individual impacts. No quantitative rationale is provided to support combining all stormwater into one load estimation group.

NYC Comment 569) Appendix E includes a flawed assessment of ancillary data used to assess CSO concentrations from other studies conducted across the harbor. Numerous errors have been identified in NCG Draft RI Table E4-6 which summarizes ancillary data from other sites and from previous studies at the Creek. Given the inaccuracies/errors found in the tables presented in the NCG Draft RI, all ancillary data used to summarize CSO data from other studies must be shared with EPA and all stakeholders for independent review.

NYC Comment 570) The misleading statements made in the text of the NCG Draft RI that mischaracterize the treated effluent discharged from NCB-002 to Whale Creek are repeated in this Appendix. New York State, EPA, and NYCDEP have provided numerous sources of information to NCG detailing that NCB002 is *treated effluent* from the Newtown Creek WWTP and is the same effluent that is discharged to East River under normal flow conditions. NCG repeatedly states that the NCB002 is permitted as a CSO and rarely refers to it as treated effluent, even though all discharge from groundwater treatment systems is described as "treated effluent". In Section 3.3, NCG states under the bullet point "WWTP overflow" on page 31 that the effluent is treated; however, implies otherwise with the statement "*Although this outfall is permitted as a CSO, it is* ***potentially*** *different from other CSO discharges because it receives treatment before overflowing*" (emphasis added).

Any speculation, whether explicit or implied, regarding the status of NCB002 should be deleted. All references to NCB002's permit status must be removed as it is known that this location does not operate as a CSO outfall. The NCG Draft RI must refer to this location as "*treated effluent*" consistent with how Category 1 point sources are always referred to as "*treated effluent from groundwater remediation and dewatering systems*" or similar.

NYC Comment 571) Appendix E states that while the Draft RI dataset includes approximately 500 chemical analytes that are being considered in the CERCLA investigation in addition to "conventional analytes" such as nitrogen and phosphorous, the Draft RI and this appendix focus exclusively on TPAH, TPCB, and Cu. Discussion of such a small subset of the analytical suite is insufficient for the development of a comprehensive Draft RI and further analysis should be included both in Appendix E and in the Draft RI as a whole.

NYC Comment 572) NCG engages in unnecessary finger-pointing in a technical document. Throughout Appendix E, there are numerous accusations aimed at NYCDEP for providing conflicting information, not providing adequate information, placing limitations on field sample collection, not permitting installation of flow meters, and so on. This list of complaints by NCG to EPA has occurred numerous times in the past through other channels and have been addressed, it has no place in what is supposed to be a technical document evaluating sample results. These claims must be deleted to present an unbiased discussion of the point source sampling program.

NYC Comment 573) NCG combines all stormwater categories (MS4s, overland flow and Category 1 stormwater) to develop loads from stormwater. Extrapolation of load calculations among stormwater categories is inappropriate. Point source categories were specifically developed in the RI Work Plan to differentiate types of point sources and assess their individual impacts. No quantitative rationale is provided in to support combining all stormwater (Category 3A, Category 3C, and Category 1 stormwater) into one load estimation group.

While the text states that statistical analysis via a one-way ANOVA model was used to determine if stormwater locations were unique, the assumptions that preceded this analysis are flawed. Three stormwater locations were chosen *a priori* as representative of stormwater concentrations throughout the study area and all other stormwater locations were statistically compared to this "representative" group. Without statistical analysis to back up the assumption that these three locations are "representative," the entire basis of stormwater load calculations is flawed. The statistical analysis conducted by the City comparing the COPC concentrations in the three reference outfalls shows that the concentrations in these outfalls are not the same (NYC Figure 55). TPCB concentration in outfall 632-B is higher than the concentration in outfalls

631 and 629, indicating a possible TPCB source in the area of 632-B which is not present in the other two watersheds. This indicates that these outfalls are different and cannot be used as a representative group.

Furthermore, the ANOVA comparison of individual outfalls to the NCG reference stormwater also shows that there is difference in stormwater concentrations of TSS, Cu, TPAH and TPCB among different outfalls (NYC Figures 56a to 56d). This clearly indicates that the Collective Data Method (CDM) used by NCG to calculate loads cannot be used to develop loads for the Creek on a creek-wide or reach by reach basis. This method will result in biased loading estimates which are not supported by data. The CDM generally provides the highest load estimates of the four methods. Combining stormwater concentrations from all categories into one overarching stormwater grouping downplays the significant variations in COPC concentrations in different discharges. Variations in industry type have observable impacts on concentrations of COPCs in stormwater from private sites (NYC Figure 57). For example, elevated Cu concentrations are observed on solids in stormwater discharges from multiple industrial sites, including Hugo Neu, Review Avenue Development, and National Grid (NYC Figure 58a). Elevated total TPCB concentrations are also observed on solids in stormwater discharges from Hugo Neu (NYC Figure 58b). This shows that the nature of solids delivered from different stormwater outfalls is not the same. The City recommends that the point source loads should be calculated using the Specific Outfall Method (SOM) where the outfall specific concentrations are used to calculate outfall specific loads.

NYC Comment 574) Information contained within Appendix E is insufficient to verify loading calculations by reach. As stated in general comments, concentration data, measured and estimated, are not completely presented in this Appendix. Flow data is also incompletely presented in the tables for this Appendix. Flow data is presented for selected outfalls, but is not made available for all outfalls. The text in Section 3.4 states that load estimates were calculated for each reach of the study area from each type of discharge. This data is not presented in the tables; rather, loads are presented by category or by reach but never by both.

When calculating loads for each reach by category, it is inappropriate to group point sources across the entire study area, as is done in the Collective Data Method, to determine loads for a specific reach due to significant variations in COPC concentrations in different outfalls. An example is calculation of TPCB loads from CSOs in East Branch. NCB-083, which discharges to East Branch, had the lowest average TPCB whole water concentrations of all sampled CSOs (NCB-083 average TPCB concentration: 7.2 ng/L; average TPCB concentration of all seven sampled CSOs: 43 ng/L). As NCB-083 is the only major CSO discharging to East Branch, the estimated TPCB load via CSOs is 0.016 kg/yr based on the concentrations in NCB-083, and an

annual flow of 580 MGY (from NCG Draft RI Table E2-1). The total TPCB loads to East Branch for all four load estimates detailed in Table E3-8 are about an order of magnitude higher than this discharge-specific value. NCG tables in this Appendix do not provide enough information for a direct comparison of TPCB loads from CSOs to English Kills; however, it follows that loads should be lower as NCB-083 contributes 580 MGY or 98% of the 590MGY total point source flow to East Branch.

NYC Comment 575) NCG assessment of ancillary data used to assess CSO concentrations from other studies conducted across the harbor is flawed. Numerous errors have been identified in NCG Draft RI Table E4-6 which summarizes ancillary data from other sites and from previous studies at the Creek.

Summarization of CARP data by NCG is incorrect. The data reported under the CARP (Litten, 2003) column are not consistent with what is presented in the CARP report. In addition, the data summaries were not presented by NCG in a consistent format for TSS, TPCB, and TPAHs. For example, TPCB concentrations were reported for Newtown Creek Wastewater Treatment Plant (NTC WWTP) influent (considered a surrogate for CSO), SWO, and WWTP effluent, while TPAH concentrations were only reported WWTP influent. TSS and TPAH were reported only for the Newtown Creek WWTP influent or effluent, while TPCB data were reported for all sampled WWTP influent or effluent. Table E4-6 reported an average TPAH concentration of 800 ug/L in WWTP influent (CSO) sample. This result is only for NTC WWTP influent, which was sampled once and does not represent an average. In addition, TPAH reported in the Appendix E is based on the sum of 26 PAHs, not 17. TPAH concentration based on 17 PAHs for the one sampling event at Newtown Creek influent is 21 ug/l, about 40 times less than the NCG reported value.

Summarization of Hudson River Conference data (EPA, 1973) by NCG is also incorrect. The first average for dry weather TSS is incorrect due to inclusion of a value that was not reported in the cited report. Review of the cited report shows that the three Cu concentrations for the first dry weather event were 1.75 mg/L, 0.45 mg/L and 1.3 mg/L. There was no Cu concentration of 180 mg/L, as was erroneously included by NCG in Section 4.2.4.1. Also, the Cu concentration of 1.3 mg/L is not from a discrete sample, rather it is the composite concentration result from the 12 hour sampling duration which includes the discrete sample results of 17.5 and 0.45 mg/L. For this reason the 1.3 mg/L cannot be included in the average calculated by NCG. The information regarding the 1.3 mg/L result is clearly detailed in Table 15 of the cited report. NCG's misunderstanding of the data presented is propagated in Table E4-6 as the dry weather event 1 Cu average concentration is listed as 59 mg/L (average of 180, 0.45, and 1.3 mg/L) when it should actually be 1.1 mg/L (average of 1.75 and 0.45 mg/L).

Given these inaccuracies/errors found in the tables presented by NCG, all ancillary data used by NCG to summarize CSO data from other studies must be shared with EPA and all stakeholders for independent review.

NYC Comment 576) NCG uses sediment data from "nearby" sediment cores in an attempt to understand impact of point sources on the Creek. This evaluation is conducted only for CSO and MS4 outfall, no such comparisons are made for other point source categories or potential ongoing sources from uncontrolled upland sites, a clear bias by NCG towards municipal outfalls.

Discussion by NCG comparing COPC concentrations in solids from point sources to surface sediment shows that the concentrations in the surface sediments are higher than those measured in solids from CSOs and MS4s. Despite this observation NCG arrives at a conclusion that the point source loads have stronger impacts on surface sediment for TPAH and Cu as compared to TPCB, without any explanation as to how such a preferential delivery of specific contaminant classes is possible. This text must be deleted from the point source appendix.

NCG also uses subsurface data collected from "near" CSO outfalls to assess historical impact of CSOs on the Creek. It is not clear what "near" a CSO outfall represents. A discussion of what "nearby" represents and how this range of influence was selected must be included. Furthermore NCG is only using one high resolution core per tributary (with the exception of Maspeth Creek) to arrive at their conclusions. NCG fails to review data from all surrounding cores which provide information regarding the heterogeneity of concentrations in the sediments of the tributaries. NCG's evaluation presented in the text amounts to cherry-picking of data to draw unsupported conclusions. Finally, NCG uses this cherry-picked dataset to make assertions regarding the historical loads from CSOs. NCG states that this comparison shows that the CSO loads were historically higher without any acknowledgement of the presence of other sources to the Creek and their historical loading. NCG's biased assumptions and characterization of historical CSO discharges fail to acknowledge the long history of untreated industrial discharge to the creek and its tributaries (e.g., the large oil water separator attached to the creek at Standard Oil (ExxonMobil) for multiple decades and the discharge of carbureted water gas tar (the GPEC site in the Turning Basin).

NYC Comment 577) Appendix E does not discuss Particulate Organic Carbon (POC), specifically observed data uncertainty in the POC dataset, and its impacts on the analysis and modeling. In aquatic systems, POC plays an important geochemical role and is critical to understanding the nature of solids in point source discharges and directly affects the dissolved/particulate partitioning of COPCs in point source discharge flows. NCG POC data has been shown to be biased low as compared to EPA split sample results. In an October 14, 2016

email from Caroline Kwan (EPA) to Jim Quadrini (AQ), the EPA detailed review and analysis of AQ's point source POC data sets and comparison to EPA split samples. Regressions demonstrated that AQ's POC was biased low and EPA instructed NCG to use a step-wise approach for adjusting the POC data and evaluating its impacts on modeling results and point source loading estimates. NYC Figure 59a was generated by EPA and shows principal axis regression analyses of the POC datasets, indicating bias in NCG's dataset.

Analysis of NCG, EPA, and NYCDEP POC datasets also indicates that NCG POC data is biased low (NYC Figure 59b). The City used the Wilcoxon signed rank test to test if there is any difference in the paired POC data from the split sample results. This is an appropriate nonparametric procedure for testing the null hypothesis of no difference when the experimental design is based on paired samples. The Wilcoxon Signed Rank Statistic result indicates that there is a significant statistical difference between the POC results from EPA and the NCG ($p=0.009$). This statistical analysis indicates that there is less than a 1% chance that the EPA's results and the NCG's results are equivalent. On average, the EPA values were twice those of the NCG. NYCDEP point source POC results are in agreement with EPA results, as detailed in an October 5, 2016 email from Ron Weissbard (NYCDEP) to Caroline Kwan (EPA). In response to this email, EPA stated that concerns will be taken into consideration including when reviewing the RI report and associated documentation. The NCG Draft RI does not acknowledge these demonstrated discrepancies in POC data.

NYC Comment 578) Appendix E does not discuss of the multiple methods employed for suspended solids characterization in point source discharges and the variation within the datasets. As detailed in NYCDEP Comments on NCG's Point Source Presentation in January 2016 and Response to EPA Comments for the Presentation in September 2015 and in other email correspondence with EPA from NYCDEP, there are concerns with TSS results from point source sampling. Two methods of suspended solids measurements were employed by NCG: TSS analysis via SM2540D method and suspended solids concentration (SSC) via ASTM D3977. Plots in NCG's data presentation show that the TSS is non-detect for most of the Category 1 outfalls and one 3C outfall (only for one event). When the results from the ASTM method for quantifying TSS are compared with the SM2540D method, the results do not agree. NYC Table 7 shows the TSS results for two methods for samples where the TSS result from SM2540D method was ND. From the table it can be seen that method D3977 is capable of quantifying very low TSS, and that during wet weather sampling events, the TSS from Category 1 events is measurable. For the Category 1 outfalls, the TSS reported by the ASTM method is on average 2.6 times higher than the TSS reported by the SM2540D method. The TSS method is performed using an aliquot of the original sample while the SSC method uses the entire sample for analysis, thereby measuring the entire mass of solids in the sample. The aliquot used in the TSS

method may not be representative of the total suspended solids which can lead to variability in the measurement. The 2000 USGS Water-Resources Investigations Report by Gray et al. considers the TSS method to be unreliable and recommends the use of the ASTM SSC method for quantifying suspended sediment concentrations in natural water samples.

Non-detect TSS was the rationale used by NCG for not conducting split phase analysis for organic COPCs in Category 1 samples. NCG was able to quantify split phase organic constituents in samples where the TSS is in the sample was greater than 10 mg/L. Had they shared the TSS measurement from method D3977, split phase measurements from Category 1 outfalls would have been conducted. The City recommends that the SSC results be used to quantify suspended sediment concentration in the samples, at least for the samples where the SM254D method reports ND concentrations. For samples with detected concentrations, NYC Figure 60 demonstrates the relationship between the SSC and TSS methods show suitable agreement. This shows a technical basis to justify using SSC concentrations for ND TSS results.

NYC Comment 579) Appendix E does not discuss grain size results in all point source samples or provide comparison of grain size of point source discharges and in-creek sediments. Grain size is only discussed in the context of comparing whole water and bulk water point source samples collected from the same locations and same events. A detailed discussion of point source grain size must be provided. This discussion should be further extended to the comparison of point source samples and in-creek sediment results (which should also be expanded to include all point sources rather than a select few CSO locations).

As detailed in an October 5, 2016 email from Ron Weissbard (NYCDEP) to Caroline Kwan (EPA), NCG analyzed grain size using a sieve methodology not detailed in the approved QAPP. Evaluation of the NCG dataset has revealed numerous issues with their grain size data. In response to this email, EPA stated that concerns will be taken into consideration including when reviewing the RI report and associated documentation.

NCG samples are not heterogeneous, they are nonsensical. There is no known mechanism or explanation which would produce samples with high colloid content and 0% silt content, a result observed in numerous samples (NYC Figure 61).

Data from chemistry at this site and in the literature suggests solids should behave similarly across the watershed, which is what City data shows. All samples were generally similar, i.e., CSO/stormwater from an urban area, so it is not surprising they have similar grain size distributions ("curve shapes"). While it may have been an original hypothesis that particle size distributions would be variable, other NCG data, as well as that of the City, show this is unlikely.

Specifically, both the City data and the NCG data indicate little variation in particle chemistry from sample to sample and station to station. Since particle chemistry is linked to particle size, the similarity in chemistry indicates similar particle size distributions across samples. While NCG chemistry shows consistency from sample to sample and station to station, the NCG grain-size analysis contradicts this, indicating an error. The City data on particle chemistry and the City data on grain-size distribution are internally consistent, with both showing only minor differences across samples and stations. The NCG method lacks technical merit, it ignores the contradiction between the City and the NCG data sets, the lack of internal consistency within the NCG dataset, and performs a data quality analysis to see if results are within 50%. Understanding these issues is critical to geochemical analysis and sediment transport modeling on the impact of point sources to the Creek.

While the NCG modeling needs currently only requires 2 grain size fractions (coarse and fines), the City's data provides data on grain size distribution on a much finer scale and is useful in understanding the point source solids. Furthermore a clearly erroneous dataset (the NCG grain size), should not be used.

Grain Size results for point sources are reported by NCG on a suspended solids concentration (mg/L) basis. The suspended sediment concentration (SSC) results reported by the grain-size method do not match with the TSS results reported by NCG for point source outfalls. On average the SSC-grain size results are 3.7 times higher than the TSS results. Refer to NYC Figure 62 for a comparison of the fine sediment fractions determined by these two methods. Understanding of these data issues is critical for discussion of load uncertainty and for sediment transport models.

NYC Comment 580) The last paragraph on Page 2 (continues to Page 3) states that while the NCG Draft RI dataset includes approximately 500 chemical analytes that are being considered in the CERCLA investigation in addition to "conventional analytes" such as nitrogen and phosphorous, the NCG Draft RI and this appendix focus on TPAH, TPCB, and Cu. Discussion of such a small subset of the analytical suite is insufficient for the development of a comprehensive RI and further analysis should be included both in this Appendix and in the Draft RI as a whole.

NYC Comment 581) Appendix E – Section 1.2, first sentence of Section 1.2 *"Solids and chemicals that enter the Study Area from point source discharges and overland flow represent a significant source to Newtown Creek."*

This statement should be deleted from the introduction section as there have been no results

presented to support such a statement. It would be more appropriate to state *"it is important to understand and quantify the solids and chemicals that enter the Study Area from point source discharges and overland flow"* rather than biasing the discussion. The data indicates that solids that enter the Study area from CSOs and stormwater are comparable to background and are contaminated by other sources once they enter the Study Area.

NYC Comment 582) Appendix E – Section 1.2, the third paragraph of Section 1.2: states that NYCDEP would not allow flow meters to be installed in municipal infrastructure, therefore flows were estimated using the NYCDEP InfoWorks model. This bogus claim repeats throughout the document and is identified in numerous sections in the following comments. After coordinating with EPA and NCG, NYCDEP installed flow meters in several CSOs throughout the entire duration of Phase 2 sampling to measure flows for the purposes of calibrating the InfoWorks Model shared with the NCG. While the City voluntarily installed flow meters in the CSOs, no other point sources were directly measured for flow. NCG should delete this statement and anything similarly accusatory from the entire document and replace it with accurate information.

NYC Comment 583) Appendix E – Section 2.1: The appendix point source inventory groups all stormwater from MS4s, private property, and overland flow (excluding individually permitted discharges) as one type of point source. Footnote 2 on the bottom of Page 4 of Appendix E states "the flow estimates from the geo-neutral point source model (presented in Section 2.1.3) are not differentiated between stormwater that discharges to the creek as overland flow versus stormwater that discharges as a point source. As a result, it is not necessary to make a distinction between stormwater and overland flow for load calculations."

Given the differences in concentration and flows from various types of stormwater point sources (MS4s, private property, overland flow), it is inappropriate to group these items together as an overall "stormwater" load. During the development of the RI Work Plan These stormwater categories were intentionally separated into three groups with the intention of extrapolating loads from the sampled outfalls to the non-sampled stormwater in a specific category. Review of the data shows that the concentration of suspended solids and COPCs is different within stormwater categories and private properties, depending on the industry, report elevated concentrations for certain COPCs. The concentrations of overland flow, MS4s, and private stormwater loads should be presented separately when evaluating point source loads.

NYC Comment 584) Appendix E – Section 2.1.1.2: in the discussion of CSOs under the bullet point for Category 2A – CSOs, it is stated that "bypasses may also occur during dry weather

when the combined sewer infrastructure malfunctions" and several Best Management Practices reports for the SPDES permits for the 14 WWTPs are referenced. It should be stated that these bypasses are typically infrequent and short term discharges and result in discharge of a very small fraction of the wet-weather CSO discharges. The locations, durations, volumes, and reasons for these dry weather bypasses are detailed in the cited reports. Without further explanation, the statement in the text implies that dry weather discharges are a regular occurrence, which is inaccurate. Additional detail should be included in the text.

NYC Comment 585) Appendix E – Section 2.1.1.2, the second to last sentence in the bullet point for Category 2A – CSOs: "*several factors affect when an individual CSO will discharge*."

There is no discussion of what these factors are. Discussion should be expanded or the statement should be deleted.

NYC Comment 586) Appendix E – Section 2.1.1.2, the last sentence under the bullet point for Category 2B – WWTP Effluent Overflow, *"the Newtown Creek WWTP SPDES permit lists NCB-002 as a CSO outfall."*

While the permit may list the outfall as such, the discussion preceding this sentence accurately states that the effluent is treated wastewater that normally discharges to the East River and is discharged to Whale Creek automatically under certain hydraulic conditions. This last statement should be removed as it confuses the discussion and implies that raw sewage is being discharged from the WWTP to Whale Creek.

NYC Comment 587) Appendix E – Section 2.1.3.1, first paragraph in the section: *"the 2015 geo-neutral point source model was used to estimate the average annual CSO and stormwater flow for 2008 through 2012."*

An explanation about years prior to 2008 needs to be included, explaining which model or data was used to estimate flows from 1999 to 2008 The modeling period for the RI/FS is 1999 to 2012.

NYC Comment 588) Appendix E – Section 2.1.3.1, second paragraph: this section discusses flow meters that were installed by NYCDEP in five CSO outfalls and that the measured flow data was used in the development of the 2015 point source model. This information should be included in the discussion in Section 1.2 and replace all other references where NCG states that NYCDEP would not allow flow meters to be installed in municipal infrastructure.

NYC Comment 589) Appendix E – Section 2.1.3.1, first sentence "Effluent overflow from the Newtown Creek WWTP is normally discharged to the East River…"

The text should be revised to state "treated effluent". This comment applies throughout the Appendix. Treated groundwater effluent is always referred to as "treated" however the WWTP effluent is often referred to as "overflow". Combined with the statement the WWTP effluent is permitted as a CSO in Section 2.1.1.2, excluding the term "treated" from discussion of the WWTP effluent implies that this effluent is raw sewage rather than treated wastewater. This comment applies to reference to the WWTP effluent throughout the Appendix.

NYC Comment 590) Appendix E – Section 2.1.3.3, third sentence in the first paragraph: Description of Category 1 discharges as ranging from "1.2 million gallons per day (MGD) to 0.000020 MGD" should be revised to "1.2 MGD to 20 gallons per day (GPD)"

NYC Comment 591) Appendix E – Section 2.2.1, second bullet point on page 19: WWTP effluent overflow should be described as treated, consistent with the third bullet point "treated effluent from groundwater remediation and dewatering systems (Category 1)."

NYC Comment 592) Appendix E – Section 2.1.3.3, Con Edison bullet point on pages 16 to 17: DMRs have been purported to provide conservative estimates of discharges from Con Edison (DAR No. 110), for example. Metering of treated discharges could have been performed much easier than the CSO discharges that are subjected to complex hydraulic conditions. Short-term monitoring of treated discharges to include accurate flow numbers are needed for the Draft RI.

NYC Comment 593) Appendix E – Section 2.2.1, third bullet: the percentage of total discharge to the study area represented by the three Category 1 sampling locations should be described.

NYC Comment 594) Appendix E – Section 2.2.1 Fourth bullet – Stormwater: Four MS4 discharges (NCB-629, NCB-631, NCB-632, and NCQ-633) were considered to be representative of the majority of stormwater discharge to the Study Area. More detail should be provided based on land use and activities in these drainage basins and how they compare to the majority of the Study Area.

Table E2-2 indicates that only one sample was collected at each of NCQ632 and NCQ633. It is very difficult to establish representativeness based on a maximum number of 3 samples at each discharge. It is statistically impossible to establish representativeness based on one sample. The issue of which stormwater discharges were presumed to be "representative" of un-sampled

discharges needs clarification in Section 2.2.1.

There is a typo here – "NCB-632" should be "NCQ-632".

Additionally, in an email dated December 19, 2014 from NYCDEP to EPA and NCG, it is stated that NCQ-633 is not a City-owned MS4 and is a private sewer draining a privately owned building and the New Penn truck yard parking lot. The same statement applies to NCQ-632. As stated in subsequent sections, NCQ-633 was dropped from the sampling program after one sample collection event. NCQ-632 was also dropped and replaced with NCQ-632B.

NYC Comment 595) Appendix E – Section 2.2.1, fourth bullet – Stormwater, fourth sub-bullet: In the discussion of four Category 3A locations (O-185, BB-610, NCQ-637, and Meeker Avenue overland flow), it is stated that these locations "were chosen for sampling as additional lines of evidence (e.g., wet-weather survey observations and opportunistic sampling results), indicating that discharge from these basins may be unique and potentially significant." There is no information provided in this bullet that supports the conclusion that these locations may be unique and potentially significant. Specific information that contributed should be presented.

NYC Comment 596) Appendix E – Section 2.2.2.1: Remove the discussion that flow-weighted composite sampling would be preferable to the time-based composite sampling that was performed but was not possible as NYCDEP "refused access to place flow meters in combined sewer infrastructure and NYC-owned stormwater pipes during the point sources sampling" (Refer to NYCDEP Comment #571).

It is also stated in Section 2.2.2 that "the focus of the point sources sampling effort was to collect whole-water samples that measure the total solids and chemical concentration discharging to the creek during a sampling event." Samples were collected from each location typically during 2 or more events with time-based composites collected typically every 15 minutes over periods of several hours, resulting in a total of nearly 100 samples across different point source categories, weather conditions, flow conditions, etc. When considering the data collected, it is clear that data to support the objectives were sufficiently collected using time-based composite sampling. The argument for flow-weighted composites has no merit – NCG did not pursue this methodology on non-NYC-owned infrastructure and does not discuss why. This discussion only serves to criticize NYCDEP and should be deleted from the text.

In Section 2.2.2.1 (last full sentence on page 21), it is stated that this time-based composite sampling approach is similar to the sampling approach approved by EPA for the Gowanus Canal Superfund Site. The Gowanus Canal sampling approach was developed by NYCDEP and not by

Woodard and Curran as stated in this Section. For the purposes of this document, reference to Woodard and Curran must be deleted as their sampling approach on Gowanus was not reviewed by the EPA or any other stakeholders for Newtown Creek. Woodard and Curran is a consultant of National Grid for Gowanus and has not played any role on this Site. Adding Woodard and Curran to this document is inappropriate.

NYC Comment 597) Appendix E – Section 2.2.2.2 Discrete TSS Sampling: NCG's unsupported contention that flow weighted average event concentration is preferable should be deleted. NCG does not discuss why discrete samples were only collected for City CSOs and MS4s and no other point sources. Stormwater sampling was collected at variety of outfalls, but flow weighted sampling was focused only on select locations.

NYC Comment 598) Appendix E – Section 2.2.2.3: The goal of bulk sampling was to collect larger diameter suspended solids present in the discharge that may not have been collected via the whole-water sample collection method. "Depending on sampling tube placement and size, this technique may preferentially capture only the finer portion of the particulate phase load." The text should discuss that whole-water sampled were collected with tubing that was 3/8" inner diameter with roughly equivalent sized openings in the "screen." Soil particles with diameters of 3/8" or larger are considered gravel under the Unified Soil Classification System (USCS). Given that the contaminants discussed in this NCG Draft RI (TPAH, TPCB, Cu) will preferentially sorb to organic content, which is present in fine solids and not typically in gravel, larger solids are not of much concern when attempting to calculate loads as the most, if not all, of the chemical load should be accounted for on the solids captured by whole-water sampling.

This was also reflected in the results of the sampling, whole-water, split-phase and bulk were comparable. In addition, bulk-water sampling was biased to municipal infrastructure, as it was conducted only at the four largest CSO outfalls, an explanation that this biased sampling may not have included bulk contaminants from private outfalls should be included in the document.

NYC Comment 599) Appendix E – Section 2.3, Footnote 11 on the bottom of page 24: "Based on information provided by NYCDEP, traffic control was initially believed to be infeasible at the NCQ-632B manhole, which was located in the roadway. Once traffic control was determined feasible, EPA requested that the manhole downstream of the junction of Grand and Page Place (NCQ-632B) replace the original sampling manhole (NCQ-632). According to NYCDEP drainage maps, sampling at the NCQ-632B location captures approximately 64 acres of the 80-acre NCQ-632 drainage basin, including the runoff from Page Place and a large portion of Grand Avenue."

This is a dishonest description of the events. From the start NYCDEP made it clear that it was

not willing to put sampling staff in danger by sampling in the middle of a very busy truck route. NCG did not pursue obtaining appropriate traffic control permits and subcontractors, until several inquiries from EPA. The original location sampled for NCQ-632 was not part of the City's infrastructure and was a private sewer draining the New Penn Truck Yard, NCG fails to mention that the City assisted NCG in obtaining necessary permits. Petty and accusatory language in the NCG Draft RI should be deleted as it serves no technical purpose.

NYC Comment 600) Appendix E – Section 2.3, excerpt from Footnote 12 on the bottom of page 24: *"During planning for Phase 2, the drainage basin for Outfall NCB-631 was identified as a potential point sources sampling location but was ultimately not selected for sampling, because (according to information provided by the NYCDEP) only a small portion of the drainage basin would be captured due to tidal inundation in the drainage infrastructure. On December 19, 2014, NYCDEP provided Anchor QEA and the EPA with modified drainage basin information for NCB-631, showing a larger 125-acre basin with a non-tidally inundated potential sampling manhole conveying the runoff from approximately 50 acres of the drainage basin. Based on this new information and the knowledge that traffic control permits could be obtained, EPA decided the drainage basin for Outfall NCB-631 should be targeted for point sources sampling."*

NCG and EPA representatives were present on all site visits prior to sampling and tidal inundation was observed by all parties present. This is accusatory language typical of the NCG Draft RI which seeks to blame the City for every deviation from NCG's original plan because of site conditions observed by all parties present. EPA approved the alternate location identified by NYCDEP and ultimately NCG obtained traffic permits and the location was sampled.

NYC Comment 601) Appendix E – Section 2.3: Although this section is called "Phase 2 Point Source Sampling Program Results", there is no quantitative discussion of the results of the point source sampling program. Section 2.3.1 (Summary of Sampling Results) cross-references to Attachment A containing 890 tables and 890 figures of whole water and particulate phase results for all analytes, of which only TPAH, TPCB, and Cu are discussed in the NCG Draft RI. This is an overwhelming amount of data for any reviewer to look over; at the very least, the analytes being discussed should be made more accessible to the reader. Furthermore, the data presented in the tables in Attachment A are not even specific to individual locations. Rather, summary statistics for point source categories only are provided. Additionally, dissolved phase results are not presented in these figures and tables, therefore, the data presented is incomplete.

NCG's indication that well-established methods for evaluating partitioning were used for estimating particulate phase concentrations for samples in which only total concentrations of

organic compounds were measured is misleading. Acceptance of NCG's estimates of particulate phase contaminants from whole water samples is predicated on whether or not NCG's estimates of site specific Kd and Koc presented by the NCG in Appendix A-C and Section 6.4.1.3 of the Draft RI Report are correct and acceptable to EPA. NCG's estimates of Kd and Koc presented in the RI are unlikely to be correct and require further consideration. NCG's estimates of Kd and Koc for the site are based on sediment porewater and limited point source samples only and include several deficiencies. The "complexities of sources and forms of organic carbon" in the Creek noted by NCG in the Draft RI are not a sound basis to select dry weight normalized rather than conventional organic carbon normalized chemical phase partitioning as NCG has done. The dry weight (Kd) and organic carbon normalized (Koc) chemical phase partitioning measurements presented by NCG include similar scatter and do not justify selection of dry weight normalization. The "complexities of sources and forms of organic carbon" noted by NCG are likely to be black carbon and/or NAPL related and need further evaluation for effects on chemical phase partitioning in Newtown Creek. In light of these concerns with Kd and Koc values estimated by the NCG, the estimates of the phase separated measurements presented by NCG are questionable and should not be published in the RI until closure is reached on site specific partitioning and whether or not site partitioning is applicable to point sources which do not represent all chemical sources to the Creek.

In the last two sentences of first full paragraph on page26, NCG states that results of calculations of the particulate and dissolved phases from whole water measurements were checked against the subset of locations at which particulate fractions were measured directly. These checks need to be shown.

The discussion in this section is qualitative and must be entirely re-written. Statements such as those under the bullet for CSOs on page 27 are insufficient for a Draft RI-level discussion of sampling results. *"Twenty CSO samples were collected from seven locations during the Phase 2 point sources sampling program. Concentrations among CSO samples are generally within one order of magnitude of each other on a whole water and particulate phase basis, with the exception of whole water TPCB concentrations (which span a little less than two orders of magnitude). In general, whole water and particulate phase concentrations in CSO samples are within the mid-range of concentrations measured in samples collected from all point source discharge categories."* This discussion needs to be quantitative and provide some numerical values to frame the discussion.

Another example of this qualitative discussion is shown in the bullet for treated effluent from groundwater remediation and dewatering systems on page 28. *"Concentrations in samples collected from treated effluent discharges (from groundwater remediation and dewatering*

systems) are generally lower than concentrations in samples collected from other types of discharges (e.g., CSO, stormwater), with the exception of whole water and particulate phase TPAH concentrations, which are within the mid-range of samples collected from all categories. Concentrations of whole water and estimated particulate phase TPAH in samples collected from the Con Edison – 11th Street Conduit (DAR No. 110) (CE11SC) discharge are higher than concentrations measured in all other point source (and overland flow) samples." Without actually discussing the magnitude of concentrations, the discussion as written provides little to no usable information.

This section needs to be rewritten to include quantitative information for at least the three groups of contaminants (TPAH, TPCB, and Cu) and physical properties (TSS and POC) discussed in the text. A table with measured/estimated concentrations (on solids, dissolved and whole water) for the above mentioned analytes should be included in this Appendix. Such basic and critical information is missing from the document and needs to be rectified.

NYC Comment 602) Appendix E – Section 3, Fourth sentence in the paragraph, *"Concentration results are discussed in Section 2.3."*

This statement is not accurate. Some concentration trends and comparisons are discussed in Section 2.3, but there is no quantitative discussion of concentration results. As stated in the comments related to Section 2.3, this section cross-references to 890 summary statistic tables for concentration results and 890 figures. The discussion contained within Section 2.3 does not include even one numerical concentration result for any analyte.

NYC Comment 603) Appendix E – Section 3, last two sentences of paragraph: NCG repeats their claim that NYCDEP would not allow flow metering equipment to be installed by NCG in municipal infrastructure so no flow data were collected for the point source program. This statement serves no purpose in this paragraph and should be deleted. As discussed in previous comments, see previous comment.

NYC Comment 604) Appendix E – Section 3.3 and subsections: Considering the load computation methodologies reviewed in Section 3.3, the use of arithmetic average as representative concentration can lead to significant biases in the overall point source estimates from stormwater/direct drainage areas tributary to Newtown Creek. Table E-A-15 shows, for Categories 3A, 3B and 3C, a median value of 66 mg/L of TSS versus an arithmetic average of 140 mg/L. All stormwater grouping shows a median of 46 mg/L vs. an arithmetic average of 120 mg/L. While the CSO arithmetic average (96 mg/L) is closer to the median of 82 mg/L, the MS4 and direct drainage concentrations show that the arithmetic averages are 2 to 3-times larger

than the median values. Similar trends are seen in the particle size fractions analyzed and summarized in tables subsequent to E-A-15. It appears that the average of the two arithmetic averages (3A+3B+3C and All Stormwater), which is 130 mg/L, was used for estimating loads from MS4 and direct drainage areas, except for the unique sites. Figure E-A-15 shows the sites such as MA-001 and MCL-001 with high TSS concentrations and all the unmonitored MS4 and direct drainage areas appear to have been assigned this 130 mg/L of TSS concentration (Table G5-4) without doing any similarity analyses to these unique sites. Use of ANOVA to establish equivalence is incorrect and inappropriate (Rusticus and Lovato, 2011). Choosing a lower alpha value does not correct that fact. Strengthening of the case with lower alpha (as suggested here) illustrates the point that the test is inappropriate. NCG must use valid equivalence testing to imply equivalence among groups. More thorough similarity analyses and median concentrations, considering additional stormwater/direct drainage measurements, need to be developed to refine loads for the RI and modeling.

The four averaging techniques that are described vary with respect to how individual loads are treated (representative or unique, and variations of same), but in all cases it seems as if simple averages (sum of concentrations divided by sample size N) are used to estimate the arithmetic averages. None of the four approaches appear to consider the form of the underlying probability distributions of concentrations or the covariance of concentrations and flow, factors which could have a marked influence on the estimates of the mean loading rate. Hence the conclusion that averaging approach is relatively inconsequential is limited in its applicability to the four methods of averaging that were employed. Please clarify the text to reflect the limitation. Please add discussion of underlying distributions and covariance.

NYC Comment 605) Appendix E – Section 3.3, second bullet point on page 31 (WWTP Overflow): *"Although this outfall is permitted as a CSO, it is potentially different from other CSO discharges because it receives treatment before overflowing."*

This statement is inaccurate and confusing. This discharge is treated effluent that normally discharges to the East River and overflows to Whale Creek under certain high flow conditions. Stating that this treated wastewater is "potentially different from other CSO discharges" implies that it is potentially the same as CSO discharges. CSO discharges consist of a mix of raw sewage and stormwater while the treated effluent consists of treated sewage and stormwater. In addition, it is unnecessary and confusing to state that NCB-002 is permitted as a CSO. This language must be deleted from the text.

NYC Comment 606) Appendix E – Section 3.3, CSO bullet point, page 32: *"While some CSO outfalls discharge more often than others, review of available information (including the zoning,*

land use, and distribution of DAR and IPP sites within the interceptor basins) indicates the composition of Category 2A discharges to the Study Area are not expected to vary significantly across or within interceptor basins as a result of those factors. Combining the data from all seven outfalls together allows for an understanding of the range of varying CSO outputs."

There is a discussion of potential uncertainty due to differences in concentrations from CSOs within the same interceptor (BB009 and BB026 on the Long Island City Interceptor) in Section 4, in contrast to what is stated in the quoted text in this section. There are significant differences in concentrations between CSOs, so combining all CSOs to represent non-sampled locations could lead to incorrect loads. For example, average TPCB concentrations for the seven sampled CSOs range from 7.2 ng/L (NCB-083) to 135 ng/L (NCQ-029). Average TPCB concentration for all seven CSOs grouped together is 43 ng/L; however, all but two of the seven CSOs have average TPCB concentrations below this group average concentration. NCG should provide a table which lists the concentrations for all sampled outfalls.

NYC Comment 607) Appendix E – Section 3.3.1: The text states that total stormwater load to each reach and total CSO load to each reach were calculated using the arithmetic average of all sampled stormwater and CSO discharges, respectively, assuming that the sampled locations were representative of the concentrations for all discharges of each type. The figures and tables associated with this and subsequent sections do not actually show loads by category and reach. Estimated loads are shown by category (e.g., CSOs, Stormwater, etc.) in the NCG Draft RI Table E3-3, E3-5, E3-7, and E3-9. Estimated loads are shown by reach (e.g., English Kills, East Branch, etc.) in NCG Draft RI Tables E3-4, E3-6, E3-8, and E3-10 and Figures E3-3 through E3-6. There is no breakdown showing loads by category and reach as the text suggests (e.g., Stormwater in English Kills, CSO in East Branch, etc.). This data should be presented and discussed for all load calculation methods. A figure and table showing the concentrations in all sampled categories must be developed and presented in this section.

NYC Comment 608) Appendix E – Section 3.3.3: The statistical power of tests performed to determine whether some sample stormwater discharges are unique from the "representative" discharges is weak to the point of invalidity. Firstly, parametric statistical tests comparing two data populations (i.e., "potentially unique" and "representative" discharge concentrations in this instance) requires that both populations pass the test of normality. The population of "representative" discharges (NCB-629, NCB-631, NCQ-632) include a combined total of 7 samples, making it difficult to establish normality with any degree of confidence. Even worse, the population for any particular test population (i.e., a "potentially unique" discharge) includes a maximum of 3 samples, and it seems unlikely that normality can be established for such a small sample population. Secondly, the small sample size and generally high data variability minimizes statistical power for the test of uniqueness and makes it very difficult to reject the

null hypothesis that a test population is the same as the "representative" population. Thirdly, multiple comparisons of "potentially unique" discharges against the "representative" discharges require application of the Holm-Bonferroni Method to minimize the occurrence of Type I statistical errors (i.e., incorrectly rejecting the null hypothesis when in fact the two populations are the same). Unfortunately, the Holm-Bonferroni Method further weakens the statistical power of the tests and increases the probability of a Type II statistical error (i.e., incorrectly retaining the null hypothesis when it fact the two populations are different). As a result, a "potentially unique" discharge would have to be extremely different from the "representative" discharge before it might be identified as "unique" statistically. NCG increased the statistical p-value to 0.1 from the traditional hypothesis-testing value of 0.05 to attempt to establish that some stormwater discharges are "unique," but the entire statistical analysis is simply too flawed to be acceptable. The statistical evaluation needs to be removed from Appendix E and associated tables. NCG might try using nonparametric statistical testing, which does not require normality of the test populations and is more commonly used for hypothesis testing of small data populations. However, with only 3 samples per "potentially unique" discharge and generally high data variability, even nonparametric statistics are unlikely to work with any degree of confidence.

This comment also applies to Section 3.3.4.

NYC Comment 609) Appendix E – Section 3.3.3 Stormwater sub-section: The text states that three category 3A locations (NCB629, NCQ632, and NCB631) were selected as representative stormwater locations as discussed in Section 2.2.1; however, Section 2.2.1 lists four stormwater locations (NCB629, NCB631, NCQ632, and NCQ633). These sections are inconsistent with one another. Additionally, it is not made clear whether location NCQ632 or NCQ632B is one of the representative locations. The text should be revised to clarify which locations are actually being used as representative locations.

NYC Comment 610) Appendix E – Section 3.3.3 Stormwater sub-section: *"Data from these three locations were considered to have representative stormwater concentrations a priori (i.e., based on similar proportions of land uses within these drainage basins, compared to the entire stormwater drainage basin), so they were grouped together for the purpose of the statistical analyses."*

Statistical analysis should be used to determine if these locations were truly representative rather than making an assumption. An ANOVA model was run to determine if stormwater locations were different from the "representative" locations. If such analyses were performed, this information should be detailed in the text. Statistical evaluation conducted by the City

shows that the TPCB concentrations in outfall 632B are significantly higher than the concentrations in the other two outfalls. This indicates that the sources of the COPCs in the watersheds of these outfalls are different and should not be grouped together to develop a reference stormwater envelope for comparing individual stormwater outfalls. Statistical analysis should also be performed on CSO locations to identify if there were differences between sampling locations or to confirm the assumption that CSO discharges were not expected to vary significantly (as stated in Section 3.3 on page 32). It is evident that there are numerous assumptions which have compounding effects on the final load calculations. These assumptions should be verified as part of the data analysis process and detailed in the report.

NYC Comment 611) Appendix E- Section 3.3.3 Page 35: In the last few bullets of this page NCG acknowledges that there is difference in stormwater concentrations of TSS, TPAH and TPCB among different outfalls. Independent analysis conducted by the City for stormwater data also confirms this assessment. NYC Figure 55 show the TSS, TPAH and TPCB whole water concentrations are different among different type of outfalls. This clearly indicates that the Collective Data Method (CDM) used by the NCG to calculate loads cannot be used to develop loads for the Site on a creek-wide and reach by reach basis. This method will result in biased loading estimates which are not supported by data, the CDM method generally provided the highest load estimates of the four methods. The specific outfall method should be used to estimate loads for different outfalls. When the concentrations in solids from different stormwater outfalls are compared, differences in concentrations on the particles are more evident. Given these differences it is clear that the collective method should not be used for loading estimates or drawing any conclusions regarding stormwater impacts on the Creek.

NYC Comment 612) Appendix E – Section 3.4; Section 3 Figures and Tables, last paragraph before Section 3.4.1, page 38: *"Although there is some variability among estimated loads for the different analytes, generally point source loads to Maspeth Creek, East Branch, and English Kills are the highest of all reaches, due primarily to discharges from the CSOs in those tributaries (i.e., NCQ077, NCB083, and NCB015, respectively)."*

Based on the plots and tables provided, this statement is not true except for TSS and Cu. PAH loads are highest in the CM0-1 reach (by almost an order of magnitude) due to the Con-Ed conduit dewatering system and associated elevated PAH concentrations (two orders of magnitude or more greater than any other point source sample according to the text) as displayed in NCG Draft RI Figure E3-4 and Table E3-6. PCB loads are very similar through CM1-2, CM2+, Maspeth Creek, East Branch, and English Kills; not elevated as stated in the text (NCG Draft RI Figure E3-5 and Table E3-8). A plot and table for these loads is needed.

NYC Comment 613) Appendix E – Section 3.4.5, summary of load estimation: *"Comparisons of the four different methods of load estimation indicate that the methods for calculating loads result in loads that are generally similar to one another (i.e., within factors of 2) and are not sensitive to treating individual and unique locations differently from a more generalized or representative approach. The load estimates are influenced more by overall discharge volumes, and to some extent, spatial distribution of chemical concentrations. The CDM, which generally provided the highest load estimates of the four methods, is reported in Section 5 (Sources) and used in the mass balance discussion in Section 6 (Fate and Transport) of the RI Report. The entire range of load estimates will be evaluated for use in the chemical fate and transport model and to provide uncertainty bounds for the modeling sensitivity/uncertainty analysis that are performed as part of the FS."*

While the four load estimation methods may result in overall loads that are generally similar to one another, there are flaws with how these final load amounts are reached and presented:

a. Loads are shown either as a total by category (stormwater, CSO, etc.) or as a total by reach (Maspeth Creek, Dutch Kills, etc.). Loads should be evaluated and presented both by category and reach to see if this conclusion still stands.
b. No statistical analysis has been conducted to confirm or refute the assumption that the three "representative" stormwater locations are truly representative. Statistical analysis conducted by the City shows that the COPC concentrations in the three "representative" outfalls is different and not really "representative". Likewise, no statistical analysis has been conducted to determine if all CSOs are representative or if any are unique. This could have an impact on the determination of loads from non-sampled CSOs as the collective CSOs are used as a surrogate for all non-sampled CSOs for all four calculation methods. If one CSO is unique from the others, its usage in the collective CSO data pool could potentially bias the overall CSO load calculation high or low.
c. All stormwater is grouped together and should be broken out further to see the impacts of private sites (Category 3C) and overland flow. A better understanding of what drives the loads to the Creek will be required when evaluating potential remedies. To fully understand these loads, Category 3C sites, MS4s, overland flows, and other stormwater should be evaluated as separate sources. This should be conducted on a reach by reach basis. The data shows that there can be significant variability in COPC concentrations between outfalls, as evidenced by the TPCB results for CSOs. Average TPCB concentrations for the seven sampled CSOs range from 7.2 ng/L (NCB-083) to 135 ng/L (NCQ-029). Average TPCB concentration for all seven CSOs grouped together is 43 ng/L; however, all but two of the seven CSOs have average TPCB concentrations below this group average concentration.

The specific outfall method (SOM) or representative/unique and specific outfall hybrid

(RUM/SOM) method would be more appropriate for use in the RI than the Collective Data Method (CDM) as it accounts for the actual results from each sampled outfall rather than grouping outfalls within categories together.

Flow data for all point source locations should also be provided so that reviewers can verify load calculations. Currently, flow data is only be provided for selected point sources locations in the tables to this appendix (NCG Draft RI Tables E2-1, E2-3, and E2-4. Flows should be provided in Table E2-5 and E2-6).

NYC Comment 614) Appendix E – Section 3.4.5: Four methods of assigning concentrations, namely, CDM, SOM, Representative and Unique Stormwater Method and RUM/SOM Hybrid, were all used to develop point source loads similar to an academic study. The estimated point source loads vary by up to a factor of 3 within individual reaches and up to a factor of 2 over the study area. In Section 3.4.5, the CDM method, that provided highest load estimates, was chosen for reporting and mass balance discussion, without any technical merit or justification. NCG needs to use data quality objectives, in terms of available data and remediation goals, to justify a method (instead of the academic exercise shown in this section) as the load estimates developed will lead to significant remediation cost differences.

Whether the several load estimate methods are reasonable is predicated on an implicit assumption that the sampled point-sources represent an appropriate spatially and/or discharge-averaged load characterization for the entire Study Area. For CSOs, this implicit assumption is acceptable because 96% of total CSO discharge was sampled and analyzed. For stormwater and direct drainage, however, the implicit assumption might not be met because 64% of total stormwater discharge was not sampled or analyzed. So as a case in point, consider TSS loading via stormwater and direct drainage. Visual inspection of aerial photographs can identify 15 sites in the Study Area (6 sites upstream of the Turning Basin, 1 site adjacent to the Turning Basin, 6 sites downstream of the Turning Basin, and 2 sites in Dutch Kills) showing ample loose soil often in large piles. These sites have the potential to generate disproportionate solids loading compared to other stormwater and direct drainage sources. One of these sites (Maspeth Concrete Loading Corp., MCL001) was actually sampled and the mean TSS concentration of the three samples was 510 mg/L, greatly in excess of most sampled stormwater sites. So the question of relevance is whether the TSS load fraction of MCL001, relative to the other sampled stormwater sites, is comparable to the relative load fraction of MCL001 plus the 14 other identified (but un-sampled) loose soil sites compared to the total stormwater/direct drainage TSS load in the Study Area. With only 36% of total stormwater discharge actually measured (and only 1 of 15 obvious sites with ample loose soil), the TSS loading estimates for stormwater and direct drainage are too uncertain. Similar cases can be

made for the stormwater loading uncertainty of various contaminants. Additional sampling is required to better characterize stormwater and direct-drainage loading in the Study Area.

NYC Comment 615) Appendix E, Section 4: Section 4 is a qualitative discussion on uncertainty in the point source load estimates. There is no quantitative discussion of uncertainty here. This is a technical document which should be supported by the vast amount of data that was collected. Discussions must be quantitative rather than qualitative when possible. Many of the sources of "uncertainty" are speculative and have no data to support such claims. Speculation on impacts of variability within reported flow data; sampling tubing intake depth within manholes; particle size captured; and essentially every other source of variability within the program has no place in a technical document without data to back up the discussion. NCG seems to conflate "variability" and "uncertainty" throughout this entire section.

For example, instead of evaluating the uncertainty in the Phase 2 dataset and load calculations, NCG compared of data collected during the Phase 2 program to data collected at other sites or from previous studies at Newtown Creek. While this data can be used to help understand variability in data collected from Newtown Creek and how such data compares to other sewersheds with possibly similar characteristics as the Creek, it does not provide any information that can be used to develop estimates of uncertainty. Without a quantitative discussion and supporting analyses to determine numerical uncertainties and sensitivities, this qualitative section is purely speculative and has no place in a technical document.

NYC Comment 616) Appendix E – Section 4.1: Relative flow contributions of point source discharges and overland flow are shown in the pie charts presented in NCG Draft RI Figure E2-5. A table should be provided detailing the total average annual point source flows to Newtown Creek, average annual flows at each sampled point source location, and average annual flows at non-sampled locations. For non-sampled locations, these flows should be shown by category (e.g., CSO, Category 3C, MS4s, etc.). The information as presented is useful; however, it would be helpful to see magnitude of all types of point source flows detailed rather than only relative contributions. As mentioned in a previous comment, the tables for Section 3 appear to only detail average flows for Category 1 and Category 2 point sources. This information should be provided for all point sources, both sampled and non-sampled. If this information is presented in full elsewhere, an appropriate cross-reference to this data should be provided. NCG Draft RI Table E4-1 provides a summary of this data, but does not break out each individual point source. Additionally, it is unclear whether the table summarizes all point sources or only those that were sampled given that only three of the four known groundwater effluent discharges are listed (the table does not include the Buckeye Pipeline facility).

NYC Comment 617) Appendix E – Section 4.1.1 and Figure E3-1: The third sentence in the first paragraph states "Annual rainfall (measured at Central Park) between 1963 and 2012 is shown in Figure E3-1." Figure E3-1 referenced in this section shows rainfall records at Central Park NOAA station until 2015, not until 2012 as referenced in the text. Please correct the text.

NYC Comment 618) Appendix E, Section 4.1.1 and Figure E4-1: *"To confirm that the annual stormwater and CSO discharges predicted by the 2015 geo-neutral point sources model are proportional to rainfall, a correlation analysis was conducted for 2008 through 2012 and is shown as Figure E4-1. This analysis shows that, as expected, CSO and stormwater discharge volumes predicted by the 2015 geo-neutral point sources model are proportional to total annual rainfall, but that CSO flow volumes are more sensitive to variations in rainfall amounts than stormwater."*

Draft RI Figure E4-1 consists of two scatter plots showing CSO and WWTP Effluent annual discharge volume versus annual rainfall and stormwater annual discharge volume versus annual rainfall. While the text states that a correlation analysis was conducted, there is no trendline fit to any of this data or any mathematical relationship derived. No analysis has actually been conducted or discussed, as presented this is not a correlation analysis. The text states that discharge volumes are proportional to total annual rainfall, but the proportion or correlation coefficient is not shown. This is a qualitative discussion of an analysis that should be made into a more comprehensive quantitative discussion by presenting actual results of the analysis.

Furthermore, total annual rainfall volume will show a better correlation with stormwater discharges than CSO discharges as there are no control structures like weirs and tide gates in the stormwater system. Further, the correlation between total annual rainfall volume and CSO discharges is weaker due to other precipitation parameters such as peak intensity, duration and inter-event time between storms, and the concurrent hydraulic conditions such as sewer system surcharging and tidal boundary conditions. Please revise the text to incorporate these points.

NYC Comment 619) Appendix E, Section 4.1.1, first sentence of second paragraph: The first sentence in the 2nd paragraph is misleading. Geo-neutralization of InfoWorks models performed by DEP does not change the CSO and stormwater basin drainage areas from the DEP models that are not geo-neutralized. Only the geographic references of basins and connectivity to sewers were masked, as part of the geo-neutralization process, to adhere to the security protocol established by DEP with NCG prior to model transfer in 2013. This sentence needs to be corrected.

Stormwater and direct drainage basins were included as simplified areas in DEP's CSO control studies. The City recommended further delineation of these basins to support the load characterization for the Superfund study, accounting for the variations in landuses and categories of industries that can have unique stormwater concentrations for various pollutants of concern. This recommendation was not incorporated by NCG in the Draft RI analyses and reporting. Inaccurate references to the geo-neutral model being simplistic must be deleted and a refined representation of stormwater and direct drainage basins must be included in the final RI.

NYC Comment 620) Appendix E, Section 4.1.1 Second paragraph page 44-45: *"In many cases, conflicting information about the areas that drain to MS4 outfalls was provided by NYCDEP. For example, the boundary of the basin draining to NCB-631 was shown four different ways in maps provided by NYCDEP between April 2013 and December 2014. Load estimates for 2015 geo-neutral point sources model basins provide a good basis for evaluating the relative significance of point sources load for the RI/FS. Uncertainties in the size of the drainage basins could result in an over- or underestimation of the load at some locations."*

This is one example of why it is important for the loads to be presented on a site-by-site basis or at the least on a category-by-reach basis. Numerical uncertainties could be calculated using the model info, information provided by NYCDEP, private properties schematics, etc. on a site-by-site basis and applied to the overall loads rather than having a qualitative discussion without any numerical bounds on uncertainty. It should also be noted that this is yet another unnecessary complaint directed at NYCDEP. The field sampling effort was still being conducted in December 2014 and NCG received the information needed long before this NCG Draft RI was submitted.

NYC Comment 621) Appendix E, Section 4.1.1, first full paragraph on page 45 "[There is uncertainty in loads] due to the inputs and parameterization of the 2013 geo-neutral point source model, which has been estimated to have an effect of approximately +/-25% on the predicted discharge volume… The sensitivity analysis relies on relative comparison of model predictions to base case results, so it is highly likely that the use of the 2015 model would not change the conclusions of the sensitivity analysis."

A sensitivity analysis was not conducted using the 2015 point source model, which was used to determine flows for the purpose of load calculations for this Appendix. This assumption is speculative and should be tested. It is unacceptable that a discussion of uncertainties has no quantitative uncertainty data in a technical document. An actual numerical portion of uncertainty should be presented.

NCG incorrectly attributes model refinements performed by the City between 2013 and 2015 as uncertainty in predicted discharge volumes. A basic premise in the modeling of natural and engineered systems is that model refinements guided by additional and recent system data leads to a reduction in model uncertainty. Most changes in the 2015 model reflect recent system characterization data, supported by high levels of correlation between monitored and modeled flows near and/or downstream of regulator structures at the monitored outfalls. Reference to "additional uncertainty in loads" due to this refinement must be corrected.

NYC Comment 622) Appendix E, section 4.1.2, first paragraph: *"Annual discharge for 2008 through 2012 from the WWTP effluent overflow (NCB002) was provided by NYCDEP and ranges from 500 MG in 2008 to 1,000 MG in 2011. The 5-year arithmetic average value (730 MG; 18% of the total point sources discharge to the creek) was used to estimate the load from this discharge. Additional information needed to extend the calculation of this discharge volume to other time periods was requested from NYCDEP in April of 2015, but has not been received as of the writing of this appendix."*

It is not clear what additional information for other time periods is required given that the annual discharges from 2008 through 2012 were used for all point source load calculations.

NYC Comment 623) Appendix E, section 4.1.2, second paragraph *"Unlike CSO and stormwater discharges, the WWTP effluent overflow is not as well correlated to annual rainfall (see Figure E4-1). For example, the smallest annual WWTP effluent overflow discharge volume occurred in 2008, rather than in 2011, when the annual rainfall was lower. Without additional information, the uncertainty of this flow estimate cannot be determined."*

Uncertainty of this flow estimate can be evaluated by running some simple statistics on the five years of flow data that was provided. Correlation with rainfall is unnecessary. DEP's wet weather operating plan provides operational rules associated with discharging of excess treated effluent flow through the NC-002 outfall, based on total inflow to the WWTP and tidal conditions in the East River. Since this treated effluent flow is driven by plant outfall hydraulic configuration and tidal conditions, correlation between NC-002 flows and annual rainfall will be weak. The weak correlation cannot be attributed to uncertainty in NC-002 flow as it is driven by the outfall hydraulic configuration and tidal conditions. The inaccurate characterization of NC-002 uncertainty must be deleted.

The statement that annual rainfall was lower in 2011 than 2008 is incorrect, as evidenced by Draft RI Figure E3-1. Rainfall is 2011 was approximately 72 inches while rainfall in 2008 was approximately 53 inches, roughly equivalent to the average rainfall for the 2008-2012 period.

Also, this source should be described as treated effluent.

NYC Comment 624) Appendix E – Section 4.1.3.1: According to the first paragraph in the section, loads from the ExxonMobil Greenpoint Remediation Project discharges were estimated using the annual discharge volumes from the 2012 DMRs for EM001A and EM002. Average flows from the DMRs from 2008 through 2012 should be used, consistent with how average flows from 2008 to 2012 were used for other point sources.

The section goes on to detail a few potential variations in the discharge, such as pumping rates in the systems and fluctuations in upland groundwater levels and states that *"Information provided by ExxonMobil during reconnaissance indicates that the pumps that determine the rate of discharge generally operate at constant rates (approximately 320 gallons per minute [GPM] at EM001A and 400 GPM at EM002) and are online for approximately 92% of the year. Based on this information, discharge volumes from EM001A and EM002 are expected to be relatively consistent from year to year."* There is an assumption that discharge volumes are consistent from year to year, but the data to support this (i.e., comprehensive review of DMRs (not just one single year) and the SPDES permit allowances) have not been presented to support this conclusion. It seems inappropriate to claim no uncertainty with the discharges from this location and then to claim that not enough information is provided to determine uncertainty in other cases (for example, the Con Edison conduit in the following section) when similar amounts of info have been provided for these locations.

NYC Comment 625) Appendix E. Section 4.1.3.2, first paragraph: *"The annual discharge volume used in load calculations was based on information provided by facility personnel during reconnaissance, and the average pumping rates reported on the facility's SPDES permit application (85,000 GPD). The annual discharge from this site is estimated to be approximately 31 MG, which is less than 1% of the estimated annual point sources discharge to the Study Area."* This is inconsistent with how the load from the ExxonMobil discharges were calculated – only the 2012 DMRs were used for those two discharges as detailed in Section 4.1.3.1. There should be consistency in how flows used for load calculations are determined.

NYC Comment 626) Appendix E. Section 4.1.3.2, second paragraph, page 46: *"According to site personnel, the flow rate of this discharge is not measured directly. The pump is controlled by a level float, so the pumping rate and frequency is dependent on the rate of groundwater infiltration. The pump turns approximately every 15 to 20 minutes and pumps at a consistent rate of 230 GPM when running, until the water level decreases. The average flow rate given on the SPDES application is 85,000 GPD (31 million gallons per year [MGY]). The facility reported a maximum flow rate of 108,000 GPD (39 MGY) in DMRs, which according to site personnel, is*

based on a calculation and is believed to be an overestimation of the actual discharge volume. Without additional information, the uncertainty in the annual discharge volume cannot be determined."

Anecdotal information from site personnel on whether they think discharges reported in DMRs are overestimations should not be considered when evaluating uncertainty in the discharge. The DMRs and SPDES permits are regulatory documents and should be used in determination of the flow for load calculations and uncertainty. It is not clear what additional information is needed to determine uncertainty in this discharge. This information needs to be clearly detailed. Based on the information presented, it appears that there is sufficient data available to determine upper and lower bounds on the flow which provide more value to a discussion of uncertainty than speculation about calculations that result in no uncertainty being determined.

NYC Comment 627) Appendix E – Section 4.1.3.3: NCG presents a broad and generic summary statement that uncertainties in flows predicted by the 2015 geo-neutral model are related to simplifying assumptions used in the model and model parameters. The NCG statement ignores that the City reviewed the weight-of-evidence based calibration procedures and the peer-review of the point source models and monitoring data in various meetings with EPA and NCG prior to and after the acceptance of the geo-neutral model for the project. NYSDEC approved the City's standardized procedure for periodically updating the InfoWorks models for CSO long term control planning and other water quality purposes in NY/NJ Harbor. NCG's generic and vague statement requires either removal from the document or specific qualification as to what City simplified assumptions or model parameters have led to flow uncertainties.

NYC Comment 628) Appendix E – Section 4.2: NCG highlights the percentages of the CSO, stormwater and effluent volumes that were sampled (e.g., 96% of CSO, 38% of stormwater and 100% of WWTP effluent). This is a relevant consideration. However, it does not address the sample size needed to characterize the inherent variability in these different sources over time. Hence, it is difficult to assess the uncertainty in the load estimates that may be related to concentration variability over time, given the relatively small temporal sampling effort.

NYC Comment 629) Appendix E – Section 4.2.1.1: This section discusses potential uncertainties related to the time-composite sampling methodology employed for point source sampling. The section claims that concentrations can vary throughout any single storm event leading to over- or underestimation of average loads.
The goal of the sampling was to collect data to support average load calculations and used the

EPA approved method of time-based composite sampling was successful. EPA considers this program to be thorough and complete. Discrete TSS sampling was conducted at eight locations (4 large CSOs and 4 MS4 locations) to evaluate if there was significant variation in TSS concentrations throughout events. If each location was sampled only one time, there might be merit to this discussion, however, large quantities of data were collected during the field sampling effort. Samples were collected under various tidal conditions, rainfall conditions, and temporal conditions. It is inaccurate to imply that the program still has uncertainty because samples were not weighted towards high flows, when samples that are representative of the many different variations of field conditions were collected.

Multiple time-composited samples collected from each location, as this program was designed and implemented, are sufficient for characterization of average annual loads to the Creek from point sources. Wet-weather samples were collected during 15 events spanning over one year of sampling.

The second full paragraph on page 49 states that NCB629 and NCQ632B showed higher TSS concentrations at the beginning of the storm *"consistent with a first-flush phenomenon."* A conclusion of a first-flush phenomenon cannot be derived from two samples, especially when the other 6 discrete TSS samples do not show such behavior. In fact, NCG concluded that the first flush phenomenon does not exist in their January 14, 2016 data presentation to EPA.

As addressed in previous sections, accusations that NYCDEP would not allow installation of flow meters should be removed.

NYC Comment 630) Appendix E – Section 4.2.1.1, page 50: *"Discrete TSS sampling results at each sampling location were arithmetically averaged and compared to the TSS measured in composite sampling. The arithmetic average results of the discrete TSS sampling, as summarized in Table E4-2 and Figures E4-2a through E4-2i, are consistent with the composite results. This indicates that the method of collecting composite samples into glass carboys in the field, and transferring those samples into laboratory containers after the sampling event, provides a reliable method of measuring time-based average TSS concentrations over a sampling event."*

An important conclusion has been omitted– if discrete TSS arithmetic averages are in agreement with the time-composite TSS concentrations, it demonstrates that the elevated TSS that NCG links to first-flush or high flow conditions are adequately captured and characterized in the time-composite sample, indicating that the time-composite sampling methodology is adequate to capture variations in the concentrations associated with variations in flow conditions and does not provide additional uncertainty when estimating average annual loads.

NYC Comment 631) Appendix E – Section 4.2.1.2: This section reads as a list of complaints. There are a lot of unfounded accusations here that have no place in a technical document. While it is true NYCDEP objected to laying sampling equipment horizontally in the bottom of a discharge pipe during low flow conditions, it should be noted that EPA was also in agreement with this. As noted in this section, modifications to the sampling approach were employed to allow for characterization of low-flow stormwater locations. These modifications were designed to limit biasing of samples. Simply laying the sampling equipment at the bottom of the pipe could lead to collecting a sample consisting of essentially a slurry of solids sitting at the bottom of a pipe or catch basin that are not representative of what is actually being discharged to the Creek. The modified sampling approach ensured that the samples collected (with the lowest sample intake positioned at 0.5 inches above the bottom of the pipe, very close to the bottom) were actually representative of solids suspended in the water column and thus discharging rather than collecting material that was accumulating at the bottom of the pipe because flow was too weak to scour and re-suspend the material.

NYC Comment 632) Appendix E – Section 4.2.1.2, page 51: *"Solids present below the level of the bottom strainer, approximately 2 inches above the bottom of the pipe at low-flow stormwater locations (and as much as 14 inches above the bottom of the pipe at CSO locations) were not captured during sampling. If chemical and solids concentrations in the lower portion of the flows (i.e., below the intake tube) or the upper portions of the flow (i.e., above the intake tube) differ from concentrations in the intervals where the samples were collected, loads calculated using the sampling results may over- or underestimate the actual load to the Study Area."*

Under normal stormwater flow conditions and in most CSOs, the lowest sample intake was positioned two inches from the bottom of the pipe. This varied depending on infrastructure configuration. Benches, weirs, elevated discharge pipes, and other site-specific considerations occasionally required modification to this approach to collect a representative sample. NCG notes that strainer depths were *"as much as 14 inches above the bottom of the pipe at CSO locations"*. This applied only to NCQ-077 and was set at this elevation as there was no direct way to observe overflow at this location (no tide gate or bench accessible). Based on extensive review of infrastructure drawings and numerous site visits, it was determined that this depth corresponded with flow overtopping weirs closer to the outfall, so sampling at 14" and greater was the approach necessary to capture flow representative of what was being discharged. This height also corresponded with a bench guide in the sampling manhole. A similar approach was employed at NCB-083 for similar reasons, where the strainer was set at 6" above the bottom of the manhole. No other CSO locations had their lowest intake greater than 2" from the bottom.

This text displays a lack of understanding of the systems sampled with these statements. Low-

flow stormwater sampling was conducted if flow depths were less than 2 inches, therefore, solids from as low as 0.5 inches from the pipe bottom were collected under low flow conditions. Under normal conditions, the flow through both stormwater and CSO infrastructure was turbulent. If laminar flow was present, the argument that solids below the sampling intake were not collected may have some merit, but given the turbulent conditions, all solids would have been resuspended and adequately captured. In many cases, flow was so extremely turbulent that the sampling equipment (i.e., steel poles) were significantly bent and damaged. There was at least one instance where the equipment had to be removed for field personnel safety as it was violently moving despite being secured to the manhole safety gate.

There is no uncertainty related to sample composition due to tubing height. Consistent with previous sections, this section is speculative, there is no supporting data presented.

The point source data, specifically MS4s and CSOs do not support NCG's predisposed notion point source solids are the cause for elevated COPC concentrations in the Creek, the Draft RI includes many fabricated uncertainties to try to make that correlation possible.

NYC Comment 633) Appendix E – Section 4.2.1.3, first paragraph: *"The bulk-water sampling method may capture larger-diameter suspended solids present in the discharge that are not collected in whole-water samples, because the bulk-water sampling method uses a larger-diameter, unscreened sampling tube and a more powerful pump."*

As stated in previous comments, the standard whole-water sample tubing is 3/8 inch inner diameter. Particles larger than 3/8 inch, which were intended to be captured by bulk sampling, are classified as gravel by the USCS. Due to the low organic fraction of particles of this size, COPCs are not expected to be present in any appreciable concentration on larger solids.

The second paragraph states *"Sediment in the tributaries near CSOs is coarser and has a higher total organic carbon content than the sediment in the main stem of the creek. The composition of the sediment bed in the heads of the tributaries of Newtown Creek, adjacent to CSO outfalls, includes particles with diameters greater than 1,000 micrometers (µm). Thus, the solid loads in the CSOs discharging from these four outfalls were expected to include measureable amounts of particles greater in diameter than 1,000 µm, and bulk-water sampling at these outfalls was proposed to capture this portion of the discharge."*

a. This speculative statement should be removed. The Draft RI does not discuss "near CSOs" means, what distance from CSOs this sediment is observe, or how this compares to sediments that are not "near CSOs."
b. Particles with diameters greater than 1,000 µm can easily be picked up by the whole-water sampling intake. This is equivalent to 0.039 inches, which is significantly smaller than the

whole water tubing size of 3/8 inch (0.375 inches or 9,500 µm).

The results of bulk water sampling indicate that suspended particles were actually better captured by whole water sampling. TSS concentrations in bulk samples were similar or lower than the results from whole water sampling conducted at the same locations during the same events. Grain size profiles show that a higher fraction of larger particle sizes were captured by whole water sampling than bulk sampling.

NCG concludes *"Although the results of the bulk-water sampling suggest that the whole-water sampling methodology may be acceptable for capturing larger-sized particles in CSO samples, it cannot be definitively concluded. The constraints placed on the bulk-water sampling methodology may have limited, if not negated, the ability to capture larger-diameter particles that were potentially not captured by the whole-water sampling methodology. For example, if sampling height has a greater influence on grain size distribution than size of opening and pumping rate, as suggested by these data, then the comparisons of the whole-water and bulk-water sampling data are confounded by the difference in their sampling heights."*

NCG's arguments have no merit for several reasons. First, a more powerful pump and larger intake were used for bulk water sampling than for whole water sampling. It is unreasonable to suggest that the difference between sample collection at a depth of 5 inches for bulk samples and 2 inches for whole water sampling could not be overcome by the larger tubing intake and greater pumping rate. As previously stated, flows in the CSOs are extremely turbulent, leading to well-mixed conditions. It is unrealistic to conclude that larger solids could somehow be occupying the 3 inch depth difference between the sampling intakes in a turbulent, well-mixed system. NCG also attempts to reason that bulk sampling did not provide the expected results due to the difference in sampling schedule. Bulk samples were collected at three discrete points during the storm while whole water samples were collected every 15 minutes during the storm. While this cannot conclusively be demonstrated to have caused a difference, it should be noted that this was NCG's sampling program design in their EPA-approved work plan and not a constraint placed by NYCDEP or EPA. Furthermore, NCG states (second paragraph on page 53) that this sampling schedule "may have resulted in missing some of the larger particles that may occur at the beginning of the event." They do not present any grain size data from whole water samples that indicates that larger particles are more abundant at the beginning of an event. This is speculative and has no basis. Finally, discrete TSS data for the CSO locations do not show consistent elevated TSS concentrations at the beginning of sampling events, further indicating that there is no merit to the argument that there could be larger particles missed at the beginning of an event by the bulk water sampling methodology.

NYC Comment 634) Appendix E - Section 4.2.1.4: This section claims that NYCDEP provided

incomplete or conflicting information about CSO infrastructure. New York City has one of the most complex sewer systems in the world, the City worked hard to help plan and implement the most intensive and comprehensive CSO sampling program of its kind, with more than a year of sampling and millions of dollars spent. The City has documented NCGs incompetency and mistakes during the program elsewhere. Any disparagement about the program should be removed from the document.

As previously stated, there is no quantitative discussion of uncertainty here and this section is a list of complaints which serves no purpose in a technical document. With regards to the statement that the tide gates opening at different times at NCB015, resulting in possibly missing the start of discharge, this assertion by NCG is untrue. NYC Figure 63 shows the sampling location and the observation manhole, any speculation regarding this outfall should be deleted.

NYC Comment 635) Appendix E - Section 4.2.1.5: If solids were accumulating in the CSOs to the point that removal is necessary, then these solids were not being transported to the Creek, otherwise there would not have been buildup. This is not a source of uncertainty – it is just another variable in an already complex system. This should have negligible impact on the loads.

NYC Comment 636) Appendix E - Section 4.2.1.7 Summary *"Time-weighted composite samples may in some cases over- or underestimate the load to the Study Area, such as when high flows resulting from periods of intense rain consistently have increased chemical and solids concentrations compared to lower flows."*

NCG provides no basis for the argument that high flows result in increased chemical and solids concentrations as compared to lower flows. This is speculative and no data has been presented to back up this statement. Additionally, there is no discussion on why flow-weighted composites were not employed at non-NYCDEP-owned sites. The time-composited sampling methodology was approved by EPA and previously used on other sites with EPA's approval. With all of the data manipulation that has gone into load calculations (averaging of numerous sets of sample data across all events within categories, usage of "collective" data for both non-sampled and sampled discharges, etc.) it is unlikely that a flow-weighted sampling approach would have resulted in any appreciable difference in load results. Given the complex hydraulics of these systems, there is no evidence that flow-weighted sampling methodology would produce a more accurate annual average load estimation than time based composites.

NYC Comment 637) Appendix E - Section 4.2.1.7 Summary *"Solids present in the lowest portion (below the sample intake tube) of CSO and stormwater discharges were not collected during sampling and may represent additional solids and chemical (particulate phase) load to the Study Area if concentrations in the unsampled portion of flow differ from the sampled portion of the flow."*

There is no data to support the claim that solids below the sample intake tube were not captured. Flows in these systems are often extremely turbulent and well-mixed. There is no merit in the argument that there are these apparent layers of different particle sizes being discharged depending on height in the water column.

NYC Comment 638) Appendix E - Section 4.2.1.7 Summary, *"At some locations, including MS4s and CSOs that did not have tide gates, sampling locations were established above tidal inundation. As a result, flows in pipes coming into the system down the pipe from the sampling location were not sampled. If concentrations from industrial areas near the Study Area are higher than the sampled flows and are down the pipe from the sampling location, actual loads to the Study Area at these locations may be higher than estimated loads."*

While the NCG Draft RI acknowledges that industrial areas may have higher concentrations than the rest of the watershed, but then groups their industrial stormwater sites (Category 3C) in with MS4 locations that drain multiple land use types when evaluating loads. If industrial sites are of such concern, this is another reason that the loads for MS4s and Category 3C sites should be presented separately.

NYC Comment 639) Appendix E - Section 4.2.1.7 Summary: *"At some CSO sampling locations, the beginning of the discharge may have occurred prior to the initiation of sample collection. If solids and chemical concentrations in the initial discharge differ from the concentrations in the later portion of the discharge, actual load estimates may over- or underestimate the load to the Study Area from those discharges."*

There is no basis to suggest that concentrations in the initial discharge differ from the concentrations in the later portion of the discharge.

NYC Comment 640) Appendix E, Section 4.2.2, page 57: *"Understanding the variations in current and future load from CSOs requires an understanding of concentrations in both the stormwater and wastewater portions of the discharge... Given the complexity of factors that determine the occurrence and composition of CSO discharges and the magnitude of these discharges (approximately 48% of the total point sources discharge to the Study Area), several evaluations were conducted to reduce the uncertainty associated with the potential variability in*

CSO discharges."

It is not clear how NCG intends to use information from their analysis of stormwater and wastewater fractions of CSO discharges to better understand loading from CSOs. The wastewater and stormwater fractions are mixed in the discharge and the CSOs as well as stormwater have been sufficiently characterized by sampling these various point sources.

This section does not determine any type of uncertainty from the composition of CSO discharges nor does it explain how the evaluations in the subsections will be used to "reduce the uncertainty associated with the potential variability in CSO discharges." It seems that NCG is conflating uncertainty and variability in this section.

NYC Comment 641) Appendix E, Section 4.2.2, subsections: The discussions of WWTP influent sampling (Section 4.2.2.2), comparison of WWTP influent data to CSO and stormwater data (Section 4.2.2.2.1), comparison of WWTP wet weather influent data to CSO data from the same events (Section 4.2.2.2.2), and comparison of BB009 and BB026 CSOs located along the Long Island City Interceptor (Section 4.2.2.2.3) discuss variability in the data but do not provide any additional information on uncertainty nor do they conclude how these comparisons have reduced uncertainty. Section 4.2.2 and its subsections do not appear to provide any additional technical information to this document and are generally unnecessary.

NYC Comment 642) Appendix E, Section 4.2.2, Last sentence of section 4.2.2.2.2: *"Although there are exceptions, generally concentrations in the WWTP influent are higher than concentrations measured at individual CSOs, perhaps due (in part) to inputs from the Kent Avenue Interceptor."*

This statement is speculative and should be removed. No samples were collected characterizing inputs from the Kent Avenue Interceptor as the Kent Avenue Interceptor CSOs do not discharge to Newtown Creek, therefore NCG has no basis to make such an assumption. There is no need to speculate on why a limited number of corresponding samples tends to show higher WWTP influent concentrations than CSO concentrations. This conclusion does not provide any additional information to the RI/FS and should be deleted.

NYC Comment 643) Appendix E – Section 4.2.3: First paragraph states that as part of the uncertainty assessment, point source sample results were compared to previous studies conducted in drainage systems similar to Newtown Creek. The Section cross-references NCG Draft RI Table E4-6 and Figures E4-13a through E4-13d. *"Data reported in ten studies (conducted between 1998 and 2010) and three national stormwater databases were reviewed and compared to Phase 2 sampling results."*

The discussion on these studies is limited to one paragraph and does not comprehensively reference all ten cited studies. Specifically, the summary only discusses comparisons of TSS data for CSOs and stormwater. There is no discussion here on TPAH, TPCB, or Cu. Furthermore, the results from the national stormwater databases are not included in this discussion and are only shown in the figures and table. This section should be further expanded.

NYC Comment 644) Appendix E – Section 4.4.2: *"Three previous studies in which CSOs and stormwater discharging to Newtown Creek were sampled were identified and are discussed in this section. There is a high degree of uncertainty in the data collected during these studies, due to unknowns in the data collection and analysis methods, as well as unknowns in the drainage infrastructure. However, the data can be used to further understand overall trends of data both spatially and temporally as well as improving the understanding of the drainage system."*

There is significantly more uncertainty in the data from the three previous studies than exists in the Phase 2 point source dataset due to the numerous unknowns described in the quoted text. The usefulness of this data is limited due to the high degree of uncertainty and its ability to be used to further understand trends in the system are questionable.

NYC Comment 645) Appendix E – Section 4.2.4.1 and Table E4-6: Combined sewage is a combination of sanitary flows and urban stormwater. Sanitary flow TSS concentrations in EPA (1973) for five New York City WWTPs were in the 100-200 mg/L range. Urban stormwater concentrations from Nationwide Urban Runoff Program (NURP, 1983) and a compilation of nationwide historic concentrations (National Stormwater Quality Database, NSQD) by the University of Alabama at Tuscaloosa (Maestre and Pitt, 2005) and others (Cave and Smullen, 2004) that included data from 1970s through 1990s did not show concentrations as high as shown in EPA (1973). NYC Table 8 shows a summary of the event mean concentrations for TSS in urban runoff from these literature sources. These sources should be discussed in the Draft RI.

NYC Comment 646) Appendix E – Section 4.2.4.1, third paragraph on page 63 *"For Cu, during the 12-hour sampling event, one of the three Cu samples had a maximum concentration of 180 mg/L (10 minutes after initial sampling occurred), whereas the other two concentrations were 0.45 mg/L and 1.3 mg/L, which were within the range of concentrations measured during the second dry weather event."*

The write-up of the Hudson River Conference 1973 CSO study has several instances of incorrect information. These errors need to be revised both in Draft RI Section 4.2.4.1 as well as in the Figures and Tables that contain data from this Section

This maximum Cu concentration of 180 mg/L is false. Review of the cited report shows that the three Cu concentrations were 1.75 mg/L, 0.45 mg/L and 1.3 mg/L. Furthermore, it is stated that this concentration was observed 10 minutes after initial sampling occurred. This statement is also false. Samples were collected every three hours for a 12 hour period. There is no sample collected at a time of 10 minutes after the start of the event. The cited report shows that sampling began at 9AM; the erroneously referenced value of 180 mg/L (which is actually 1.75 mg/L – it seems that NCG misread this number and rounded to two significant figures) was the Cu concentration in the sample collected at noon – three hours, not 10 minutes, after sampling began. Cu was analyzed for every other sample, so this was actually the first Cu result in the sampling event. It should also be noted that the Cu concentration of 1.3 mg/L is not from a discrete sample. This is actually the concentration result of a composite sample from the 12 hour sampling duration. This information is clearly detailed in Table 15 of the cited report. This misunderstanding of the data presented appears to be propagated in Table E4-6 as the dry weather event 1 Cu average concentration is listed as 59 mg/L (average of 180, 0.45, and 1.3 mg/L) when it should actually be 1.1 mg/L (average of 1.75 and 0.45 mg/L). Averaging the composite sample with samples from discrete times is not appropriate. This must be checked for all results presented in Table E4-6 for this study as composite samples were collected during both dry and wet weather events.

NYC Comment 647) Appendix E – Section 4.2.4.1, fourth paragraph on page 63 *"Wet weather sampling occurred on April 13, 1972, and June 16, 1972. The April storm had a total rainfall of 0.97 inch over a 9-hour period, with a peak intensity of 0.26 inch per hour. This storm was characterized by the study as being a typical all-day spring storm. The June storm had a total rainfall of 1.31 inches over 4 hours. Most of the rainfall occurred in the first 2 hours (1.22 inches) with a peak intensity of 0.65 inch per hour. This storm was characterized as a typical summer thunderstorm. Concentrations during these sampling events are several orders of magnitude higher than concentrations for TSS and TPAH, TPCB, and Cu measured at this location during Phase 2."*

The June 16th storm was not classified as a typical summer thunderstorm. The Hudson River report states "This type of storm is perhaps typical of a summer thunderstorm due to its high intensity and short duration. In fact, this storm has established a new record for rainfall on this date." A record-setting storm is anything but "typical." Further, while the statement of concentrations from this event being several orders of magnitude higher than Phase 2 samples from this location may be true for TSS and Cu, this 1973 sampling effort did not include analysis of TPAH or TPCB, so this statement is false and must be revised.

NYC Comment 648) Appendix E – Section 4.2.4.1, first paragraph on page 64 *"The study concluded that during the low intensity and long duration of the first storm, the "first flush" may*

have been diverted to the WWTP prior to discharging to the waterway. The second storm, having an initial high intensity, likely had all the "first flush" diverted to the waterway, with little or none being diverted to the WWTP."

This is consistent with the conclusions drawn in the cited report; however, is inconsistent with the data collected during Phase 2 point source sampling. First flush phenomena is not shown in the numerous samples collected for this program. Additionally, NCG verbally concluded that first flush phenomenon did not exist in their January 14, 2016 data presentation to EPA.

NYC Comment 649) Appendix E – Section 4.2.4.2: The Sewer System Monitoring report (LMS, 1992) referenced in this section could not be obtained for independent review in full. Review of the sections that were obtainable demonstrate a lack of understanding of the report. NCG Draft RI Table E4-6 did not report TPAH results from this study, listing them as not available. Appendix D of this report details results of PAH compounds within the "CSO Priority Pollutant Results: Acid-Base Neutrals" table. All PAH compounds were non-detected. NCG must provide this report to reviewers so that the conclusions drawn can be verified.

According to the last sentence of the second paragraph on page 65, *"However, supporting documentation referred to in this report is not available for review,"* it appears that NCG was not able to obtain this information either. If that is the case, this study should not be included.

NYC Comment 650) Appendix E – Section 4.2.4.3 and Table E4-6: The data reported under CARP (Litten, 2003) column are not consistent with the CARP report. In addition, the data summaries were not presented in a consistent format for TSS, TPCB, and TPAHs. For example, TPCB concentrations were reported for CSO, SWO, and WWTP effluent, while TPAH concentrations were only reported WWTP influent. TSS and TPAH were reported only for the Newtown Creek WWTP influent or effluent, while TPCB data were reported for all sampled WWTP influent or effluent.

a. TSS: Table indicates that WWTP influent (CSO) had TSS of 26 to 44 mg/L. Based on the review of CARP report, only one TSS data was reported for WWTP influent (CSO), which is 169 mg/L at Owls Head Influent. TSS ranged from 13 to 44 mg/L (Avg 29) in NTC WWTP effluent samples and ranged from 2.5 to 254 mg/L in other WWTP effluent samples.
b. TPCB: Table reported TPCB concentration ranged from 10 to 3500 ng/L in WWTP influent (CSO) samples. CARP reported TPCB concentration was 260 ng/L in NTC WWTP influent (CSO) and ranged from 44 to 3500 ng/L in all WWTP influent (CSO) samples.
c. TPCB: Table reported TPCB concentration ranged from 1.9-330 ng/L in WWTP effluent samples. CARP reported TPCB concentrations ranged from 3.4 to 25 ng/L in NTC WWTP effluent and ranged from 0.4 to 330 ng/L in all WWTP effluent samples.
d. TPAH17: Table reported TPAH concentration of 800 ug/L in WWTP influent (CSO) sample.

This result is only for NTC WWTP influent. In addition, TPAH reported in CARP is based on the sum of 26 PAHs. CARP reported TPAH26 concentrations ranged from 37.8 to 210 ug/L in all other WWTP influent (CSO) samples, from 5 to 430 ug/L in SWO samples, and from 0.11 to 64.4 ug/L in WWTP effluent samples. CARP also mentioned that the data quality of PAHs were poor, "All samples are shown due to the difficulty of averaging. There may be large lab to lab differences and the media (filtered and unfiltered) may or may not be significant. As indicated above, the quality of these data is poor." And "The quality of the PAH data are clearly problematic, particularly for the more critical dissolved phase. The source of the problem is in large measure due to inadequate field concentration. There may be problem with field contamination in some cases."

e. Appendix E – Section 5 and subsections: Evaluation of in-creek (surface water and sediment) data and point source data is biased towards MS4s and CSOs and their potential influence on in-creek data in the tributaries. Category 1, Category 3C, and non-MS4 Category 3A results are not included in this evaluation.

NYC Comment 651) Appendix E – Section 4.2.4.4: Higher TSS and Cu concentrations measured for the Hudson River Conference at NCB015 and published in 1973 as compared to TSS and Cu concentrations in more recent studies do not suggest that the historical CSO load to the Study Area was higher than present-day load estimates. Please remove the conclusion from the text. Data from two events were published in EPA (1973) at regulator B-1 (NCB-015) and the event mean concentration (EMC) of TSS from one event was about an order of magnitude less than the EMC from the other event. NCG is not considering the variability within the Hudson River conference data.

Further, in contrast to the discussion of TSS concentration measurements for CSOs and stormwater, the NCG Draft RI does not present data on discharges from private industrial sites or information on treatment system performance to develop TSS or other pollutant loads from private industrial sites for 1999-2015. Assumptions used for historical concentrations or history of groundwater treatment system (as to when they were installed and their efficacies over the period of operation) need to be included in the NCG Draft RI.

NYC Comment 652) Appendix E – Section 5.1, page 68, *"the four largest CSOs located at the head of the tributaries (BB026 in Dutch Kills, NCQ077 in Maspeth Creek, NCB083 in East Branch, and NCB015 in English Kills) and BB009 (located approximately 850 feet from the head of Dutch Kills) are evaluated." Data collected from three large stormwater discharges to the tributaries, BB610 in Dutch Kills, NCB632B [**note: typo – location is NCQ632B**] in East Branch, and NCB629 in English Kills, are also evaluated. For Whale Creek, results from the Category 2b (WWTP*

effluent overflow NCB002) and the nearest upstream MS4 (NCB631; in the main stem) are evaluated."

Exclusion of other sampled locations results in an incomplete evaluation, especially when the Con Edison – 11th Street Conduit dewatering system contributes the largest TPAH point source load to the Creek, as described in previous sections. All data collected should be compared to in-creek data rather than the incomplete and biased evaluation presented in Section 5 and the following subsections. As noted in footnote 16 on the bottom of page 68 of the NCG Draft RI, *"Although several of the graphics discussed herein (see Figures E5-2 through E5-7) present all the point sources data, the discussion is primarily concerned with point sources data in the tributaries."*

NYC Comment 653) Appendix E – Section 5.1 and Table E5-1: In the first paragraph on page 69 NCG states that wet and dry weather surface water results "from locations close to the discharges identified" are evaluated; however, there is no indication of how "close" these surface water samples are collected to the discharges identified. Additionally, this evaluation is biased as it only focuses only on City-owned outfalls. Surface water samples used in the evaluation are located near CSO discharges at the head ends of the tributaries and the WWTP effluent overflow in Whale Creek. There are no surface water samples adjacent to Category 3A locations, Category 3C locations or Category 1 locations.

Surface water samples in Whale Creek and main stem of Newtown Creek near Whale Creek were collected under wet-weather conditions only. There is no dry weather sample for either of these locations for comparison purposes. This is a data gap that should be filled. The evaluation is incomplete without this data.

NYC Comment 654) Appendix E – Section 5.1, page 69: *"Wet weather surface water samples were collected during the day in which discharge began (Round 1) and the day after the discharge began (Round 2) from two depths (near-surface and near-bottom). Results from Round 1 near-surface samples are included in this discussion because these results provide the strongest signal of point source impacts."*

This evaluation is incomplete without discussion of Round 2 and near-bottom data.

NYC Comment 655) Appendix E – Table E5-1, *"Although these arithmetic averages are based on results from samples collected near surface and deep, evaluation of this dataset indicated minimal differences (between results at these two depths), because the water column is relatively well mixed."*

By this logic, deep surface water results should also be included for wet weather surface water and point source evaluation.

NYC Comment 656) Appendix E – Section 5.2 and Figures E5-2 through E5-4: As stated in previous comments, this evaluation is incomplete due to the exclusion of Round 2 surface water data, near-bottom surface water data, and focus only on CSO and MS4 locations. This discussion and the associated plots should be expanded to include all point sources sampled and the surface water program should have been designed to collect samples in locations other than head ends of tributaries (i.e., there should have been locations adjacent to Category 3C and other discharges).

The point source groupings in Figures E5-2 through E5-4 should be broken out by category (i.e., CSO, MS4, etc.) to give a better understanding of each category's potential impact on surface water concentrations rather than grouping all point sources in one dataset for each reach. The data presented in Figure E5-3 for Total PCBs should be plotted on a log-scale to better visualize the box and whisker plots for lower concentrations.

Reference waterbody data, East River data, and Newtown Creek mouth transect data are shown on these plots but are not discussed in the text. It should be noted that in many instances, while wet weather results are greater than dry weather, they are within the same order of magnitude as dry weather results and often the same order of magnitude as reference waterbodies and East River concentrations. This is evident for total PAH and Cu. It is difficult to tell if this is accurate for TPCB as much of the data is compressed to the x-axis due to lack of log scale on the y-axis.

The conclusion of this section, as stated at the top of page 73, is "The results of these analyses suggest that the impacts of point source loads on surface water in the Study Area may be generally stronger for TPAH and Cu than for TPCB."

Preferential delivery of one class of contaminants over other contaminants from a single source is not possible. Without a full evaluation of all point sources and all nearby surface water, these conclusions have no merit.

NYC Comment 657) Appendix E – Section 5.3, Table E5-2, Figures E5-5 through E5-7: *"The surface sediment (samples collected in the top 6 inches) and subsurface sediment datasets include samples that were collected during the Phase 1, Phase 2, and National Grid programs"* however,

Table E5-2 only provides data from Phase 2 surface sediment for comparison to point source

concentrations. This evaluation is incomplete and should include all stated sediment datasets. Additionally, all point sources should be used in this evaluation. Currently, this evaluation is biased as only Category 2A and Category 3A concentrations are included.

Reference area concentrations that are shown in the figures should also be included in Table E5-2. NCG concludes that point source particulate phase concentrations are within the range of reference area surface sediment data *"consistent with the fact that the point sources are characteristic of urban contamination."*

The discussion of comparison of point source particulate phase concentrations and reach-average surface sediment concentrations that begins on the bottom of page 71 and continues to page 72 does not have any figures or tables to support the discussion. This discussion would be much easier to follow and visualize if supporting figures and tables were provided. As previously stated, this evaluation should also include all point sources and not just CSOs and MS4s.

The first full paragraph on page 72 states *"The comparison of point source particulate phase concentrations of the TPAH, TPCB, and Cu to surface sediment concentrations suggests that the influence of point source loads on surface sediment is expected to be stronger for TPAH and Cu, compared to TPCB."*

As stated in the comment on surface water comparison, preferential delivery of one class of contaminants over other contaminants from a single source is not possible. There is no explanation on what is the source of TPCB in the sediments.

NYC Comment 658) Appendix E – Section 5.4 and Figure E5-8:*"Chemical concentrations and inferred patterns of historical deposition in four subsurface sediment cores collected near the largest CSOs (NCB083, NCQ077, BB026, and NCB015; see Figure E5-8) were evaluated and are described in the following paragraphs."*

No information is provided on what distance is specified by "near the largest CSOs." This is an arbitrary statement without a distance or range of distances specified.

NYC Comment 659) Section 5.1, bottom of page 69 to top of page 70, *"the subsurface sediment analysis (presented in Section 5.4) focuses on cores collected near the four major CSOs—at the heads of Dutch Kills (BB026), Maspeth Creek (NCQ077), East Branch (NCB083), and English Kills (NCB015). Cores where paired chemistry and geochronology data were collected were selected for this analysis when possible. In Maspeth Creek, the geochronology core did not have paired chemistry data, so chemistry data in the nearest core (MC007CSC) to the geochronology core were evaluated."*

NCG must specify how close "the nearest core to the geochronology core" was located. Geochronology and chemical data from separate cores, especially if they are not co-located, should not be paired as there is no way to know if the deposition history displayed in the geochronology core is applicable to the chemistry core.

NYC Comment 660) Section 5.4, page 72: *"The Dutch Kills core (DK033SC-G) exhibits evidence of three peaks in the depth profile for TPAH and Cu, with relatively high variation in concentration with depth. This is suggestive of a complex history of chemical and sediment deposition, which may have been further complicated by historical dredging in this area."*

This section does not discuss any geochronology despite making claims regarding deposition and historical loadings. Without a discussion on geochronological data paired with the chemical data, these findings are speculative. Conclusions regarding historical deposition or dredging activities cannot and should not be drawn without a thorough discussion of the geochronological profile of the core.

NYC Comment 661) Section 5.4 page 73 *"In the East Branch core (EB040SC-A), TPCB and Cu concentrations generally increase with depth down to the end of the core, although the patterns are broken by a few individual high values. This suggests a history of continuous deposition, possibly with intermittent interruption... To summarize the sediment profile observations, chemical concentrations for these four cores are generally greater in subsurface sediment than surface sediment, indicating that historical chemical loads were higher than current loads. The vertical patterns are variable, differing by chemical and by tributary. Patterns are likely impacted not only by historical loads, but by dredging and depositional history as well, confounding interpretation of patterns in individual cores."*

As previously stated, conclusions regarding deposition history are speculative unless accompanied by a discussion of geochronological data. Additionally, there is no attempt to explain elevated concentrations clearly visible in several of the core tops. TPAH is elevated in the top 20 cm of the English Kills core; Cu and TPAH are elevated in the top 20 cm of the Dutch Kills core; and TPCB is elevated in the top 20 cm of the Maspeth Creek core.

NYC Comment 662) Appendix E, Table E2-4, Footnote 1: *"Annual CSO and stormwater flows for 2008 to 2012 were estimated from historical precipitation using the 2013 geo-neutral point source model. This has not been updated to the 2015 geo-neutral point source model, since the decisions on which CSOs to sample were based on the 2013 geo-neutral point source model. The arithmetic average annual discharge is shown."*

This table should be updated to use flows from the 2015 model as these are flows that were used in the load calculations.

NYC Comment 663) Additionally, it is unclear what purpose the outfall dimensions column serves in this table. If this data is not needed, it should be removed from the table or the subsequent tables should also list outfall dimensions.

NYC Comment 664) Appendix E, Table E2-5, Footnote 2: *"NYC personnel stated that outfall IDs in the 600s are owned by NYC but, in several cases other sources indicate that some outfalls that are designated as "General" are also NYC-owned."*

NYCDEP has informed NCG that several outfall IDs in the 600s are not owned by the City and drain private properties. Examples include NCQ633, NCQ632 and BB610. This statement should be removed as it has been clarified.

NYC Comment 665) Appendix E, Table E3-3, E3-5 E3-7, and E3-9: Estimated loads are shown by category (e.g., CSOs, Stormwater, etc.), there is no breakdown showing loads by category and reach as the text suggests in Section 3 (e.g., Stormwater in English Kills, CSO in East Branch, etc.). This tables should be revised to present this data. Additionally, stormwater should be broken out by category (MS4, highway drains, Category 3C) to better understand the loadings from the various point sources.

NYC Comment 666) Appendix E, Tables E3-4, E3-6, E3-8, and E3-10: Loads by reach should be calculated using only the outfalls that discharge to each reach. There is significant variation between outfalls and as such it is inappropriate to calculate a load for one reach based on a collective grouping of all point sources in the study area. For example, there are significant differences in concentrations between CSOs, so combining all CSOs to represent non-sampled locations could lead to incorrect loads. Average TPCB concentrations for the seven sampled CSOs range from 7.2 ng/L (NCB-083) to 135 ng/L (NCQ-029). Average TPCB concentration for all seven CSOs grouped together is 43 ng/L; however, all but two of the seven CSOs have average TPCB concentrations below this group average concentration. The actual TPCB load to English Kills is likely lower than what is presented as NCB-083, which discharges to English Kills, had the lowest PCB concentration of all CSOs sampled and is the only major CSO point source to English Kills.

NYC Comment 667) Table E4-6, Hudson River Conference Data column: Average values for TSS and Cu need to be revised due to incorrect interpretation of data in the report. The first average for dry weather TSS is incorrect due to inclusion of a value that was not reported in the cited report. Review of the cited report shows that the three Cu concentrations for the first dry weather event were 1.75 mg/L, 0.45 mg/L and 1.3 mg/L. There was no Cu concentration of 180 mg/L as was stated in Section 4.2.4.1. The Cu concentration of 1.3 mg/L is not from a discrete sample, this is actually the concentration result of a composite sample from the 12 hour

sampling duration. This information is clearly detailed in Table 15 of the cited report. This misunderstanding of the data presented is propagated in Table E4-6 as the dry weather event 1 Cu average concentration is listed as 59 mg/L (average of 180, 0.45, and 1.3 mg/L) when it should actually be 1.1 mg/L (average of 1.75 and 0.45 mg/L). Averaging the composite sample with samples from discrete times is incorrect. This error must be checked and revised for all results in Table E4-6 as composite samples were collected during both dry and wet weather events.

NYC Comment 668) Table E4-6, Sewer System Monitoring column: This data was not available for review. NCG must provide this report and supporting data to reviewers or it should be excluded from the evaluation.

NYC Comment 669) Table E4-6, CARP column: The data reported under CARP (Litten, 2003) column are not consistent with the CARP report. In addition, the data summaries were not presented in a consistent format for TSS, TPCB, and TPAHs. For example, TPCB concentrations were reported for CSO, SWO, and WWTP effluent, while TPAH concentrations were only reported WWTP influent. TSS and TPAH were reported only for the Newtown Creek WWTP influent or effluent, while TPCB data were reported for all sampled WWTP influent or effluent.

a. TSS: Table indicates that WWTP influent (CSO) had TSS of 26 to 44 mg/L. Based on the review of CARP report, only one TSS data was reported for WWTP influent (CSO), which is 169 mg/L at Owls Head Influent. TSS ranged from 13 to 44 mg/L (Avg 29) in NTC WWTP effluent samples and ranged from 2.5 to 254 mg/L in other WWTP effluent samples.
b. TPCB: Table reported TPCB concentration ranged from 10 to 3500 ng/L in WWTP influent (CSO) samples. CARP reported TPCB concentration was 260 ng/L in NTC WWTP influent (CSO) and ranged from 44 to 3500 ng/L in all WWTP influent (CSO) samples.
c. TPCB: Table reported TPCB concentration ranged from 1.9-330 ng/L in WWTP effluent samples. CARP reported TPCB concentrations ranged from 3.4 to 25 ng/L in NTC WWTP effluent and ranged from 0.4 to 330 ng/L in all WWTP effluent samples.
d. TPAH17: Table reported TPAH concentration of 800 ug/L in WWTP influent (CSO) sample. This result is only for NTC WWTP influent. In addition, TPAH reported in CARP is based on the sum of 26 PAHs. CARP reported TPAH26 concentrations ranged from 37.8 to 210 ug/L in all other WWTP influent (CSO) samples, from 5 to 430 ug/L in SWO samples, and from 0.11 to 64.4 ug/L in WWTP effluent samples. CARP also mentioned that the data quality of PAHs were poor, "All samples are shown due to the difficulty of averaging. There may be large lab to lab differences and the media (filtered and unfiltered) may or may not be significant. As indicated above, the quality of these data is poor." And "The quality of the PAH data are clearly problematic, particularly for the more critical dissolved phase. The source of the problem is in large measure due to inadequate field concentration. There may be problem

with field contamination in some cases."

NYC Comment 670) Table E4-6, Summary of the City's CSO Sampling Program to Date column: The source of this data is outdated and incomplete. The Gowanus Canal sampling program included eight wet weather events and six dry weather events. The cited data source only includes data from wet weather events 1-6 and dry weather events 1-2. The units listed for minimum and maximum TPAH values in this column are incorrect. These values are shown as ng/L but should actually be ug/L.

NYC Comment 671) Attachment E-A, Supplemental Point Sources Evaluation Information: Considering the load computation methodologies reviewed in Section 3.3, the use of arithmetic average as representative concentration will lead to significant biases in the overall point source estimates from stormwater/direct drainage areas tributary to the Creek. For example, NCG Draft RI Table E-A-15 shows, for Categories 3A, 3B and 3C, a median value of 66 mg/L of TSS versus an arithmetic average of 140. All stormwater grouping shows a median of 46 mg/L vs. an arithmetic average of 120. While the CSO arithmetic average (96 mg/L) is closer to the median of 82 mg/L, the MS4 and direct drainage concentrations show that the arithmetic averages are 2 to 3-times larger than the median values. Similar trends are seen in the particle size fractions analyzed and summarized in tables subsequent to E-A-15. It appears that the average of the two arithmetic averages (3A+3B+3C and All Stormwater), which is 130 mg/L, was used for estimating loads from MS4 and direct drainage areas, except for the unique sites. NCG Draft RI Figure E-A-15 shows the sites such as MA-001 and MCL-001 with high TSS concentrations and all the unmonitored MS4 and direct drainage areas appear to have been assigned this 130 mg/L of TSS concentration (Table G5-4) without doing any similarity analyses to these unique sites. Because these parameters can be mostly log-normal, the geomean is the best representation of central tendency of these datasets. Arithmetic averages should be replaced in the NCG Draft RI with median or geomean concentrations. Similarity analyses need to be performed to assign appropriate concentrations to the unique sites and unmonitored MS4 and direct drainage areas.

NYC Comment 672) Attachment E-C, Development of Particulate Phase Concentrations in Surface Water and Point Source Sample Results, Page 7/8, Footnote 4 and Table E-C-1: Acceptance estimates of particulate phase contaminants from whole water samples is predicated on whether or not estimates of site specific dry weight (Kd) and organic carbon normalized (Koc) chemical phase partitioning measurements presented in NCG Draft RI Appendix A-C and Section 6.4.1.3 of the NCG Draft RI Report are correct and acceptable. NCG's estimates of Kd and Koc are based on sediment porewater and limited point source samples only and include several deficiencies and require further consideration. The "complexities of

sources and forms of organic carbon" in the Creek noted by NCG in the NCG Draft RI are not a sound basis to select dry weight normalized rather than conventional organic carbon normalized chemical phase partitioning as NCG has done. The Kd and Koc chemical phase partitioning measurements presented by NCG include similar scatter and do not justify selection of dry weight normalization. The "complexities of sources and forms of organic carbon" noted by NCG are likely to be black carbon and/or NAPL related and need further evaluation for effects on chemical phase partitioning. In light of these concerns with Kd and Koc values estimated by the NCG, the estimates of the phase separated measurements presented by NCG should not be published in the NCG Draft RI until closure is reached on site-specific partitioning and whether or not site partitioning is applicable to point sources.

NYC Comment 673) Table E5-1: All point source category results should be presented, not just CSO, MS4, and WWTP effluent.

Wet-weather surface water results for Round 1 surface only are presented. The table should include Round 2 and near-bottom results. Distances from point source outfalls and surface water sampling locations should be detailed.

NYC Comment 674) Table E5-2: All point source category results should be presented, not just CSO, MS4, and WWTP effluent. All surface sediment should be presented, not just Phase 2 surface sediments. The text states that Phase 1 and National Grid sediments were used in the evaluation but are not present in the table.

NYC Comment 675) Figure E2-1: Figure as shown is incorrect. See NYC Figure 64 for corrections.

NYC Comment 676) Figure E2-2 and Figure E2-4: An updated outfall inventory shapefile used to create these figures should be provided. There are numerous outfalls that do not line up with shapefiles previously provided by NCG.

NYC Comment 677) Figure E2-5: Total annual point source discharge to Newtown Creek should be detailed somewhere on this figure. Furthermore, Figure E2-5 demonstrates a strong bias in the point sources evaluation toward CSO loading and an inadequate evaluation and characterization of stormwater loading, particularly for direct drainage from present-day and historical upland industrial sites. Whereas, un-sampled CSO discharge represents only about 4% of total CSO discharge, un-sampled stormwater discharge represents 64% of total stormwater discharge. Unique and significant point-source loads are more likely to be found at sites of stormwater discharge (including direct drainage), so extensive sampling of such sites is

essential. Additional sampling is needed to better characterize the contribution of stormwater/direct drainage to point-source loads.

NYC Comment 678) Figure E2-8: The drainage area for NCQ-633 was omitted from Figure E2-8 and needs to be added.

NYC Comment 679) Figures E3-2 through E3-6: Loads by category should be shown. Individual loading by outfall should also be investigated due to differences in concentration from outfall to outfall.

NYC Comment 680) Figure E4-1: No correlation between discharge and rainfall has been determined by these plots. Regressions should be fit to the data and R^2 should be displayed.

NYC Comment 681) Figure E4-13a through E4-13d: Gowanus Canal, Nationwide Urban Runoff Program (EPA, 1983), CDM National Stormwater Database (Cave and Smullen, 2004), and National Stormwater Quality Database (Maestre and Pitt, 2005) data are displayed on these figures but are not discussed in the text. These data should be included in the discussion of studies at other sites.

City Comments on NCG Draft RI Appendix F – Groundwater Evaluation

The groundwater evaluation in Appendix F of the NCG Draft RI is flawed and must be revised due to; 1) The use of seepage metering data and inaccurate calculations to calculate COPC loading to the Creek, 2) The CSM and loading calculations fail to include groundwater flow through the banks of Newtown Creek, 3) Slug testing used to estimate hydraulic conductivity of the sediment beds is greatly overestimated. Combined with the detailed comments specified below, the NCG Draft RI fails to account for what is likely one of largest contaminant loads to the Creek, direct discharge of NAPL on groundwater and dissolved-phase COPCs through the bank materials.

Although great detail given to the tiered process for assessing a water balance and resulting groundwater discharge, ultimately only seepage metering data and flawed calculations based on hydraulic gradients from in-creek monitoring wells (which are too sparse to characterize flow through the sediment bed and are over-extrapolated) are used to calculate COPC loading to Newtown Creek from groundwater and porewater. This approach has fatal flaws, specifically, not including groundwater flow through the Creek banks and loading of COPCs from upland sites leads to underestimating the amount of groundwater discharge and the mass discharge of COPCs to the Site. The groundwater CSM/contaminant mass loading calculations must be re-developed to include groundwater discharge from the banks and contaminant loads

from upland sites.

The CSM and loading calculations fail to include groundwater flow through the bank of the creek. Groundwater flow through the Creek banks are much larger (approximately 3 times larger) than flow through the sediment bed. The reason for this is that the sediment bed beneath the creek has a much lower hydraulic conductivity and is much less transmissive than the fill materials which comprises the banks, so where the fill materials exists below sea level, groundwater will flow along the path of least resistance and discharge there. The EPA requested that NCG develop cross-sectional models and hydrogeologic flow sections to confirm NCG's proposed groundwater CSM; however NCG did not present the requested models and flow sections in the NCG Draft RI. Cross sections that are presented in the groundwater section (see file Groundwater Eval_Attachmnent F-I_EPA_Draft_2016-11-11.pdf Figures F-I-2a through F-I-13b) contain no groundwater head or flow/potentiometric information. Adding groundwater potentiometric head and hydraulic conductivity information to the cross sections shows the importance of discharge through the banks (see NYC Figures 65a through 65g) and that NCG's CSM for groundwater is incorrect.

A compounding factor to the lack of hydrogeologic flow sections is that the slug testing results, which are used in the NCG Draft RI to estimate hydraulic conductivity of the sediment beds, are flawed and greatly overestimated the hydraulic conductivity of the sediment bed. Water displacements averaging 1.5 feet were used in the slug tests of sediment and the soft sediment were deformed by these large changes in head, resulting in overestimating the hydraulic conductivity of the sediment bed. The overestimation of hydraulic conductivity is shown by the slug tests' average hydraulic conductivity being 1.75×10^{-3} cm/sec (in the range of fine to medium sand), however low flow purging for sample collection in the same sediment caused 10 out of 17 temporary wells to dry up and 5 temporary wells to have excessive drawdown. The inability to purge the temporary wells installed in the sediment at flow rates of 50 ml/minute (0.013 gallons/minute) is consistent with the low hydraulic conductivity expected for a fine grained material such as the organic silts which comprise the sediment bed. Review of the NCG Draft RI cores that describe the sediment show that the predominant sediment type is soft black organic silt. The hydraulic conductivity implied by the drawdown seen during low flow sampling is orders of magnitude less than estimated from the slug testing. Because low flow sampling is designed to remove water at closer to the natural flow rate and over longer periods of time, the water level response to low flow purging is much more representative of the actual hydraulic properties of the sediment. The City discussed the slug testing with Dr. Jim Butler of the Kansas Geologic survey, considered an authority on slug testing, who confirmed that the excessive water displacements used by the NCG would result in over estimating hydraulic conductivity. Dr. Butler indicated that slug tests in soft sediments should use displacements of a few inches at most, not the 1.5 feet used by NCG. A further line of evidence that slug testing

with displacements of 1.5 feet would be erroneous in the soft sediment is that, as NCG reports in the NCG Draft RI, the hydraulic profiling tool (HPT) could not be calibrated and was not used because the sediment bed was too soft and easily eroded (deformed) by the HPT's small amount of injected water[3].

Flow sections constructed based on NCG's cross sections by Louis Berger using correct hydraulic conductivities show that flow through the banks of the creek is significantly more than the flow through the sediment bed (see NYC Figure 65). The groundwater discharge through the banks is corroborated by the potentiometric head in the fill. NYC Figure 66 is the potentiometric map for the fill presented in the NCG Draft RI with groundwater flow directions identified with arrows. Note that because of large differences in hydraulic conductivity between the fill and the sediment, flow is preferentially through the more conductive fill. Because NCG ignores flow through the banks and does not include any upland site's water quality data in their analyses, the groundwater CSM and loading calculations are incomplete. As noted above, flow through the banks is 5 times greater than flow through the sediment bed. At several locations, the City has documented NAPL being transported on the groundwater into the creek. At these locations the contaminant load in the discharging groundwater is also expected to be high, since the groundwater is in direct contact with NAPL deposited in the fill and native materials. Loads in the groundwater discharging through the banks will not be mitigated by the lower hydraulic conductivity sediment bed (as NCG incorrectly postulates occurs to loads being transported through the sediment bed). Therefore, NCG's Draft RI fails to account for what is likely one of largest contaminant loads to the Site (direct discharge of NAPL on groundwater and dissolved-phase COPCs through the bank materials).

There are many other flaws with NCG's groundwater CSM and analyses that also need to be corrected. These over-arching issues include:

NYC Comment 682) NCG's Tier 1 water balance underestimates recharge and over estimates groundwater losses which result in underestimating groundwater discharge and the development of a flawed conceptual site model (CSM) for groundwater. One of the most important failures in this respect is that NCG estimates a negative (-) 0.72 million gallons per day (MGD) of groundwater are lost from the aquifer from anthropogenic sinks (sewers, subway tunnels, groundwater extraction, building dewatering). If this were the case (-0.72MGD), this water loss would result in the long-term mining the aquifer/saturated deposits and resultant long-term declines in the groundwater potentiometric heads, which are not demonstrated by groundwater data collected during this RI or prior studies conducted by others such as the

[3] Appendix F, Section 3.5.3.2 Hydraulic Profiling Tool states: *"The HPT could not collect relative hydraulic conductivity in the subsurface sediment because an accurate measurement of resistance to flow could not be obtained in such soft materials."*

USGS. If the Tier 1 water balance was accurate, groundwater levels in Brooklyn and Queens would be decreasing with time as this water is continuously removed from storage. However, groundwater levels in the aquifers/saturated deposits beneath Brooklyn and Queens, after recovering from the historic over pumping of water supply wells in the 1940's-70's have remained relatively stable over the past two decades, responding to variations in precipitation and recharge.

NYC Comment 683) NCG's Tier 2 and 3 analyses assume *all* groundwater at the Site discharges to the Creek through the Upper Glacial Aquifer or Post Glacial Deposits. As discussed above, this is incorrect; more groundwater discharges through the fill than either of these units.

NYC Comment 684) NCG misinterprets and misuses a USGS off-shore saline water-cycling conceptual model to describe underlying mechanism for driving groundwater flow to Newtown Creek. This misinterpretation suggests that groundwater does not discharge to the creek west of Dutch Kills and Whale Creek, rather, East river water flows through the subsurface upstream to Whale Creek and Dutch Kills, where they claim it discharges. The scale and direction of groundwater flow of the USGS conceptual model are at a beach with the entire ocean as one side of the model and make no sense hydraulically in an estuary surrounded by aquifer. This does not fit the estuary setting of Newtown Creek where prolific aquifers surround the entire site. The misinterpretation of groundwater flow based on NCG's flawed modification of the USGS coastal cycling as presented on figure F5-6 is directly contradicted by the groundwater contour map presented in Figure F5-3 (which is based on data).

NYC Comment 685) Salinity data that NCG points to as evidence of their CSM actually confirms the opposite: salinity of the groundwater is <u>always</u> less than the salinity of the surface water. For this to occur, there must be a freshwater mixing (i.e., groundwater discharging). If surface water (East River water) was infiltrating the subsurface at the mouth and discharging a mile upstream as postulated by NCG, the water in the subsurface would be of the same salinity as the surface water, however, it is fresher. The gradients of salinity seen in the subsurface is explained by tidal pumping which is a much more localized phenomenon and does not preclude groundwater from discharging. Further, the City conducted an extensive Trident Probe survey and UltraSeep seepage metering that show groundwater discharge occurs at the mouth of the creek and other areas where NCG interprets that infiltration occurs.

NYC Comment 686) The report does not recognize that groundwater also discharges from the bedrock (near the mouth of Newtown Creek) at this Site and that the recharge area for the bedrock is not known, is not coincident with the recharge area of the UGA and likely greater than the Newtown Creek groundwater recharge area.. An example of where this is an issue is

the ConEd service tunnel which is constructed (except for drop shafts) in the bedrock, but NCG accounts for water losses to it exclusively from the UGA. Also, near the mouth of the creek where the bedrock is immediately below creek sediments, additional water from the bedrock will be discharging to the sediment bed and Creek. Not accounting for this hydrogeologic unit and associated discharge is a flaw in the CSM that needs to be corrected.

NYC Comment 687) NCG uses porewater samples collected from the surface sediment to assess the COPC loading from the deeper sediments to the surface sediment and to the Newtown Creek surface water column. The samples collected by NCG are composites of tidally pumped surface water and groundwater, but NCG multiplies them by only the groundwater portion of the flow. These samples also only account for the dissolved COPCs and not COPCs associated with DOC, so are underestimates of the amount of COPCs being transported.

NYC Comment 688) NYCDEP has provided information and models showing that the subsurface at the Newtown Creek WWTP has been extensively modified, essentially hydraulically separating it from the groundwater system, NCG does not acknowledge that these modifications have occurred and erroneously shows groundwater cones of depression extending into this area from remedial groundwater pump and treat systems located in proximity to the NCWWTP. These modifications include both deep tanks/structures and sheet piling designed to be water tight to reduce dewatering effects at the NC WWTP on the aquifer. See NYC Figure 67 which shows the location of deep sheet piling on the NC WWTP site. NCG's groundwater contour maps and cross sections continue to show aquifer material and groundwater flow (drawdown from nearby pumping) at the NCWWTP. The conditions represented by NCG do not exist.

<u>Specific Comments - Groundwater and Porewater</u>

NCG's Draft RI groundwater and porewater investigations and findings are described in Sections 3.1.1, 3.1.2, 4.8, 4.9, 5.2, 6.4.5, 6.5, 8.4.4, 8.5.2.3, 8.6.1, and in Appendices B and F. Specific comments on each of those sections are presented below. The flaws in the studies undermine the results and conclusions presented on groundwater

NYC Comment 689) Chapter 3 Section 3.1.1.2, page 28, second paragraph, last sentence: Fill is not limited to areas of historic channels or marshes, it is also present in upland areas where land modifications occurred. Historic photographs show large cinder mounds that were later either spread out or used to level topographic lows.

NYC Comment 690) Chapter 3 Section 3.1.1.2, page 29, second full paragraph: although some areas have downward hydraulic gradients between the fill and underlying UGA,

intervening low-hydraulic conductive material (post glacial deposits) will limit vertical flow. Because the fill is in direct contact with and in many places makes up the banks of the Newtown Creek and its tributaries, groundwater flow in the fill will be preferentially towards the site (and not through the UGA). The EPA requested during the groundwater modeling meetings that NCG create flow sections and cross sectional models to help understand the flow conditions adjacent to the creek. NCG did not provide such flow sections or cross sectional models in the NCG Draft RI. The City used NCG's cross-sections (which had no groundwater information) to create flow sections. These flow sections show that more water discharges through the fill (banks) than through the sediment bed.

NYC Comment 691) Chapter 3 Section 3.1.2: The description of the sediment bed in this section (muddy fine, organic rich, cohesive silt and clay with varying amounts of course grains) does not agree with the slug tests results (average 1.73 X 10-3 cm second, equivalent to a clean fine to medium sand). NCG should have been alerted to the unusual slug tests results by simply looking at the description of the sediment.

NYC Comment 692) Chapter 4, Section 4.8, first paragraph: *"Porewater originates as surface water from above or groundwater from below, and represents a mixture of those two waters; the relative amounts depend on rates of groundwater movement and tidal exchange."*

Because porewater is a mixture of surface water and groundwater that makes it inappropriate to use porewater concentrations in calculating contaminant flux from groundwater and the sediment bed. The surface water will dilute the groundwater and the amount of loading will be underestimated.

NYC Comment 693) Chapter 4, Section 4.8 Page 158, last paragraph: *"The shallow porewater samples were collected using passive sampling methods (SPME for organics and peepers for metals, both in situ and ex situ)."*

Samples collected by SPME/peepers in a tidal system, where tidal pumping is known to occur, represent a time and flow weighted composite concentration of surface water and groundwater. Such a sample will not capture the range (especially the peak) concentrations derived from groundwater and will be dominated by the surface water. What is needed is low-tide groundwater samples which will represent the greatest concentration that is arriving. Three fatal flaw errors occur based on this flawed sampling:

1. The concentration derived from this composite concentration is later multiplied by only the ground water seepage (does not include tidally pumped water to derive loading, so loading is greatly underestimated,
2. Porewater concentrations used in risk assessments do not account for the higher

concentrations seen by organisms for low tide periods when groundwater is discharging. This is an issue for samples collected for triad as well.

3. SPMEs do not account for DOC associated COPCs so underestimate the COPC load being born by groundwater. This is an issue for samples collected for triad as well.

NYC Comment 694) Chapter 4, Section 4.8 Page 158, last paragraph: *"The mid-depth porewater samples were collected using low-flow sampling techniques from temporary wellpoints installed within the sediment at depths ranging from 2 to 9 feet below the mudline."*

No information has been given about the temporary well sampling other than 10 of the 17 temporary wells went dry and 5 had greater than 10 feet of drawdown during low flow sampling. No information is given regarding well development. The low yield of the wells and the drying out during sampling raises several concerns and makes data interpretation impossible:

1. The low yield of the wells begs the question of what water was sampled. If low-flow sampling can dry out the well, then water in the well may have originated from above during drilling/well installation. Purge logs need to be provided so that this can be evaluated.
2. NCG sampled in sequence instead of "round-robin". If so, the last samples collected were the TSS samples. Because the wells had low yield, the TSS samples could contain significantly more suspended solids than the samples collected before them (*i.e.,* COPC samples) in any given temporary well. This means that the TSS and COPC samples are not comparable and the TSS cannot be used for partitioning calculations. The following text from Footnote 47 on Page 162 confirms this is the case: *"Sample volume limitations due to low water yield from the sediment (10 of the 17 wells went dry during low-flow sampling) precluded analysis for some constituents. Specifically, whole water chemical analyses were given priority over dissolved (field-filtered) metals and conventional parameters, including salinity and TSS"*

NYC Comment 695) Chapter 4, Section 4.8.2.1 *Salinity*, general comments

1. Shallow and potentially mid-depth porewater salinity and concentrations are sensitive to tidal fluctuations. These data are presented without any reference to when the measurements were made with respect to tide.
2. The history of the region includes long periods of salt water intrusion into the adjacent aquifer system. High salinity water is not unexpected in the groundwater because of the variety of travel times associated with groundwater flow in the aquifer. For this reason, more information is needed to assess if salinity is due to influence of surface water (East River as stated in the text), is simply saline groundwater being transported and discharged, or is due to tidal pumping and diffusion in upper portions of the sediment bed.

3. Regardless, all of the locations measured (see figures 4-137 and 4-138) confirm a salinity gradient between the groundwater and the surface water showing the presence of groundwater discharge.
4. The City conducted an extensive low-tide survey of salinity and temperature in the porewater near the sediment bed surface (2 feet below the mud line) and surface water one foot above the mud line. These low tide measurements allowed for a direct comparison of surface water and porewater specific conductance (a measure of salinity) at low tide. NYC Figure 21 shows the specific conductivity measurements for both surface water and porewater with respect to river mile. The figure shows that at almost all locations conductivity in porewater is lower than in the surface water. For the most part where surface water and porewater are similar, the specific conductance is lower than the average surface water specific conductance in neighboring measurements. This indicates that groundwater discharging through sediment bed is of sufficient quantity to local lower the conductance of the surface water.

NYC Comment 696) Chapter 4, Section 4.8.2.2.1 *TPAH Spatial Distribution*, general comment: As discussed in previous comments, because the shallow samples were collected as averages of surface water and groundwater, little can be interpreted from this data. For example, it is possible and even likely that the concentrations seen in shallow porewater in English Kills are higher than elsewhere not only due to proximity to source areas, but also because groundwater discharge carrying the TPAH makes up a large component of the porewater samples collected. The other COPCs described (TPCB and Cu) have the same porewater sample limitations.

NYC Comment 697) Chapter 4, Section 4.8.2.3 *Near-Surface Vertical Patterns*, general comment: The samples discussed in this section are composites of surface water and groundwater. Because tidal pumping is going to have a greater influence on the 0-15 cm sediment, it is likely that these samples were diluted more than the 15-30 cm samples, also the 0-15 sediments are exposed directly to the surface water, so there is a strong diffusive gradient. For these reasons, this information cannot be used to conclude that concentrations in the <u>groundwater</u> portion of the sample are decreasing as the water approaches the surface water (although this is not stated here, this is concluded by NCG later).

NYC Comment 698) Chapter 4, Section 4.8.3 *Mid-Depth Porewater*, general comment: The number of locations that did not have TSS, salinity or field filtered metals should be made clear.

NYC Comment 699) Chapter 4, Section 4.8.3.1 *Salinity and TSS*, first paragraph, last sentence *"This spatial pattern is generally similar to that observed in the shallow porewater (i.e., values*

similar to surface water in the lower part of the main stem, with lower values in the upper tributaries)": NCG Draft RI Figures 4-137a and b as well as 4-138 do not support the assertion that the mid-depth salinity is the same as surface water salinity. See previous discussion on shallow salinity as well. Salinity in the samples from this reach also is higher the shallower the sample (note the depth scale is not consistent on these figures form location to location). This suggests the salinity could easily be a function of tidal pumping and since the samples were not constrained to low tide, the interpretation of these samples is ambiguous.

NYC Comment 700) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* The upstream-downstream discussion of contaminant distribution is unimportant for groundwater and porewater; the NCG Draft RI must be discuss proximity to potential upland sources.

NYC Comment 701) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* Footnote 48 - See previous discussion on TSS and sample collection procedures. The TSS cannot be used for partitioning because it was not collected at the same time as the COPC samples (i.e., as a round robin sampling).

NYC Comment 702) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* Footnote 49 - Raw data needs to be presented for all locations, including locations where no TSS samples were collected.

NYC Comment 703) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* Footnote 50 – The presence of NAPL and its impact on groundwater quality are acknowledged, and the document suggests that sampling induced NAPL to move with the porewater, through the well screen and that it was too small to notice in the sample collected. However, the document does not make the connection that this is the description of a colloidal NAPL that can be transported by groundwater. The description here should note whether the concentration exceeded the solubility and that coal tar NAPL is known to form emulsions with water.

NYC Comment 704) Chapter 4, Section 4.9.1 *Groundwater Dataset,* first paragraph: *"Field parameters and water levels were monitored during development and low-flow sampling, and did not indicate any evidence of short-circuiting.":*

The information and methods used to determine this need to be presented. If they are presented elsewhere in the NCG Draft RI that location needs to be cited.

NYC Comment 705) Chapter 4, 4.9.1 Groundwater Dataset, second paragraph: *"This was unavoidable due to the well construction and sampling methods that were used in accordance*

with the EPA Final Groundwater Investigation Work Plan (EPA 2014a).":

NCG presents no evidence that methods prescribed in the work plan will result in high turbidity samples and they do not discuss the development of the temporary wells. The NYCDEP was able to collect much less turbid samples using similar methods. This statement should be removed from the text.

NYC Comment 706) Chapter 4, 4.9.1 Groundwater Dataset, Page 168, last paragraph: *"Salinity values at all depths, including surface porewater, mid-depth porewater, and groundwater, between CM 0 and 1.3, are similar to surface water salinity; these data suggest potential surface water intrusion into groundwater (see Figures 4-137a, 4-137b, and 4-138).":*

This statement is incorrect and is not supported by the data presented on NCG Draft RI Figures 4-137a, 4-137b, and 4-138. In all cases, these figures show a salinity gradient between groundwater and surface water, with the groundwater being less saline than the surface water. While salinity in groundwater in the lower reaches of the Creek are higher than in the upper reaches, they are still lower than the associated surface water measurement. If surface water were infiltrating the groundwater in the way that NCG suggests, then the groundwater should be the same salinity as the surface water. Since there is a gradient between the groundwater and the surface water, there must be fresh groundwater included in the water discharging at these location. Because of the history of salt water intrusion along Newtown Creek, there is still a likelihood that intruded salt water is still arriving at the Creek bed. Tidal pumping is also expected to occur, but NCG's salt water cycling hypothesis are not supported (presented on Figure F5-6).

NYC Comment 707) Chapter 4, 4.9.1 4.9.3 *Distribution of Contaminants* – general comment: Transport processes in the Creek likely have no influence on groundwater transport below the sediment bed. For this reason the discussion of contaminant distribution should be tied to adjacent upland sites. The discussion of gradient up and downstream has little or no meaning and should be replaced.

NYC Comment 708) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* Page 169, last paragraph: *"As discussed in Section 6 of Appendix F, estimated dissolved phase TPAH concentrations at wells NC075GW (estimated dissolved phase TPAH = 8,300 µg/L), EK093GW (estimated dissolved phase TPAH = 1,300 µg/L), and NC296GW (estimated dissolved phase TPAH = 360 µg/L) may be above the actual dissolved concentrations in these samples, due to potential interferences from NAPL."*

None of the field notes indicate NAPL was observed in the samples, which were collected

through pre-constructed filter packs. This indicates that if NAPL were present in samples, it was mobile enough to migrate through the well filter pack under low-flow purging and that the droplets of NAPL were too small to be observed. Both of these conditions are indicative of colloidal transport of the TPAHs. The concentrations detected should not in any way be discounted or considered "conservative high estimates". Also, because of the possibility that these samples indicate mobile NAPL in the environment, calculating a partition concentration may be inappropriate for assessing loading. NCG should also present the raw concentrations.

NYC Comment 709) Chapter 4, Section 4.8.3.2 *Distribution of Contaminants:* 4.9.3.1.2 *Vertical Distribution* – general comment: Because the porewater samples collected in the shallow sediment are time-weighted composites of surface water and groundwater, they cannot be compared to the discrete groundwater samples. The conditions presented in this section (and for TPCB and Cu) cannot be derived from the data presented.

NYC Comment 710) Chapter 5, Section 5.2: This section does not account for groundwater discharge through the banks of the Creek, which is approximately 3/4th of the groundwater flow. NCG extrapolates seepage metering and discharge calculation from in-Creek wells (some of which is spurious) to the extent of the creek and then multiplies this by contaminant concentrations found in the groundwater and porewater. Because discharge through the bank is not considered (and not characterized) loads which will enter the Creek without being transported through the sediment bed are not accounted for.

Section 5.2 is a summary of Appendix F, so comments and concerns regarding Section 5.2 are discussed in detail NYCDEP's comments on Appendix F:

a. The Tier 1 analyses underestimates recharge by underestimating permeable surface and using a highly uncertain and arbitrary regression. It also overestimates groundwater losses by misinterpreting an NYCDEP I/I report (Greeley and Hansen, 1982) to overestimate losses to sewers and the USGS groundwater modeling report's description of subway dewatering (Misut and Monti, 1999).
b. Flawed slug test data was used to characterize the hydraulic conductivity of the sediment bed. This results in overestimation of infiltration where downward gradients were inferred.
c. NCG's porewater samples from the shallow sediment use a sampling technique which will result in the underestimation of contaminants in the porewater (both because it represents a mixture of surface water and groundwater and because it does not capture DOC associated contaminants). Using this data in the loading analyses results in an overestimation of attenuation of contaminants being transported through the sediment bed.

NYC Comment 711) Chapter 5, Section 5.2: Page 207 second paragraph: *"...loads cannot be definitively linked to proximate upland sites."*

This statement is not true, groundwater discharging and contaminants being transported through the subsurface are inherently connected to the adjacent upland site.

NYC Comment 712) Chapter 5, Section 5.2.1 *Groundwater Discharge:* This analysis uses spurious data that erroneously extrapolates surface water infiltration to areas where measurements confirm that groundwater discharges. As noted above, it does not account for 3/4ths (the vast majority) of groundwater discharging to the creek. This significant data gap and the use of spurious data and over-extrapolation make the findings of this analysis unusable.

NYC Comment 713) Chapter 5, Section 5.2.2 Estimated Groundwater Loads: For all the reasons cited here, the loads calculated by NCG are incomplete (lack the loads from groundwater discharging from the banks) and underestimate groundwater contaminants loading.

NYC Comment 714) Chapter 5, Section 5.2.3 *Sensitivity Analyses:* The analyses presented here are of very little value and show the biased nature of NCG's groundwater evaluation. As an example, in the first bullet point, the document describes changing the recharge rate in the Tier 1 analysis to 7 and 11 percent of precipitation. NYC Figure 68 shows the 95% confidence bands for the highly uncertain exponential regression that NCG use for their analyses. The range of recharge values for "77% Impervious Cover" (the value estimated by NCG) is from 2.3 to 36% of precipitation. Based on the range of likely recharge rates, NCG essentially tests the same value in their sensitivity analysis. Importantly, the calibrated USGS model (Misut and Monti, 1999) that NCG cites elsewhere simulates recharge specifically using a varied rate based on land cover type for the Newtown Creek groundwater recharge area. The average recharge for the Newtown Creek area in the calibrated USGS model is 25 percent of precipitation, which means even NCG's highest estimate of recharge is more than 2 times less than what a calibrated model shows.

NYC Comment 715) Chapter 6, Section 6.4.5.1 Sources of Chemicals to the Subsurface Sediments, page 259 1st paragraph: *"Chemicals can also enter the subsurface sediment from underlying native materials with groundwater flow (see Section 5.2.2).The mass fluxes of chemical associated with these two processes on short (yearly) timescales are generally small compared with the total chemical mass that is present in the subsurface sediment, due to the long (decadal) history of accumulation represented."*

The assumption that groundwater works on time scales of years is incorrect. Groundwater

discharges day in and day out for millennia. The arrival of contaminants to the sediment bed from groundwater is continuous over many decades and represents the most significant measured loading mechanism. Groundwater percolating through the sediment bed can mobilize and transport contaminants that were deposited there from above.

NYC Comment 716) Chapter 6, page 260, first full paragraph: *"The observation that the chemical concentrations do not continue to increase to the bottom of the subsurface sediment in most locations indicates that groundwater is not a significant ongoing source to the mass of chemical in the subsurface sediment bed."*

This statement is not supported by the data. The highest concentrations are noted in the groundwater in the native material at several locations. The size of an important groundwater load discharging to the creek is not known, so the data are insufficient to conclude that groundwater loading is unimportant. To the contrary, groundwater loads are the largest measured load by orders of magnitude. This also ignores groundwater discharge through the bank which has not been characterized or even acknowledged.

NYC Comment 717) Chapter 6, Section 6.4.5.3 Sorption and Desorption in the Subsurface Sediment, First paragraph: *"Mixing does not extend significantly down into the subsurface sediment because the primary mechanisms of mixing—propwash and bioturbation—are top-down processes that generally do not penetrate much beyond the 15-cm-thick (6-inch-thick) surface sediment layer (see Section 6.4.4)."*

This statement and concept ignores ebullition which has been shown to mix contaminants in the sediment column and there is no information as to what depth ebullition influences. The microbes responsible for ebullition are not depth specific, so methane generation can occur where ever (and in any strata) an organic source such as NAPL occurs.

NYC Comment 718) Chapter 6, Section 6.4.5.3 Sorption and Desorption in the Subsurface Sediment, Second paragraph: *"Chemicals that migrate from groundwater within the native material into the lower portion of the subsurface sediment column subsequently partition between the sediment and porewater based on sediment characteristics and chemical properties (i.e., partition coefficients; see Section 6.4.1)."*

This statement assumes that the receptor sites available for partitioning have not already been depleted. With the presence of NAPL and the decades to potentially more than a century for contaminant transport in the sediment bed, in some locations it is likely that sediment no

longer has capacity to sorb contaminants being transported through it. Like a spent carbon canister, contaminants likely have already broken through.

NYC Comment 719) Chapter 8, Sections 8.4.4, Section 8.5.2.3, and Section 8.6.1: NCGs data and analyses regarding groundwater are flawed and incomplete including:

1. A flawed model of saltwater cycling that is not supported by the data.
2. Extrapolation of spurious seepage data to large areas of the creek.
3. Use of composite groundwater/surface water data to characterize groundwater loads arriving at the shallow sediments and surface water.
4. Failure to include groundwater discharge and contaminant loading through the banks of the creek.

For these reasons, these sections are erroneous and must be re-written when the data gaps are filled, and deficiencies and errors are corrected.

NYC Comment 720) Appendices B, B-09 Groundwater Core and boring logs: The "Groundwater Core Logs" provide depth units in centimeters. The "Groundwater Boring logs," however, are presented in feet. To facilitate correlation between the two, consistent units must be used. It is important to understand the "lithology/ies" in which the wells are screened and set.

This comment is especially important because comparison of the two (core and boring logs) reveals that some wells were screened across an interval(s) where poor to no recovery was noted in the core logs. Without understanding the material that the screen is set in, it is not possible to accurately determine hydraulic parameters for or generate reliable conclusions from data gathered at these locations.

NYC Comment 721) Chapter 8, Table B-B9-2: The note, "Damage to peepers yielded partial volume" appears consistently in the "Device Retrieval Notes" column for each station in Table B-B9-2. Damage to instrumentation, equipment, sampling apparatus, and/or the sample itself can have serious implications for the integrity and resulting usability of results from such negatively impacted samples. As such, it is important that the nature of the "damage" to the samplers be described and assurance of the integrity of the sample quality be carefully documented.

NYC Comment 722) Appendix F General Comments:

NCG ignores groundwater flux through the banks of the creek by making an erroneous unsupported assumption based on a misleading fact: they claim that since the banks only account for 2.5 percent of the wetted surface, the banks do not contribute significant amounts of water to site. This assumption is wrong on the face of it: the banks have a hydraulic conductivity of 1 X 10^{-2} cm/sec while the vertical conductance of the sediment bed[4] is at most 1

X 10^{-5} cm/sec:

Bank flow: 2.5 L^2 * 0.01 L/T = 0.025 L^3/T

Sediment flow: 97.5 L^2 * 0.00001 L/T = 0.000975 L^3/T

The potential for discharge through the banks is at a minimum 3 orders of magnitude greater than the sediment. With the single fundamental erroneous assumption that the area is small so the discharge must be as well, NCG dismisses ¾ of the groundwater discharging to the site. All of this water originates in upland sites and discharges directly to the water column. Any contaminants that are born on this water bypass the sediment bed and are available to contaminate arriving solids in the surface water that then settle to the top of the sediment bed. Groundwater seeps that are observed in the Creek banks are often associated with NAPL seeping as well, so it is highly likely that the groundwater is contaminated.

The remainder of NCG's analyses are either aimed at reducing the estimates of groundwater discharge or are undermined due to the lack of acknowledgment of discharge through the banks, general flaws are discussed below:

1. The Tier 1 water balance underestimates groundwater available to discharge to the creek by:
   a. Underestimating recharge using a flawed regression, an overestimation of "impervious area" and inappropriately using an algorithm constructed specifically for New Jersey.
   b. Overestimating ground water losses to sewers and subways by misinterpreting two reports (NYCDEP's 1982 I/I Report (Greeley and Hansen) and the USGS groundwater model (Misut and Monti, 1999).

2. The Tier 2 and 3 analyses simply rearrange the extrapolation of the seepage through the sediment bed data and completely ignore groundwater discharging through the banks of the creek. These analyses are not in any way connected or back checked against the Tier 1 analysis.

3. The loading analyses take the flawed extrapolation of seepage data as a flow rate and multiplies it by groundwater concentrations from beneath the sediment bed to calculate loading to the sediment bed. Then porewater concentrations, which are representative of both groundwater and surface water are multiplied by the groundwater seepage through the sediment bed to calculate loading to the surface water and surface sediment. This not

[4] AQ/NCG overestimates the hydraulic conductivity of sediment due to flawed slug testing, the 1 X 10^{-5} is used here is conservatively high based on the inability of monitoring wells tapping the sediment to produce water when purged for sampling and the likelihood that there is significant vertical anisotropy.

only underestimates the amount of contaminants arriving by that pathway but also ignores any that arrive through the banks of the Creek.

All in all, the sections and analyses presented by NCG are wrought with internal inconsistencies and misinterpretations and do not follow from each other. Often NCG presents an assumption and then treats it like data or facts. Also, much of Appendix F is poorly referenced and disjointed. As a prime example, the Tier 1 analyses do not inform the Tier 2 and Tier 3 analyses so seem of little value (other than its role to overestimate losses and underestimate recharge). Data gaps, including but not limited to including data and analyses from upland sites contributing groundwater and COPCs through the banks, seepage metering from a more closely spaced distribution (and checking the metering from NC266SP), and better estimates of COPCs in porewater must be completed before the FS so that groundwater's ongoing impacts to the site can be understood and fully included in the evaluation of remedial alternative. The failings of the groundwater evaluation are significant flaws in the NCG Draft RI.

NYC Comment 723) Appendix F, Page 1, bullet list, *"Surface sediment is defined as the deposits within the top 15 centimeters (cm) below the sediment surface (i.e., mudline)."*

A rationale for the selection and a justification for the appropriateness of surface sediments being identified as the top 15 cm of the channel materials should be provided. The difference(s) between surface and subsurface sediments (e.g., physical characteristics, importance for differentiating the depths) should be explained so the distinction between the two is more clear. In lieu of such explanation, the depth of 15 cm seems arbitrary, which could cause oversights of important details, as well as render study results overgeneralized and potentially inaccurate. In other portions of this Appendix and in the main body of the NCG Draft RI 15 cm to 30 cm is also considered shallow sediments.

NYC Comment 724) Appendix F, Page 2, bullet point 2, *"Fill is present only in the upland, and where present, occurs above the native material."*

It is known that many properties were historically built out into the creek with fill. Data that are available to support the statement that fill is absent in the Creek channel should be provided. Further, fill is immediately adjacent to the creek at most locations and makes up the bank material. This aspect needs to be highlighted as the largest amount of the groundwater discharges through this strata based on observations of seeps and on calculations of discharge using fill hydraulic conductivity and measured heads in the fill (NYC Figure 66).

NYC Comment 725) Appendix F, Page 3, paragraph 1, *"...three chemicals: total polycyclic aromatic hydrocarbon (17) (TPAH), total polychlorinated biphenyl (TPCB), and Cu (Cu)."*

Explanation is need on 1) why these three parameters are the only three for which loads were estimated, 2) why only totals were estimated, and 3) what 17 for TPAH represents or cites. Note that different congeners of PAHs and PCBs will have widely varying physicochemical properties so will have different fates with respect to groundwater transport.

NYC Comment 726) Appendix F, Page 4, Section 1.2.2 (overall comment). Rationale is required for the appropriateness of modeling only estimated total concentrations for parameters with known congeners that are demonstrated to behave differently from one another when transported by groundwater and why congener analysis was not included.

NYC Comment 727) Appendix F, Page 4, Section 1.2.2, paragraph 2, 2nd sentence, *"Chemical loads to the Study Area are considered zero for segments where hydraulic gradients are downward, upland groundwater elevations adjacent to are negative (i.e., lower than surface water)…"*

At some locations, the UGA water levels are below sea level, but water levels in the fill are positive (there are few places where measured heads in the fill are below sea level) and show discharge to the Creek. Since low-hydraulic conductivity post glacial deposits underlie the fill, discharge of water in the fill through the banks to the creek must be evaluated.

Per the definition on page ES-1 of main NCG Draft RI text, footnote 1, the Study Area includes the water and the sediments below the high-high water level. The statement above indicates the absence of contaminants in surface water that could negatively impact underlying porewater, groundwater, and/or sediment. From this, it can be interpreted that either there are no direct discharges to surface water to negatively impact underlying porewater, groundwater, and/or sediments, or contributions from those sources are negligible and have little impact on underlying conditions where infiltration occurs. Furthermore, this supports the conclusion that the primary mechanism for contaminant transport to the surface waters of the Study Area are via direct groundwater discharge, not direct discharges (from discharge pipes/outfalls, direct releases, or CSOs).

This discussion also does not consider the possibility that infiltrating surface water passes through a sediment bed that is highly contaminated and contains NAPL. At these locations, the Site is an up-gradient source of contamination to the groundwater.

NYC Comment 728) Appendix F, Page 7, Section 2, paragraph 2, 1st sentence, *"Additional chemistry data considered in the groundwater evaluation include laboratory analytical results for surface water, sediment, native material, surface sediment porewater (0- to 15-cm and 15-*

to 30-cm depth intervals)...."

The depth intervals that correlate to each media should be specified. No specific depth interval is defined for subsurface sediments, rather the depth of subsurface sediments is stated to coincide with the top of native. The citation above can be read to imply that 30 cm represents the top of native across all sampling locations discussed in Section 2. This is likely incorrect, however, and the depth description needs to be re-visited and the statement cited above requires further clarification as to what 15- to 30-centimeters specifically represents.

NYC Comment 729) Appendix F, Page 7, Section 2, paragraph 2, 2nd sentence, *"Salinity...data...are incorporated into the evaluation."*

Nowhere in the Draft RI text, nor in Appendix F, is the laboratory method used to analyze salinity (NaCl) described. It can be concluded that all salinity measurements were collected using a water quality meter, which convert Actual Conductance to salinity via algorithms (does not measure salinity as a function of NaCl). This is not a true measurement of salinity, as in "saline water." Meters measuring Actual Conductance respond to any ions in a water body, not just those from salinity. Contaminants and other natural mineral sources can affect the Actual Conductance of water. As such, caution must be taken when reviewing results and conclusions, as any specific "salinity" reading may or may not be representative of actual seawater salinity and could be due to contaminants in the water (units are presented in practical salinity units).

NYC Comment 730) Appendix F, Page 7, Section 2.2 (overall comment): For a RI/FS of this magnitude it is strongly recommended that any substantive interim reporting submitted during the RI efforts be included as an attachment to the final RI, so that a complete set of information and data and documentation of all of the RI efforts are provided for the record. Exclusion of such key pieces of information gathered during the RI requires justification in text.

NYC Comment 731) Appendix F, Page 11, Section 3.2, first paragraph. *"Shoreline structure information was first obtained from a boat-based Phase 1 RI shoreline assessment survey in November 2011, where visual observations were made regarding shoreline types (bulkheads, bare ground, and vegetation) and condition."*

It is important to note what the tide was when the structures evaluated during (high versus low, neap versus spring). Many of the structures look like solid shorelines until low-low tide when it is apparent that they are piers built on piles and the actual shoreline is some distance underneath and unobservable.

NYC Comment 732) Appendix F, Page 11, Section 3.2 Figures 3-3a through 3f (referenced in this section): The construction details provided indicate that all of the shoreline types except for (new) sheet pile do not present any restrictions to groundwater flow. Most have very apparent flow pathways through very coarse grained material (e.g., gravel and cobbles or stone/rubble ballast). Observations on the creek show that at low tide many of the sheet pile areas have not been well maintained and have been penetrated by corrosion so that they no longer impede groundwater discharge. As NCG discovered during their Tier 3 analyses, the shoreline type does not generally impede groundwater discharge unless it was specifically designed to do so and other hydraulic controls are in place (*e.g.*, the trench drain at the PDRC Laurel Hill Site).

NYC Comment 733) Appendix F, Page 13, Section 3.4.1, paragraph 3. References to the appendices and/or attachments in which the complete, raw transducer data are provided should be added. This comment applies to all raw hydraulic data discussed in the text or shown on figures and tables. Summary tables and nebulous/congested figures will not support a thorough review of the data. As good practice, the raw hydraulic data should be provided somewhere in Appendix F or well cross-referenced. Actual, live data files would be helpful for the review.

NYC Comment 734) Appendix F, Page 14, paragraph 3, 1st sentence, *"The pressure data recorded by the transducers at the long-term monitoring stations were converted to freshwater-equivalent heads to account for variable density effects, which were then used to calculate vertical and horizontal gradients."*

Review of long-term monitoring data gathered reveals that some of the most current and cutting-edge transducers were utilized in and, of particular concern, ostensibly mishandled, during the investigation. It should be noted that the transducers used are equipped with a Dynamic Density Correction Feature, which, if used, would have been appropriate, accurate (as pertains to variations with time), and efficient, rather than having to make retroactive corrections to the data. This (in addition to other comments that address the execution of the hydraulic tests and validity of the slug test and long-term monitoring data) is an oversight and speaks to the concerns of mishandling equipment, expertise and/or diligence of those involved with the hydraulic testing, and inappropriate manipulation and/or usage of the hydraulic data. Provide explanation for why more tedious and less accurate hand-calculations were conducted to correct for salinity over usage of the Dynamic Density Correction Feature available for the transducers.

NYC Comment 735) Appendix F, Figures F3-7a through F3-7g (referenced on page 14) The tight clustering of data from multiple monitoring wells, as currently presented is obfuscating and precludes the reader from being able to draw anything meaningful from the figures. The data should be more separated and discussed in much greater depth in the text of the report.

NYC Comment 736) Appendix F, Attachment F-D, Section 2 (overall). Similar to the comment above, the transducers used were capable of determining elevations on their own. Explain why the extra step of retroactively manipulating the data was chosen over using the more sophisticated and less fallible features available for the transducers.

NYC Comment 737) Appendix F, Page 15, Section 3.4.2, paragraph 1 (and Tables F3-3 and F3-5). Table F3-5 shows a basic summary of statistics (*i.e.,* arithmetic average, minimum, and maximum) of the vertical gradients at long-term monitoring locations in-creek. The standard deviations of these data sets and resulting interpretation should be provided. This provides greater and more useful insight into the variation that can be expected at the wells.

Additionally, statistical justification is needed for using small sample sizes in the average contours (*i.e.,* wells or properties with only one or a few water level measurements, like the majority of those tabulated in NCG Draft RI Table F3-3). These small sample sizes may not be representative of overall average groundwater elevation for the Study Area. Typically, such small datasets render statistical analysis of any sort inappropriate. This is particularly true in this system where water levels can be influenced by tides and fluctuate significantly over any given tide cycle.

NYC Comment 738) Appendix F, Figure F3-11 (referenced on page 15): The RI shows the average groundwater elevation contour for the UGA in the vicinity of the Creek. USGS wells,

long-term monitoring locations, and uplands properties wells were used to create the water table map, however, explanation is required for contours where no data points are shown. The contours appear more elaborate than the available data allows (e.g., horizontal flow to the tributary heads, east of the creek, and the west corner of the Calvary Cemetery). The contouring suggests data points used but not shown, or uncorrected geoscience software output. As an example, the contours around Dutch Kills "bend" as if to simulate horizontal flow to the Creek.

The NYCDEP provided to NCG information on substantial subsurface modifications that were undertaken at the Newtown Creek Waste Water Treatment Plant as part of a multi-billion dollar upgrade over the last decade. The information given to NCG includes a calibrated 5-layer groundwater flow model that contains detailed information on the subsurface modifications. Sheet piles designed to limit groundwater flow during dewatering were driven through more than 80 percent of the overburden thickness were installed surrounding the site and around specific excavations within the site. NYC Figure 67, taken from the model given to NCG, shows where the sheet pile was installed. This sheet pile was designed specifically to be water tight. NCG's contour maps (both F3-11 and F3-12) ignore the existence of this barrier to flow.

It is also not clear why fill monitoring wells at the Frito Lay site included in Draft RI Table F3-9 but excluded in Figure 3-12. Including these wells would show stronger hydraulic gradients adjacent to the Creek, the groundwater elevations disagree with the way that the contours are now drawn.

NYC Comment 739) Appendix F, Page 16, Section 3.5.2 (overall comments on hydraulic conductivity): Interpretation of the hydraulic conductivity ranges in this section is strongly recommended. The section lists ranges, but it is not clear what this variability means for the study or what conclusions have been made based on these data.

Careful inspection of the ranges indicate extreme variability in the materials across the area investigated. With such heterogeneity, rather than using an overall average, more local and thorough understandings of the conductivities would be more appropriate. Using more localized hydraulic conductivity values would more accurately represent groundwater flow and contaminant transport pathways.

NYC Comment 740) Appendix F, Page 17, Section 3.5.3.1 (overall comments on monitoring wells and slug testing): More focused discussion of well installation activities, units and material textures screened across, construction, development, problems encountered, decommissioning is warranted, as is a Well Construction Summary Table, which is a standard part of any report. Depiction of well construction with detailed lithology (i.e., logs, cross

sections) is necessary and has not been done. These components (as built) must be included in the Draft RI, regardless of what was included in any work plan, QAPP, or any other earlier document. Wherever slug tests, well construction details and purging records are discussed or shown elsewhere in the Draft RI there must be a citation to the details of these activities and the details must be presented in a comparable and easily followed method. As an example, well construction details presented in Appendix B09 are generalized and presented with depths in feet, while the more detailed core lithologic logs are in centimeters, making comparison of well construction details to lithology difficult at best. This is an unacceptable way of presenting the details of these investigations.

Inspection of the slug test data reveal numerous causes for concern for the integrity of the resultant data set. A list of concerns was previously issued. The content of that previous summary and additional items can be summarized as follows:

- Slug testing is not appropriate in soft sediments, which, as demonstrated by the HPT attempts, are susceptible to deformation during testing. Without the feedback from a tool like the HPT, it may not be clear during testing that deformation occurred. This can yield falsely high apparent hydraulic conductivities.
- Explanation for how the slug test were conducted is not provided but is necessary to inform the reader. To reference that this information is in an older document not acceptable: details of the methodologies, problems encountered, tools used, etc., are necessary.
- Review of the data indicate that the slug tests were inappropriately conducted and that the instruments were inappropriately used.
- Consideration to the type of displacement needed to best evaluate this tidally dominated environment was not given (i.e., large displacements were made which have a high likelihood of deform the sediment and resulting in an overestimation of hydraulic conductivity).
- Analysis of slug test results were not completed accurately (the depths to top of screen used in evaluation of slug tests in native material are inaccurate).
- Explanation for anomalous data (as an example why Actual Conductivity values vary during some of the tests) and usability of tests with errors noted on the transducer output logs is not provided and is required.
- Explanation for why the tools, such as the real-time density based head correction feature of the transducers, were not used to their maximum capabilities is warranted.

Any conclusions made based upon these data and their calculated hydraulic conductivities is suspect. As described elsewhere, multiple other lines of evidence show that the slug tests significantly overestimated the hydraulic conductivity of the sediment bed. Most significant are the inability to calibrate HPT equipment in the sediment bed due to sediment deformation and

the excessive drawdown during low-flow purging of temporary monitoring wells. Both of these show that the hydraulic conductivities derived from the slug tests for the sediment bed are significantly overestimated. Without the details, it is impossible to assess the validity of slug test results in the other strata (*i.e.,* the post glacial deposits and the UGA).

NYC Comment 741) Appendix F, page 20, Section 3.5.3.1, paragraph 1, *"...although some groundwater discharge is likely to occur directly from the fill along the banks of the Study Area, the majority of the groundwater flow from the upland to the Study Area occurs via deeper flow paths (within the UGA)."*

These statements are made without any analyses to support them. Note that the cross-sections presented in this document do not include water level and water flow information. Regardless, the City has calculated the flow through the fill (banks) and compared it to measured seepage through the sediment bed. These analyses are based on (and located at) the cross sections presented in the Draft RI Appendix F, Attachment F-I, hydraulic conductivity of fill report by NCG (10^{-2} cm/sec) groundwater elevations found in Draft RI Figure F3-12 (using heads at wells, not contours, adjacent to the Creek) and seepage metering (Ultraseeps) conducted by the City (because the NCG seepage metering includes spurious and over extrapolated data). Comparing Darcy-law calculated for discharge from the fill material compared to seepage meter estimates applied to the width of the creek results in an average ratio of 3:1 flow through the fill compared to the sediment bed. NYC Table 9 presents the results of this comparison.

At only one location (English Kills) is the flow through the sediment bed greater than the flow through the fill. Also, although the cross sections show "impermeable barriers" at the Creek, there are permeable banks adjacent to the (usually) sheet pile, so the analyses did not consider the barrier as impeding flow. These analyses along with hydrogeologic flow sections presented in NYC Figure 65 show that groundwater follows the path of least resistance and the majority discharges through the fill (banks). The Draft RI at does not have a defensible hydrogeologic conceptual site model, what is present is contrary to standard hydrogeologic principals.

For this reason all analyses presented in the Draft RI that assess or include groundwater discharge to the Creek underestimate the amount of groundwater discharging and incorrectly assume all groundwater passes through the sediment bed as a contaminant transport pathway.

NYC Comment 742) Appendix F, Page 20, Section 3.6, paragraph 1 (overall comments): Usage of average discharge data is understood for a generalized, overall depiction of the groundwater-surface water flux. However, if using the data in a model, the flux itself would be of some use. Sometimes flow is down, others it is upward. This kind of tidal pumping effect is very real and very important in settings such as the Creek. For reported use in fate and transport modeling with a fine-scale grid, some discussion of such an evaluation and analysis of the flux ranges, patterns, and sensitivities is warranted.

Furthermore, the seepage point at the mouth of the Creek (NC266SP) is noted as being anomalous by the USGS. This point is very remote from the other points, so the impact of the anomaly reaches a much greater area in the model/CSM than it does in reality. Additional data from this point, near this point, between this point, and where other large distances span between points is needed (the City has made measurements in these areas which cannot duplicate the measurement at NC266 or the calculated infiltration at NC320). This data point has a significant impact on the "modelled" hydrodynamics of the system and the Draft RI conclusions.

Lastly, it is not clear if the seepage measurements were reviewed in terms of a simple Darcy calculation to verify the validity of the hydraulic parameters (vertical hydraulic conductivities, vertical flux, and/or vertical hydraulic gradient). Where measurements were collected, checking the validity of the estimated vertical conductivities and/or vertical gradients should be conducted to demonstrate consistency between the measured results and the calculated/estimated results for vertical flux (and the other two parameters, for thoroughness).

NYC Comment 743) Appendix F, Page 21, Section 3.7 (overall comment): Despite previous documents possibly detailing this information, a description of the sampling methods and chemical analysis conducted is required. If present elsewhere in the Draft RI, a reference to this information's location should be provided.

NYC Comment 744) Appendix F, Page 21, Section 3.7.1, paragraph 1, last two sentences: It is not clear how "dry TDS concentrations have an arithmetic average of 26,000 mg/L," when the range listed is 8,500 to 26,000 mg/L.

Additionally, explain what is implied by *"more spatial variation than surface water data,"* stated in the last sentence. It is recommended that anything to do with spatial variability should be depicted on a figure. If one of the figures already included makes the points, please provide a reference to it in this paragraph.

NYC Comment 745) Appendix F, 21, Section 3.7.1, paragraph 2, (reference to Figure F3-19): Figure F3-19 shows salinity in PSU across the creek. This is a converted value for salinity, not actual salinity, which could be quite different due to cofounding effects. A note is needed describing the actual measurement and how it was converted to salinity from actual conductivity.

NYC Comment 746) Appendix F, Page 21, Section 3.7.1, paragraph 2, (reference to Figure F3-20). Figure F3-20 needs to include surface water salinity measured at each location as well as the groundwater salinity.

NYC Comment 747) Appendix F, Page 21, Section 3.7.1, paragraph 2: *"Salinity in groundwater near the mouth at the East River has concentrations similar to surface water, and groundwater salinity generally becomes lower, toward the upstream areas of the Study Area."*

This statement is not supported by the data. NCG Draft RI Figures F3-21a and b show that there is a salinity gradient from the groundwater towards the surface water and that the groundwater always has a lower salinity than the surface water. While there is greater salinity towards the mouth of the Creek, the reason for that trend is not clear and could easily be related to salt water intrusion that occurred during over-pumping in the past.

NYC Comment 748) Appendix F, Page 22, Section 3.7.2, second paragraph: *"as well as the large spatial variability in TPAH and TPCB concentrations, suggests that there are influences from particulate matter in the groundwater samples from the temporary wellpoints."*

Large spatial variability in TPCB and TPAH is likely due to proximity to sources. As discussed later, there appears to be almost no correlation between these COPCs and TSS.

NYC Comment 749) Appendix F, Page 23, Section 3.7.2, first paragraph. *"However, the temporary wells in the Phase 2 investigation used pre-packed well screens and many of them were completed in fine-grained materials. These temporary wells could not be developed as extensively as a typical land-based, permanent groundwater monitoring well. As a result, some of the Phase 2 groundwater and mid-depth sediment porewater samples have higher turbidity compared to more typical land-based, permanent monitoring wells."*

Well development methods and logs for development of the temporary wells need to be presented along with summary tables of parameters/flows measured during well development.

NYC Comment 750) Appendix F, Page 23, Section 3.2.7, first full paragraph. *"Cross plots comparing whole water TPAH, TPCB, and total Cu concentrations to TSS and turbidity are presented in Figures F3-25 through F3-30. As shown, the concentrations of all three chemicals correlate well with TSS and turbidity, suggesting that the whole water concentrations reported for these analytes in unfiltered groundwater samples are affected by TSS and associated particulates in some of the samples."*

The plots shown on NCG Draft RI Figures F3-25 to F3-30 are shotgun patterns and actually show quite the opposite of what is described above: there is little correlation between analytes and TSS. The only graph that indicates any correlation is for Cu (Figure f3-29). For such analyses as these, statements should be supported with coefficients of correlation (*r*).

NYC Comment 751) Appendix F, Page 25, Section 3.2.7.1 first paragraph. *"For this evaluation, it was assumed that the DOC-bound fraction was negligible given the generally low concentrations and detection frequency for DOC in groundwater samples. As shown in Table F3-25, DOC is non-detect in 52 of 64 samples."*

It is unclear if DOC was also measured in mid-depth sediment porewater and in shallow porewater or if DOC was also discounted in these samples.

NYC Comment 752) Appendix F, Page 29, Section 3.7.2.2.1, paragraph 1, (reference to Figure 3-35). Figure 3-35 shows estimated dissolved TPAH in groundwater across the creek. Rationale for the concentrations represented by each color is required. Showing four colors representing 0.026 to 9.8 and then only one to represent concentrations above 9.8 is an ineffective presentation. This categorization is very unclear from the notes on the figure and not discussed in the text. Also, presentation of the raw, un-partitioned data is necessary (as a separate figure).

NYC Comment 753) Appendix F, Page 29, Section 3.7.2.2.1, paragraph 1, *"Estimated dissolved phase concentrations are generally less than 10 ug/L...."*

The significance of 10 ug/L needs to be explained (is this a standard, criterion, of statistical importance?).

NYC Comment 754) Appendix F, Page 29, Section 3.7.2.2.1, paragraph 7, "*Estimated dissolved phase concentrations in the main stem are generally less than 50 ug/L (24 of 29 samples)...."*

Similar to the previous comment, the significance of 50 ug/L needs explanation (Is this a standard, criterion? If so, clarify. If not, add rationale for and implication of the statement).

NYC Comment 755) Appendix F, Page 32, Section 4.1 (reference to Figure F3-10): It is unclear why there are differences between the reported contours in Draft RI Figure F3-10 and the USGS Long Island 2010 water table contours.

By definition, being outside of a groundwater divide means that groundwater flows away from the area within it. The disparities between this definition, the description of the horizontal domain of the PGCA area in text, the domain depicted in Figure F3-10, and the ultimate rationale for having chosen this particular shape need to be explained.

NYC Comment 756) Appendix F, Page 34, first paragraph, *"In western Long Island, the UGA consists of saturated glacial drift...."*

Please clearly explain what is meant by "saturated" glacial drift.

NYC Comment 757) Appendix F, Page 35, 3rd bullet under Section 4.4, "*Bottom elevations of Phase 2 in-creek Geoprobe borings...."*

Explain whether these boring actually reached the base of the UGA. If they did not, explain the differences between the original and refined. There may be a need to collect additional data there to get a better understanding of the depth of the UGA. It's unclear if the depths notably different, a little different, frequent, sporadic, etc. It is also unclear how significant it is that the depths of the UGA had to be refined, and if the refinements truly adequate to represent the system. A figure showing the changes (like an isopach map of before and after) would be beneficial. It cannot be ruled out that the Study Area may require further stratigraphic evaluation.

NYC Comment 758) Appendix F, Page 36, Section 4.5, 1st paragraph, "*This section qualitatively describes the sources, flow paths, and sinks for groundwater within the PGCA."*

Qualitative descriptions alone are not sufficient and do not provide adequate information to inform a CSM or decision-making. Quantitative discussion of flow is required and must be referenced in this section.

NYC Comment 759) Appendix F, Page 37, Section 4.5, first partial paragraph, *"Because of the quantity of the water being transmitted and <u>the age of the water-supply system</u>, it is likely that a large quantity of water would leak from the water-supply lines."*

A review of Buxton and Shernoff, 1995 indicates that these estimates come from oral communication with the now-defunct Jamaica Water Supply company and a 1981 NYCDEP annual report. More recent sources of information would likely indicate that maintenance and modernization of water systems in Brooklyn and Queens. Directly measured information on leakage from water pipes shows it to be minimal.

NYC Comment 760) Appendix F, Page 37, Section 4.5 last paragraph: "*Groundwater flow in the UGA is toward the Study Area and the East River, with two exceptions.*"

It appears that this section argues that water from the East River flows inland subsurface to discharge near Whale Creek and Dutch Kills. Water in the East River flowing inland would be inconsistent with water in the UGA discharging toward the East River. The notion that water from the East River flows in the subsurface up-stream to discharge at Whale Creek and Dutch kills is counter to standard, well established hydrogeologic principles.

NYC Comment 761) Appendix F, Page 38, Section 4.5.1, 1st paragraph, last sentence, "*...under 1983 conditions artificial returns were approximately 70 MGD.... This information is used to estimate the artificial return in the PGCA.*"

More current, authenticated, and localized data should be being used at this point in this investigation.

NYC Comment 762) Appendix F, Page 38, Section 4.5.2, paragraph 2, "*Groundwater flow in the UGA is toward the Study Area and the East River, with two exceptions.*"

It is understood that the seepage metering conducted by the USGS facilitated quantification of vertical seepage to the Study Area through the Creek bed. Please quantify the component of flow to the creek that is horizontal. Also, this metering was described by the USGS to be highly anomalous. Drawing any conclusions about the subsurface conditions of the larger area from this one anomalous measurement is questionable. Similarly, the calculations of infiltration at NC320 and NC056 suffer from spurious slug test data. The lithologic log for NC320 contains only fines and no transmissive material is present (although the coring there had exceptionally bad recovery so the complete stratigraphy is not known).

NYC Comment 763) Appendix F, Page 38, Section 4.5.2, 2nd paragraph, Figure F4-8 reference. An explanation us needed for the red line that extends from the East River to Whale Creek.

Over the course of the field work, the pumping rates at the known upland groundwater

extraction areas have varied, sometimes a little and sometime a great deal. Please provide justification to back up the need(s) for the changes and how why the pumping values presented are believed to be the most accurate. What is the variability and how would it affect the analyses? In the justification, sources must be referenced appropriately.

NYC Comment 764) Appendix F, Page 38, Section 4.2.5.1 Figure F4-10(referenced in the second paragraph). The figure shows that the Con Edison 11th Street conduit is constructed largely in the bedrock (only drop shafts are in contact with the UGA). The recharge area and flow in the bedrock has not been described in the NCG Draft RI and is unknown. Water that is drawn from this and other structures in or partly in the bedrock cannot be assumed to come from the UGA and therefore cannot be included in a water balance that is only considering the UGA.

NYC Comment 765) Appendix F, Page 39, Section 4.5.2.1, 2nd paragraphs 3 and 4, *"...27 [industrial] well logs were reviewed. ...these 27 industrial wells are assumed to be no longer in operation."* ***and*** **Page 40, Section 4.5.2.1, 1st paragraph,** *"...four permitted, non-potable supply wells are within the PGCA...the amount of groundwater withdrawal for non-potable uses is unknown."*

Information about the non-potable water uses of the four permit holders should be collected.

NYC Comment 766) Appendix F, Page 40, Section 4.5.2.1, last paragraph. *"Attachment F-J presents an assessment of the water chemistry profile of the extracted water at the Con Edison – 11th Street Conduit (DAR No. 110). The extracted water is interpreted to be a mixture of surface water from the creek (that has a composition similar to seawater) and groundwater."*

The Con Edison tunnel is constructed in bedrock and the source of the water in the bedrock is unknown. Figure F-J-2 is not informative (the logarithmic scale makes comparison of the relative concentrations impossible). What is needed is Piper diagram that can be used to assess the aqueous geochemistry with respect to origins of the water. As seen on Table F-J-1 there are significant differences in the relative amounts of cations and anions found in the tunnel water as compared with the surface water, which without further analyses appears indicative of alternate water sources. Where leakage occurs in the tunnel is also of importance, but is not discussed. Compared to other larger tunnels in the area, 60 gallons a minute seems like a significant amount of leakage (the nearby Midtown tunnel which penetrates the same bedrock has a discharge permit for 20 gallons a minute, most of which is from run-off from precipitation).

NYC Comment 767) Appendix F, Page 41, Section 4.5.2.2 (whole section): As pertains to losses from sewer pipes, the number of 4.9MGD total loss to sewer pipes within PGCA is inaccurate and is a significant overestimation. Review of the appendices at the back of the I/I report reveal the backup for much of the data summarized in the tables and discussed in the text.

Specifically, Draft RI Table F5-9 Note 5 states adjustment for sewer service areas E6, E8, and F6 could not be made because information about length of sewer pipe under water was not available. A closer read of the I/I report, however, reveals that this information is provided in Appendix A of the I/I report. It appears information used to inform the NCG Draft RI along this line was derived from Appendix C of the I/I report only.

NYC Comment 768) Appendix F, Page 41, Section 4.5.2.2 second paragraph. *"The I/I report concludes that "[T]he extraneous flows listed in Table 25 are, therefore, due to infiltration of groundwater directly into the sewers" (Greeley and Hansen 1982). Extraneous flows to sewers within the PGCA were used to calculate the loss of groundwater to sewers for the Tier 1 analysis."*

The City has gone to great lengths to correct NCG on their misinterpretation of the 1981 I/I report conducted for the NYCDEP. NCG have disregarded the NYCDEP's guidance and maintain their flawed assertions. First, later studies found that the extraneous flow that was assumed to be groundwater infiltration in the 1982 report (as a conservative assumption, not a conclusion) was actually due to other unaccounted for inflows such as tidal inflows, dewatering, and steam condensate. So NCG assuming <u>all</u> of the extraneous flow is groundwater is a significant error. Further, there was very little extraneous flow in the Newtown Creek Sewershed, and NCG misapplies the two locations where extraneous flow was measured to the entire Newtown Creek groundwater recharge area. NYC Figure -69 shows the Sub Service Areas (SSA's)

discussed in the report with the extraneous flow for each SSA shown. As can be seen, almost all of the SSA have no or very little extraneous flow. The small extraneous flows are explained by tidal inflows that were measured in the 1981 I/I report, but were not deducted from extraneous flow. The remaining two SSA's that have larger extraneous flows are close to the south end of English Kills. The SSA with the largest extraneous flow is only partially in the Newtown Creek groundwater recharge area. This SSA is coincident with a specific subway dewatering project (also outside of the Newtown Creek groundwater recharge area, more about this later) that was not included in the 1982 I/I reports accounting of inflows (Greeley and Hansen). This dewatering project accounts for a large portion of the extraneous flow from that SSA. The other SSA is adjacent to English Kills and could have been subjected to tidal inflows.

It is inappropriate to take the extraneous flow from two localized SSA's and apply it to the entire recharge area, when it is clear that most of the recharge area had *no* extraneous flow. As was presented to the EPA and NCG, a much better method of conservatively estimating losses to the sewer system is to use the maximum allowable designed infiltration and multiply that time the length and diameters of pipes that are known to be under the groundwater. Some pipes may leak more but many will leak less, so the total should be conservative.

All of NCG's assumptions seem to be aimed at reducing the estimate of groundwater discharge to the creek. It would seem counter intuitive for an investigation that needs to account for all contaminant inputs to the site to rather limit those inputs through assumptions.

NYC Comment 769) Appendix F, Page 41, Section 4.5.2.3 (whole section): The section states that dewatering at the Con Edison 11th Street Conduit is inducing downward flux of surface water into underlying units, but there is no discussion as to where these underlying units discharge. Knowing the concentrations of contaminants in surface water, porewater, and groundwater, it would seem prudent to discuss these water bearing units and discharge features to ensure that all potential migration pathways of the contamination in the Study Area are not posing a potential or real threat to human health or the environment. If this pathway has been addressed, further discussion is required. If this discussion is present in other parts of the NCG Draft RI, a cross-reference to that section is needed.

Further, as discussed above, the Con Edison tunnel is mostly in bedrock, which is outside the domain of what NCG have characterized. For example, it is entirely possible that water arriving at the tunnel originates a great distance away and is brought to the tunnel via a fracture in the rock that does not intersect transmissive deposits in the Newtown Creek recharge area. Much more information and investigation is needed before it can be concluded that surface water is making it into the bedrock aquifer.

NYC Comment 770) Appendix F, Page 42, Section 4.5.2.5. "*Some of the groundwater within the UGA, particularly the deepest portions of the UGA, may bypass the Study Area and discharge to the East River. If so, this would result in a loss of water from the PGCA that is not quantitatively included in the groundwater evaluation.*"

There is no evidence that any groundwater from within Newtown Creek groundwater recharge area discharges to the East River. This erroneous assertion is contradictory to NCG's flawed CSM that East River water flows in the subsurface upstream to discharge at Whale Creek and Dutch Kill. The assertion of "deeper in the UGA" is also not supported, since the UGA essentially pinches out at the western end of Newtown Creek, so there is no "deeper in the UGA". This shows a lack of internal consistency within NCG's groundwater CSM.

NYC Comment 771) Appendix F, Section 5.1, starting on page 43 (general comment): The parameter *Vgnc* from the Tier 1 analysis is derived from the summation of a series of groundwater water budget parameters. The result is an estimated discharge rate. Ultimately, Section 5.1 concludes that the overall groundwater discharge *from* the Study Area is 0.72 MGD (i.e., a losing stream). The Tier 1 water balance calculations appear to account for both the horizontal and vertical components of flow in the one term, *Vgnc*. It is unclear how these water budget estimates compare to the modeled parameters and/or results from Tier 2 analysis and how Tier 1 supports (or refutes) Tier 2 and/or 3 results. Discussion of the evaluation of the Tiers' results (how they compare, where the major differences lie, what accounts for the differences, etc.) is not included with any discernable clarity in the text of Appendix F, nor the Draft RI text. Discussion is needed to demonstrate how the different stages build on one another, to document the "learning" process and the error analyses that were conducted (as would be expected of any investigation), and to support the validity and connectedness of later stage results.

NYC Comment 772) Appendix F, Page 41, Section 5.1.1.1, reference to Table F5-2. Recharge across the PGCA is cited as being 9%. It appears it is assumed this is ubiquitous across the PGCA. Instead, sophisticated geospatial software should be used: a high-quality land cover data layer is available, soil types are estimated, recharge based upon these (if not additional factors) should be developed with the GIS. Coupling the use of sophisticated tools and techniques with broad, generalized estimates reveals inconsistency in the investigation, which weaken the accuracy, precision, and reliability of the results. For this level of investigation, a more consistent and sophisticated technique would be expected.

Furthermore, more current data available for recharge from literature should be used. At a minimum, the calculations summarized in Table F5-2 should be revised to incorporate more current work from the USGS.

NYC Comment 773) Appendix F, Section 5.1.1.1, reference to Table F5-3: A side-by-side comparison of the GIS layer and any aerial image shows that the category "other paved surfaces" are any grey-colored surfaces. Because other paved surfaces represents 29% of the PGCA, further differentiation between which "other paved surfaces" are pervious and which are impervious is necessary. The coverage represents a quarter of the PGCA—ground-truthing and field verification are imperative for accuracy. At a minimum, a field reconnaissance to support such refinements would be expected for this level of investigation. As an example, the +90-acre National Grid Greenpoint energy site is covered with a loose gravel cap. This loose gravel cap is isolated from traffic and pedestrians so is not compacted in any way, and from inspection, contains very few fines. This area of +90-acres is included in the "other paved surfaces" because it is grey in color, however, any drop of precipitation that falls on it will quickly move into the subsurface and not be subjected to evapotranspiration. This site is immediately adjacent to locations on Newtown Creek and English Kills where some of the largest seepage measurements have been made and where the highest groundwater contamination has been documented, so it is a gross error to consider it as impervious.

NYC Comment 774) Appendix F, Section 5.1.1, page 44, reference to Table F5-1: In Table F5-1, recharge is listed as 4.0 inches per year; in Table F5-2, recharge is listed as being 9% of the PGCA. This inconsistency needs to be explained or corrected.

Artificial returns in Draft RI Table F5-1 is a term based upon data from a report published in 1995, 22 years ago. For an investigation of this magnitude and at this stage, current, authentic, and quantitative values for this term are expected. This term must be quantified (with such data listed in the previous sentence) because the water balance is the foundation of all the rest of the groundwater work completed as part of the RI/FS. Again, poor data supporting the base of the information pyramid results in a weak build: model, CSM, interpretations and conclusions, etc.

Quantification of the terms in the water balance lack thoroughness, accuracy, and concreteness. The value for recharge is inconsistent throughout the text, and requires additional work.

NYC Comment 775) Appendix F, Page 41, Section 5.1.1, page 44, reference to Figure F5-1: Draft RI Figure F5-1 shows the estimation of recharge from precipitation based on percent impervious area using an exponential trend line to extrapolate essentially different interpretations of two data points. This is highly uncertain and the value derived from extrapolated point is essentially meaningless. As shown on NYC Figure 68, the 95% Confidence band for this extrapolation at the point where NCG chooses one value, 9 percent, ranges from 2.3 percent to 36 percent. The 9 percent value chosen is arbitrary and the 7 and 11 percent used in the "sensitivity analyses" described in Section 7 are essentially the same number and yield no light on sensitivity. The USGS calibrated groundwater model simulates recharge based on variation in ground cover, so recharge is varied in their across the Newtown Creek groundwater recharge area. Based on the USGS calibrated groundwater flow model, the average recharge is 25 percent. The NCG Draft RI underestimates the amount of water in the system.

NYC Comment 776) Appendix F, Section 5.1.1.1, page 45, 2nd paragraph, NJGS Tool. Using the NJGS tool to calculate recharge is invalid outside of New Jersey. The NJGS explicitly states in the model (author notes 6): *"The methodology was developed in the early 1990s and applies only to New Jersey."* Use of the tool for estimating recharge in the Newtown Creek groundwater recharge area is inappropriate and more accurate methods are available.

NYC Comment 777) Appendix F, Section 5.1.1.1, page 46, 2nd paragraph. The text states the recharge rate was estimated by first matching areas in the PGCA to "corresponding" land cover types in the NJGS Tool; second by matching the land cover categories from the GIS layer to NJGS land cover categories; and third by matching the soil types within the PGCA to those in the NJGS. Ultimately, the averaged recharge was scaled up, proportionally, because Long Island gets more precipitation than Newark.

The soil types and underlying between the two cities are not the same, which is, in part, why the GS cautioned against use of the tool outside of New Jersey. The Newark area is underlain by thin till on top of Newark Super Group Triassic siltstones, shales and sandstones. The bedrock nearby and underlying the Newtown Creek area is crystalline metamorphic and plutonic igneous rock. The tills and morainal material and ultimately soils derived from these rock types are very different than what is found in Newark, New Jersey.

NYC Comment 778) Appendix F, Section 5.1.2.2, page 49, 1st paragraph. NCG inappropriately apply specific localized subway dewatering projects outside the Newtown Creek recharge area (and described by the USGS in Misut and Monti 1999) as generalized subway dewatering across all subsurface of all of Brooklyn and Queens. The subway dewatering is simulated in USGS model as specific locations where dewatering takes place (Specifically the Crosstown or G line at three stations outside the Creek groundwater recharge area near Myrtle Avenue in Brooklyn, this is the subway dewatering described in the previous comment). The MTA was successfully contacted by NCG and provided information on subway dewatering within two miles of Newtown Creek that is significantly lower than what is estimated by NCG, however NCG insists that their misinterpretation of the USGS model document is correct and the MTA is incorrect. The MTA's dewatering rates are also reported in the 1982 I/I report (Greeley and Hansen), which unsurprisingly agrees with the MTA's correspondence. Again, the NCG Draft RI overestimates the amount of groundwater losses.

NYC Comment 779) Appendix F, Page 41, Section 5.1.2.3, page 50, 1st paragraph. As explained in a previous comment, NCG inappropriately uses extraneous flow from two SSAs and extrapolate that flow (even though there are other explanations for the water than groundwater) to the entire Newtown Creek groundwater recharge area. Based on these two areas, 3.8 million gallons per day are calculated as lost to sewers. However, according to the I/I report this is based on, all of the losses occur in one area near English Kills. If this magnitude of groundwater was being withdrawn, which is more than 4 times what is being withdrawn for groundwater remediation at the NCG's sites near the middle reach of Newtown Creek, where they claim significant induced infiltration due to the pumping, then the even larger withdrawal would cause significant induced infiltration from English Kills. But contrary to NCG's interpretation, English Kills has some of the highest groundwater discharge rates measured in the Site.

NYC Comment 780) Appendix F, Section 5.2, beginning in Section 5.2.1 on page 53, 2nd paragraph: "*The vertical anisotropy ratio for sediment is assumed to be 1 for all locations except NC056....*"

A vertical anisotropy of 1 to little more than 1 is highly unlikely, given the fine-grained texture of the soils and materials comprising the uppermost portion of the stream channel. Typically, vertical conductance in silts is two orders of magnitude less than horizontal conductance. This holds true, despite the "soft nature" of the material, which ultimately render slug testing in it useless (because slugs would disrupt the sediments more than facilitate movement of water through them). It cannot be assumed with confidence that the vertical anisotropy is 1. Fatal flaws in NCG's slug testing are described elsewhere in these comments; these flaws cause any

calculations using sediment hydraulic conductivities based on the slug tests to be invalid.

NYC Comment 781) Appendix F, Section 5.2.2, page 54, 1st paragraph, Figure F3-18 reference: In Draft RI Figure F3-19, NC266SP has an anomalous significantly high downward seepage (net -20 cm/day) and a very wide swing between infiltration and discharge (up to 130 cm per day instantaneous discharge). During the groundwater model meetings, Dr. Rosenberry of the USGS who conducted this seepage metering, claimed that NC266SP was the most anomalous measurement he has ever made. He cautioned that measurements at NC266SP should not be extrapolated any distance and that additional measurements in this area are needed (the NYCDEP has conducted three seepage measurements at this location and the USGS's results were not duplicated; all three NYCDEP measurements found positive seepage). Overextrapolation by NCG and their unwillingness to acknowledge measurements conducted by the City have made a significant error in the groundwater discharge estimation and CSM. Because there are significant concentrations of TPAH in groundwater in the region affected by NCG's flawed CSM (near the Pulaski Bridge), underestimation of loading also results.

If the extreme value is kept for inclusion in calculations reported in the Draft RI, which informs the FS and remedy, ultimately, justification for *why* the flux is so high in magnitude and verification of its lateral extent is required. In any investigation, dismissal or at least testing of outliers is expected, otherwise, unrepresentative data misinform dependent analysis and interpretations (i.e., impose bias and skewness). Addressing this issue requires more than a rebuttal in the form of a response to comment; this discrepancy needs to be addressed via the collection of additional data to support or refute the soundness of using data gathered from NC266SP (or utilizing the NYCDEP seepage data, which has been shared with EPA).

NYC Comment 782) Appendix F, Section 5.2.3, (global comment but prompted by page 55, 3rd paragraph: *"The only types of areas where seepage meters and long-term monitoring locations cannot be installed, and groundwater discharge may occur, are vertical permeable shorelines.... Based on a detailed geographic information system (GIS" evaluation of the entire wetted surface of the Study Area...."*)

Neither seepage, nor evaluation of the wetted surface behind "open" docks (i.e., covered on top with dock and vertically by barrier but otherwise open to groundwater discharge underneath) are evaluated in the NCG Draft RI. Failure to investigate these areas constitutes a major data gap in the NCG Draft RI that must be addressed before implementation of any pilot testing or full remedy. As noted elsewhere, flow through the banks constitutes ¾ of the groundwater discharge and is not acknowledged by NCG.

NYC Comment 783) Appendix F, Page 55 last paragraph into page 56, paragraph 1: The assumptions detailed in this paragraph are dependent upon this assumption and that of the UGA being more hydraulically conductive/permeable than the fill. Elsewhere in the report, NCG shows the fill to have the same hydraulic conductivity as the UGAS. The analysis presented however fails to acknowledge the low-permeability post glacial deposits which exist at almost all places between the fill and the UGA as well as the very low-permeability (cannot even low-flow purge it) sediment that lies between the UGA and the surface water. NCG was asked to provide hydrogeologic flow sections and cross-sectional models that would resolve these points but failed to do so. NYC Figure 65 and Table 9 show that ¾ of the groundwater discharge flow through "2.5% of the wetted surface**".**

The Draft RI is deficient, it fails to address the majority of the groundwater discharging to the site and dismisses an important source of contamination with a flawed assumption.

NYC Comment 784) Appendix F, page 56, Section 5.2.4, paragraph 1. The assumption that the conductivity (the actual measured value, later converted by the water quality meter to PSU) is due to seawater requires verification with actual salinity data analyzed by a chemical analytical laboratory. Conductance is simply a response to ions in dissolved load in water, and it responds to more than just sodium and chloride ions.

NYC Comment 785) Appendix F, Page 59, Section 5.2.6.1, paragraph 1. Areas with reported negative downward flux are areas that are poorly characterized (in terms of seepage metering points) and are based solely questionable data. Although some induced infiltration is expected near areas of significant groundwater withdrawal, NYCDEP data shows that the area characterized by NCG to have negative flow in the middle reach is exaggerated, and the estimated negative flow area near the mouth of the creek likely does not exist (other than a very localized anomaly that likely has another explanation). Given the magnitudes of negative flux portrayed by NCG, the inconsistencies noted throughout these comments, the assumptions and conclusions made based upon these data are questionable and ignore data collected by NYCDEP that show extrapolations by NCG are incorrect. The NCG Draft RI requires that supporting data be collected (including about groundwater discharging from the banks). These are major data gaps that are fatal flaws to the Draft RI as presented.

NYC Comment 786) Appendix F, Page 60, Section 5.2.6.2, paragraph 2, "*... the interpretation of negative seepage in this area is consistent with the expected pattern of natural saltwater recirculation with in a freshwater-saltwater transition zone....*"

The *magnitude* of the negative seepage is by no means consistent with any expected natural saltwater cycling. As noted elsewhere, the USGS conceptual model is perpendicular to the shore line at a beach setting and is in no way analogous to an estuary that sits upon a prolific aquifer system. If NCG's CSM were true, then the groundwater near would be at the same salinity as the surface water (they are postulating that East River water migrates through the subsurface to Dutch Kills and Whale Creek where it discharges, so in this scenario all of the water in the subsurface must be surface water from the East River), but all measurements presented by NCG show a gradient from the less saline groundwater to the more saline surface water, showing this CSM is false. This whole scenario seems concocted simply to support over-extrapolating a single anomalous data point.

Appendix F, Page 63, Section 5.3, last paragraph, "*Groundwater discharge is positive (i.e., upward) for the majority of the Study Area.*"

In light of this statement, anomalous data points that potentially skew interpretations should be considered as possible outliers and either discarded or further investigated. The Draft RI maintains an overall net-negative discharge from the Study Area, which if true would dewater Greenpoint, and there is no upland data to support that. This one sentence suggests that further investigation and consideration of the data, assumptions, and conclusions should be revisited before any of these conclusions are used to inform evaluation of any potential remedy.

NYC Comment 787) Appendix F, Page 65, first paragraph, last sentence, "*These results show significant spatial variation throughout the Study Area in chemical loads from groundwater; spatial variation is also different for each chemical.*"

If spatial variation is significant, and it varies for each chemical, then it would suffice to reason that source areas can be more robustly defined.

NYC Comment 788) Section 1.1.2, paragraph 3, *"Due to the protracted history of industrial development, urbanization and discharges into the Study Area from numerous uncontrolled sources..., and the dynamic transport and depositional processes within the Study Area over time, the locations of elevated groundwater TPAH, TPCB, and Cu concentrations and load cannot be definitively linked to proximate upland sites."*

This statement appears to contradict or ignore the conclusion cited from page 65. It is understood that specific property owners or operators may not be able to be linked, but it would seem reasonable to be able to make linkages between contaminants and physical properties (i.e., the land itself), given the variability noted on page 65. As evidence, the highest concentrations of TPAH in groundwater beneath the sediment are adjacent to the former MGP site. It is more than highly likely the TPAH in the groundwater originated from the processes at the MGP site.

A clear understanding of the conditions of the land (on which the uplands sites are situated) are critical for any well-informed CSM along the lines of understanding the nature and extent of source material. No apparent linkages of this sort have been made and discussed beyond sweeping generalizations. To understand groundwater contamination impacting Newtown Creek, it is imperative to understand the sources of the contamination. A much more thorough investigation of this needs to be conducted to address this deficiency, so meaningful connections can be made, understandings deepened, and a constructive path forward can be forged.

NYC Comment 789) Appendix F, Page 65, first paragraph, last sentence, Appendix F, Section 6, page 66, paragraph 2 (general comment on alpha): The quantitative, geochemical, and/or statistical rationale for an alpha of 0.25 for groundwater needs to be explained. Stating it is conservative with no scientific or statistical basis that backs this up is insufficient, as is the relative and subjective line of evidence provided toward the end of the paragraph.

NYC Comment 790) Appendix F, Page 65, first paragraph, last sentence, Appendix F, Section 6, page 67, paragraph 1, last sentence, *"...groundwater samples with lower alpha values may also have been affected by the presence of NAPL in the groundwater sample, further indicating that the TPAH load may be biased high."*

A counter-argument to this statement is that if NAPL is present in the matrix through which groundwater is flowing, then it can be expected that extremely high dissolved concentrations of TPAH will be contributed to the groundwater. Instead of weighing whether there is bias in the concentrations, the conclusion should emphasize the concern that NAPL is present at that sampling location.

NYC Comment 791) Appendix F, Page 65, first paragraph, last sentence, Appendix F, Page 69, Section 7.1, (general comment about recharge range used): A more robust sensitivity analysis is required. Recharge values as low as 4% and as high as 11% have been discussed in the Draft RI, as noted the uncertainty in the original analysis has a 95% confidence band from 2.3 to 36 percent. Varying the percentage up and down from 9 percent by 2 percent is not an effective sensitivity analysis. Variation should be greater, as is common for model sensitivity analysis and supported by the known uncertainty. Further as noted elsewhere, the calibrated USGS model simulates groundwater recharge in the area as 25 percent (on average). The sensitivity analyses does not test the model is of little value.

NYC Comment 792) Appendix F, Page 65, first paragraph, last sentence, Appendix F, Page 70, Section 7.2, third paragraph, last sentence, *"This change affects the majority of the Study Area."*

This statement requires elaboration. It is not clear how and what it changes in the majority of the Study Area, or why it is it believed to change it. The report should detail what specifically happens to the model when the changes are made and what inferences can be made.

An explanation is also needed on why vertical anisotropy was explored during sensitivity analysis but horizontal and vertical hydraulic conductivity were not separately explored.

Based upon the results of this sensitivity analysis, it is assumed (but not stated outright) that when vertical anisotropy increases, there is less vertical flow. This circles back to the comments about the water balance—the balance must be established up front and thoroughly rather than after the fact or as an afterthought. It is a real possibility (and highly likely) that there is greater vertical anisotropy than what is used in NCG's model. As such, knowing seepage metering yielded actual values, if water has a more difficult time getting through the channel sediment vertically, then it has to be introduced *somewhere else* to maintain consistency with the well-thought out and quantified water balance. Inconsistencies in data lend themselves to the re-working of the investigation's CSM, which should be dynamic and flexible to refinements. In this instance, the results of the sensitivity analysis (in addition to the other items questioned in this set of comments) show that the water budget as presented is flawed.

City Comments on NCG Draft RI Appendix G – Final Modeling Results Memorandum

The Final Modeling Results Memorandum (FMRM) for point source, hydrodynamic, sediment transport, and propeller induced sediment re-suspension ("prop wash") modeling, Appendix G of the NCG Draft RI, has several major flaws. The flawed modeling results presented in Appendix G are pervasive throughout the Draft RI, including Section 3 - Natural Setting, Section 4 - Nature and Extent, Section 5 - Sources, Section 6 - Fate and Transport, and Section 8 - Conceptual Site Model. Further, the flawed modeling results presented in Appendix G are intended to form the basis of chemical fate and transport and bioaccumulation models to be developed during the FS. If the issues identified in this section are not corrected, and NCG continues to rely on the current model, the result will be an inaccurate assessment of remedial alternatives in the FS.

One of the most critical deficiencies is NCG's failure to accurately calibrate the model. Importantly, NCG has used East River boundary conditions as adjustable calibration parameters rather than known inputs for suspended sediment composition (i.e., grain size), tidal amplitude and tidal phase. The NCG approach has added rather than eliminated degrees of freedom. Notwithstanding NCG's poor choice of model boundary locations in the Lower East River, while the inappropriate NCG tidal amplitude and tidal phase boundary condition specifications can likely be corrected using existing measurements and regional models, correction of the suspended sediment composition specifications requires collection of measurements, especially for characterization of the composition of East River solids. Flaws in the NCG model calibration are further evidenced by the arbitrary assignment of a very slowly settling solids class to much of the suspended sediment in order for the model to simulate measured TSS concentrations in lower Newtown Creek. A calibrated model should not to use different settling speeds to match measured data.

In addition to model calibration issues, the City has identified several other deficiencies in model results, including, but not limited to: inadequate representation of upland solids loadings to the Creek; qualitative and unsupported inferences regarding spatial and temporal trends in Creek solids; use of a biased sub-selection of EPA derived net sedimentation rate targets; absence of separate presentations for fine and coarse grain solids results; incorrect reactivity of point source organic carbon solids; overall uncertainty of prop wash modeling; effects of groundwater discharge and aeration system mixing on hydrodynamic circulation; need for more comprehensive displays of model and measurement comparisons, especially for low pass filtered currents; and confusion between model sensitivity and model uncertainty, especially in the context of the point source model. These concerns are detailed in the comments that follow.

To address these deficiencies in the NCG model would require significant data collection major, revision of model inputs and calibration, and meaningful peer review. As an alternative, the City suggests that EPA take advantage of the fact that the City already has developed a more detailed, more accurate, peer reviewed model, and adopt the City's models for the NCG Draft RI. The City's Newtown Creek models have been developed with continuous feedback from peer reviewers and include a model grid very similar to NCG's model grid within Newtown Creek, but with more detail and accuracy, as the City's model includes segmentation in the Upper and Lower East River and in the Harlem River and interfacing with a regional model for boundary conditions Reliance on the City's model would be far more efficient that trying to resolve the pervasive issues with the NCG model, which would require continued engagement of EPA modeling experts, and collection of additional solids measurements from upland sources and the East River. Even after a properly calibrated model is developed, the conditions under which the models will be applied for remedy evaluation will require discussion and coordination with federal and state regulatory programs.

The City has already presented its hydrodynamic model to EPA, NYSDEC, and NCG and has been working on a sediment transport model. Pursuing revisions to the NCG models would require continued engagement of EPA modeling experts. Collection of additional solids measurements from upland sources and the East River are needed. Once calibrated models for the NCG Draft RI are achieved, the conditions under which the models will be applied for remedy evaluation will require discussion and coordination with federal and state regulatory programs. NCG has failed to achieve final calibrations suitable for RI purposes. While nearly complete transmittals of NCG model source codes, model input files, and model output files allow for general reproducibility of the NCG model results, numerous deficiencies in the models are readily apparent.

As appropriate, the City has incorporated results of "hands-on" work with the NCG models in the comments. Comments on Appendix G, are divided into two sections 1) the geo-neutral point source flow and hydrodynamic modeling and 2) the sediment transport modeling.

Comments on Appendix G, Geo-Neutral Point Source Flow and Hydrodynamic Modeling

NYC Comment 793) Appendix G, Section 1.1 Description of the Study Area, Page 1: In reference to NCB-002, NCG refers to "WWTP Effluent Overflow." The term "treated," which is used elsewhere in this document when referring to the pumped groundwater treatment system point sources, is not used here. Meanwhile, because the term "overflow" is used, this source is erroneously associated with "combined sewer overflow." The document should be revised so that "treated" is and "overflow" is not used in descriptions of discharges from NCB-002. Further, change "discharges of wastewater treatment plant (WWTP) effluent overflow;" to "discharges of wastewater treatment plant (WWTP) effluent".

NYC Comment 794) Appendix G, Section 2.1.1, Modeling Framework, Pages 6 and 7: The second set of bullets includes generalized descriptions of the functions of each of 6 models. In the first five, the word "predict" is used to describe model output. Technically, "predict" only applies when the models are used to project to a future or hypothetical condition, not when used in association with a prior set of conditions. The bullet for the last model uses the word "compute" which is a more appropriate term. "Calculate" or better, "estimate" would also be appropriate. Instances of "predict" should be replaced with "estimate" in each of the bullets.

NYC Comment 795) Appendix G, Section 2.1.1, Modeling Framework, Pages 6 - 7: In the first bullet, the term "urban hydrologic and hydraulic components" is used. The word "urban" can be dropped as the model is independent of urban or rural conditions.

NYC Comment 796) Appendix G, Section 2.1.1, Page 7, second bullet: Ebullition and NAPL migration need to be mentioned as chemical loads that will be modeled.

NYC Comment 797) Appendix G, Section 2.1.1, Page 7: The first sentence of the first full (non-bullet) paragraph includes "point source model output (i.e., point source flow rates and loads)." The point-source model output includes only flows, not loads. Loads are calculated using the point-source model output and assignment of concentrations. This is correctly represented in the referenced NCG Draft RI Figure G2-2. Move the end parenthesis to follow "rates" as follows: "(i.e., point source flows) and loads"

NYC Comment 798) Appendix G, Section 2.1.2, Page 8: The second paragraph attempts to distinguish between the geo-neutral model and the non-geo-neutral model, and between the 2013 and 2015 versions of these models. This description needs to be clearer. Suggested language: "The NYCDEP developed and calibrated a model to estimate the freshwater discharges from CSO outfalls, stormwater outfalls, and overland flow. In 2013, the then-current version of that model was shared with NCG in a geographically neutral format (that is, a format lacking security-sensitive geographical coordinates of the sewer-system infrastructure) as a tool to estimate point source discharges. NCG used this 2013 version of the geo-neutral point source model during Phase 1 (Anchor QEA, 2014a) and initially during Phase 2. However, NYCDEP updated the model in 2015, and NCG adopted it during the summer of 2016 (see description in Section 3.1). The NYCDEP geo-neutral point source model evaluation processes for the 2013 and 2015 versions of the model are discussed in Sections 3.2 and 3.3, respectively."

NYC Comment 799) Appendix G, Section 2.1.2, Page 8, footnote: *"These direct drainage basins, which often drain to the creek via multiple outfalls or overland flow, are modeled as a single point source."*

This sentence is inaccurate and needs to be replaced with the following:
"These smaller direct drainage basins, which often drain to the Creek via multiple outfalls or overland flow, are modeled as lumped point sources to represent their approximate discharge to the Creek."

NYC Comment 800) Appendix G, Section 2.1.3, Page 9, end of first paragraph: This should reference groundwater. Specifically, the language should say, *"Freshwater inflows from* **groundwater and** *point source discharges are specified as input to the hydrodynamic model using results from* ***groundwater monitoring*** *and the geo-neutral point source model (see Figure G2-3)."* (the words, "groundwater and" and "groundwater monitoring" should be added).

NYC Comment 801) Appendix G, Section 3, Page 16: The last sentence indicates that the model can be used to simulate the impact of changes to the sewer system infrastructure. It does not specify that the model can also be used to simulate the impacts of changes to other input conditions as well, such as meteorology. This is an important point because it can allow the model to simulate future, or design conditions. Suggested edit: "The model can also be used to simulate the impact of changes to various conditions (such as changes to sewer system infrastructure or different meteorology) on point source discharges to the Creek. "

NYC Comment 802) Appendix G, Section 3, Page 16, first sentence, second paragraph: The City's hydrodynamic modeling analysis has demonstrated that point source discharges of freshwater during rainfall events are transported out of Newtown Creek through a thin layer near the surface. Due to weak tidal currents inside of the Creek, discharged freshwater is not easily mixed down to depth and remains near the surface until it exits the Creek. The effect of point source discharges on circulation is therefore restricted. The language should state: "Freshwater inflows from point source discharges **have limited effect on** hydrodynamic circulation, including density-driven currents, which impacts the transport and fate of solids and chemicals within Newtown Creek (replace the word "affect" with "have limited effect on").

NYC Comment 803) Appendix G, Section 3.1.1, Page 16: The first sentence states that the point source model predicts flows from "CSO and stormwater outfalls." This text does not include overland stormwater flow, to correct this issue the word "outfalls" should be removed.

NYC Comment 804) Appendix G, Section 3.1.1, Page 17: The first full sentence indicates that the 2007 Landside Modeling Reports provide descriptions of the 2013 point source model. This is not entirely correct, as those early reports described an earlier version. The write-up should also refer to the June 2012 LTCP2 Recalibration Report. There were also other updates to the model completed after 2012, notably the refinement of the runoff coefficients, that comprise the 2013 version of the model. These are described in the 2016 Modeling Report for Newtown Creek. Documents outlining updates and recalibration of the InfoWorks models since the 2007 Landside Modeling Reports NCG mentions have been available for public use in DEP's long term control planning web page since late 2012. These documents also have been the foundation for NYCDEP's long term control planning efforts. The NCG Draft RI needs to reflect these documents. The documents can be accessed with the following links:
http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/infoworks-citywide-recalibration-report.pdf
http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/recalibration-report-comments-and-responses.pdf

NYC Comment 805) Appendix G, Section 3.1.2, Page 17: The third sentence would be more accurate if edited as follows: "In response to a series of follow-up questions and requests between March and July 2016, NYCDEP provided EPA and NCG additional supporting information and data related to the 2015 point source model."

NYC Comment 806) Appendix G, Section 3.3.1 Page 18: The first sentence would be more accurate if edited as follows: "After NYCDEP's initial modeling presentation on March 3, 2016, NCG made a series of requests for additional data and information relating to the point source modeling. Between March and July 2016, NYCDEP transferred the requested information to, and held an additional technical meeting with, EPA and NCG."

NYC Comment 807) Appendix G, Section 3.3.2.1. Page 21: The first sentence is unclear and would be better if edited as follows: "Based upon field surveys and other new information, NYCDEP made several updates to the 2013 point source model associated with the Dutch Kills (BBL-026) CSO."

NYC Comment 808) Appendix G, Section 3.3.2.1. Page 21: The second sentence after the bullets is also unclear as written because the write-up does not mention that the NYCDEP updates were based in part on newly updated sewer maps. A corrected version of the sentence would simply insert the word "recently" as follows: "The BBL-026 tributary area in the 2013 geo-neutral point source was compared to **recently** updated NYCDEP sewer maps."

NYC Comment 809) Appendix G, Section 3 Figures: Some of the Section 3 Figures are not referenced in the Section 3 text. All figures need to be referenced in the document.

NYC Comment 810) Appendix G, Figure G3-10: This figure relates the 2015 model output to measured data at BBL-026. Figure G3-10 is not referenced in the text. The particular storm for which results are displayed on Figure G3-10 was an outlier and is not representative of the typical model match; as such, including this example without any explanation is misleading regarding how well the model represents the monitored data overall.

NYC Comment 811) Appendix G, Section 3.3.2.6, Page 26: The NCG Draft RI states that the tidal elevation inputs were revised in the 2015 geo-neutral point source model for two reasons, with the first one being a 0.5-foot increase to account for the additional pressure head needed to open tide gates. This 0.5-foot headloss to open the tide gates has been used by DEP since late 1990s when the City started using dynamic hydraulic models such as HydroWorks (predecessor to InfoWorks), EPA Stormwater Management Model, etc. for sewer system characterization. This is not a refinement specific to the 2015 point source model as stated here. The document should reflect this by deleting the reference to 0.5-foot as refinement specific to the 2015 model.

NYC Comment 812) Appendix G, Section 3.3.3 Page 27: The first sentence states that three types of data were used to evaluate the 2015 point source model. Evaluation of the model was based on more data, including inflow measurements at NCB and at the BB WWTP. Inflow measurements at the Newtown Creek Brooklyn Pump Station provided an additional check for system-total flows entering the treatment plant during the study period. Inflow measurements at the Bowery Bay WWTP provided an additional check for system-total flows entering the plant during the study period. The text should reference these additional measurements.

NYC Comment 813) Appendix G, Section 3.4, page 29: The last sentence (just before the bullets at the bottom of the page) implies that the outfalls are sorted according to the size of the overflows, however, these are not listed in order of magnitude.

NYC Comment 814) Appendix G, Section 3.4, page 29: The footnote at the bottom of the page contains erroneous information regarding the NCB-002 discharge and needs to be corrected. The last sentence states that NCB-002 "may include combined flows from Manhattan and the Kent Avenue interceptors, which are otherwise not represented by combined sewer discharges targeted for sampling." This is incorrect, misleading and should be deleted. NCB-002 is treated discharge from the WWTP and does not include combined sewer overflows.

NYC Comment 815) Appendix G, Section 3.5 pages 30 to 33: A comparison between the 2013 and 2015 point source model is not needed. NYCDEP has already shown the reasons for the updates and the superior performance of the 2015 model version.

NYC Comment 816) Appendix G, Section 3.5, page 31 first sentence of the last paragraph: An annual average total discharge from the point source model to the creek for the period 2008-2012 is indicated as 2,890 MG/yr, which does not match the value of 2,850 MG/yr shown in the referenced Table G3-1. The value in Table G3-1 is closer to the arithmetic average of the 5 years shown, so the value in the text should be edited to match Table G3-1, "The total annual discharge volume predicted by the 2015 geo-neutral point source model for the 5-year period (2008 to 2012) had an average value of **2,850** million gallons per year (MG/year; see Table G3-1)."

NYC Comment 817) Appendix G, Section 3.5, page 31, last paragraph: The text references Table G3-2 and annual, model-calculated total discharges to the creek from 1999 to 2014. These values are close, but do not exactly match, NYCDEP's own modeling results for the same years. Because NCG did not provide NYCDEP with a copy of the inputs (IWC) file NCG used, NYCDEP cannot determine the reason for the discrepancy. The input (IWC) files used by NCG should be provided so that the City can further investigate the discrepancies.

NYC Comment 818) Appendix G, Section 3.5, page 31, last paragraph: *"Total annual discharge volume positively correlates to annual rainfall [...]."*

No mention is made of the strength of this correlation, or to the other factors affecting the discharges. To address this issue, please add a new sentence following the sentence referenced above: "As described elsewhere in this report, point source discharges, particularly from CSO, vary considerably as a result of rainfall characteristics such as intensity, tidal condition, and sewer system infrastructure and operation."

NYC Comment 819) Appendix G, Section 3.5, page 31, last paragraph: *"annual average discharge volume from CSOs is predicted to be 65% of the total annual volume [...] with discharge from direct drainage and stormwater outfalls comprising the remaining 35% [...]."*

While these averages are correct, there is no mention of the variability in these fractions. As a result, the following edit to the sentence is needed: "Not including discharges from treated groundwater effluent and treated WWTP effluent relief discharges from NCB-002, CSOs typically represent about 60% to 70% of the annual total point source volume discharged to the creek, with stormwater discharges from direct drainage and stormwater outfalls comprising the remainder (Table G3-2). Similarly, from 2008 to 2012, CSOs averaged 65% and direct drainage and stormwater outfalls averaged 19% and 16%, respectively, of the non-treated point source discharges to the creek (see Figure G3-20)."

NYC Comment 820) Appendix G, Figure G3-20: The title of Figure G3-20 needs to be modified and a note included on the figure to clarify what the fractions shown actually represent, as follows:
Corrected Title for Figure G3-20: "Relative Proportions of Average Annual, Non-Treated Point Source Discharge from 2015 Geo-Neutral Point Source Model for 5-Year Period: 2008 to 2012".
Note to insert on Figure G3-20: "Point source model results do not include discharges of treated groundwater effluent or treated WWTP effluent relief to Whale Creek."

NYC Comment 821) Appendix G, Section 3.5, page 31, page 32, last two sentences of the top paragraph: Referring to Figure G3-21, the statement that the monthly variation of modeled point source discharges is dependent upon variations in monthly rainfall is unsubstantiated, as Figure G3-21 does not show monthly rainfall. Figure G3-21 requires modification to show monthly total rainfall, possibly as "hanging" bars from the top using a 2nd y-axis at the right, to demonstrate the point made in the text. Alternately, monthly total discharge may be graphed versus monthly total rainfall. The relative proportion of CSO/stormwater does not appear to be the point and so showing that breakdown on the bar chart does not appear to serve a purpose.

NYC Comment 822) Appendix G, Figure G3-21: Clarification is needed that the graphic is presenting only CSO and stormwater, and does not include treated effluent from groundwater and from the WWTP effluent relief to Whale Creek. This needs to be clarified with edits to the title and a note on the Figure as follows:
Corrected G3-21 Title: "Monthly Variation in Non-Treated Point Source Discharge to Newtown Creek from 2015 Geo-Neutral Point Source Model During 2009"
Note to add to Figure G3-21: "Point source model results do not include discharges of treated groundwater effluent or treated WWTP effluent relief to Whale Creek."

NYC Comment 823) Appendix G, Section 3.5, page 32, first full paragraph: The NCG Draft RINCG Draft RI states that the four largest CSOs represent 91% of the total CSO volume, however, using the results shown in Tables G3-2 and G3-3 indicates that the four largest CSOs averaged 1,630 MG/yr (1999-2012) of 1,749 MG/yr or 93% of CSO discharges. The text should be corrected.

NYC Comment 824) Appendix G, Table G3-3: : The NCG Draft RI shows other metrics including number of annual discharges, average discharge duration, and average peak flow in addition to total annual discharge volume. Despite general agreement of the model results presented with NYCDEP results, NCG results for some metrics (e.g., event counts) do not match NYCDEP results. Some metrics may be generated in a different manner than the NYSDEC-accepted methods employed by NYCDEP. The InfoWorks model "Stat Tool" can be used to generate metrics but some metrics require additional inputs. For example, Event Counts require inputs for minimum allowable time between storms (NYCDEP uses 12 hours) and minimum flow rate per 5 minutes (NYCDEP uses 0.01 MGD). Similarly, for peak flow rate, NYCDEP uses maximum flow rate (MGD) for 5-minute interval. This table needs to be corrected to reflect NYSDEC-accepted methods.

NYC Comment 825) Appendix G, Tables G3-3 and G3-4: TableG3-3 shows a summary with the 2015 geo-neutral model and Table G3-4 shows a summary with the 2013 geo-neutral model. Total acres for individual large outfalls were revised in the 2015 InfoWorks model, specifically for BB-026, NCQ-077 and NCB-015. However, Tables G3-3 and G3-4 show the same acres for both the 2013 and 2015 models. These tables either require correction or need to be updated with the 2015 geo-neutral model only, including deletion of the references to the 2013 model.

NYC Comment 826) Appendix G, Section 3.5, page 32, last paragraph: Regarding Figure G3-22 and others of similar format, the figures do not clearly establish the relationship between rainfall and CSO discharge because they do not show the magnitude of the rainfall or the discharges. A graphic of event-total CSO discharge versus event-total rainfall would be more useful.

NYC Comment 827) Appendix G, Section 3.5, page 32, last paragraph: Despite clearly describing that complex relationships determine whether or not a CSO may discharge, the write-up goes on to attempt to identify and quantify a single factor (event-total rainfall) to determine whether a CSO may occur at NCB-015 or NCB-083. The methodology used to derive these thresholds is unclear. The source of the rainfall data shown in Figures G3-23 and G3-24 is not indicated, and it is not clear if that rainfall shown is a point gauge or spatially representative of the rainfall that fell on the drainage catchment upstream of these CSOs. The thresholds provided for NCB-015 (0.1 to 0.2 inches) and NCB-083 (0.1 inch) do not appear to agree with those shown in Figure G3-25, which indicates thresholds of about 0.5 inches for NCB-015 and about 0.25 inches for NCB-083. The discussion of minimum storm-total rainfall to cause a CSO should be removed.

NYC Comment 828) Appendix G, Section 3.5.2, pages 34 - 35: It is unclear why there is a comparison included here between the 2013 and 2015 model versions. NYCDEP demonstrated how the 2015 version represented an update of selected infrastructure based on physical measurements and field studies, and how well the updated 2015 model represents monitoring data. Referencing and detailing an out-of-date model is unnecessary, there have been many iterations and improvement on the models since they were first developed in the 80s/90s.

NYC Comment 829) Appendix G, Section 3.5.2, page 35: The NCG Draft RI points out that the 2015 model has "numerous low-flow-rate discharge events" not seen in the 2013 model. This is an artifact of the location in the regulator where the overflows were taken from the model being affected by tides. The "discharge events" referred to are actually simply ebbing tides in that location in the regulator, and NYCDEP filtered these from the outputs. The earlier 2013 model did not take into account the overflows from a tidally affected location. The report does not need to include analysis or comparison to the superseded 2013 model, but any explanation that is included should revise the analysis and text to account for the tidal effect.

NYC Comment 830) Appendix G, Section 3.6, page 35, second paragraph: NCG states that the 14-year period is "representative" of the long-term record at both the CPK and LGA rain gauges, based on a comparison of the average annual total rainfall at each gauge for both periods. However, the 14-year rainfall totals cited are about 5% higher than the corresponding long-term average annual rainfalls. More importantly, and as noted on page 32/71 of this document, the relationship of CSO discharges to rainfall is dependent upon numerous rainfall characteristics such as intensity and pattern, as well as tides at some locations, and is not simply a function of annual total rainfall. As a result, the 14-year period may or may not be representative of the longer-term. That said, assuming CSOs <u>are linearly correlated</u> to annual total rainfall at CPK, the 14-year period would have 9% higher CSO discharges for the 14-year period relative to the longer-term period. Therefore, the last sentence of the paragraph should be edited as follows: *Therefore, the 14-year period is likely to have 5% to 9% higher stormwater and CSO discharges, respectively, than the long-term average, assuming that stormwater discharges are directly proportional to annual total rainfall and applying a linear correlation of CSO discharges to annual total rainfall at CPK based on the 14-year model results. That said CSO discharges are highly affected by rainfall intensity, duration, and patterns.*

NYC Comment 831) Appendix G, Section 3.6, page 36, paragraph beginning "WSE": A comparison of the water surface elevation (WSE) data that NCG applied to the WSE that NYCDEP applied in the model shows a slight difference, with NCG's elevations slightly lower than those used by NYCDEP. The impact of the difference is not expected to be significant however this should be checked and resolved.

NYC Comment 832) Appendix G, Section 3.6, page 36, paragraph beginning "The NCB portion": Rainfall data specified for model input are described. Although the source of the data used by NCG is the same as that used by NYCDEP, a comparison of the rainfall datasets reveals that there is a 1-hour shift between the two datasets. Because NOAA reports rain for the *prior* hour, NYCDEP assigns the rainfall in the model accordingly. It is likely that NCG did not adjust

the time of the rainfall in this manner. This change likely affects results on a storm-by-storm basis, but not significantly over the course of a year.

NYC Comment 833) Appendix G, Section 3.7, page 37: The analyses described in the NCG Draft RI are ***sensitivity*** analyses and not ***uncertainty*** analyses. A sensitivity analysis shows how model outputs change given variations in model inputs, and this is what was performed. However, the first sentence of the section states the objective of the analysis as "evaluate the effect of uncertainty in model inputs on [...] model predictions." To achieve the stated objective, the analysis would need to consider key factors such as inherent randomness (typically characterized using probabilistic models), measurement error (typically characterized using statistical models), and natural variation (often difficult to characterize) as identified in Uusitalo et al., 2015. As a result, Section 3.7 and other related NCG Draft RI text must be revised to reflect that a model sensitivity analysis was performed rather than a model uncertainty analysis.

NYC Comment 834) Appendix G, Section 3.7, page 37: The NCG performed sensitivity analyses (which was called an uncertainty analysis) using the 2013 model, not the 2015 model. As a result, the sensitivity analyses may not be entirely applicable.

NYC Comment 835) Appendix G, Section 3.7.1, page 37: The second sentence incorrectly uses the term "uncertainty" instead of "variability." Replace "***uncertainty***" with "***variability***."

NYC Comment 836) Appendix G, Section 3.7, pages 37-38: Rainfall variability, impervious area and sanitary flows were considered by NCG for the sensitivity analysis. While the spatio-temporal variability in rainfall and the sanitary inflow variability analyses are pertinent, large ranges evaluated by NCG for impervious area characterization are not realistic. The range of runoff coefficient changes evaluated by NCG are large (14 to 20%) and are beyond the justifiable ranges based on the City's application of spectral mixing analysis (which yields errors of < 5% to 10% to quantify pervious and impervious areas). As documented in NYCDEP 2012 (link provided below) regarding NYCDEP InfoWorks recalibration, the Spectral Mixing Analysis (SMA) was performed by Columbia University to quantify the pervious and impervious areas used in model calibration/validation. While the unrealistic large runoff coefficient changes considered by NCG may be useful for the purposes of a strictly numerical sensitivity analysis, used to gauge the impact of such changes on model output, the variability range used for impervious areas must be reduced to realistic ranges in the sensitivity analysis so as not to be misleading.
http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/infoworks-citywide-recalibration-report.pdf

NYC Comment 837) Appendix G, Section 3.7, pages 37: NCG indicated that the sensitivity analysis was not repeated using the 2015 geo-neutral point source model. The final RI should include the sensitivity analysis with the 2015 point source model.

NYC Comment 838) Appendix G, Section 3.7.2, page 39: The impact of input rainfall on model output was performed by comparing model results given assignment of different rain gauges as input. Although the percent change on discharge volume of using different rain gauges was reported, it is not the gauge itself that is the meaningful variable, but rather the difference in the rainfall used as input. The results are not meaningful without an analysis of the difference in the input rainfall, but the write-up does not document the difference in rainfall used as input. Even if a comparison of rainfall input were provided, the fact that multiple rainfall characteristics are different would obfuscate the sensitivity analysis. As a result, the following is suggested: Start with a particular rainfall record and for sensitivity purposes, apply a factor (such as 0.8 or 1.2) and use the resulting adjusted rainfall as input. This approach isolates the variable to rainfall magnitude (not pattern, duration, or antecedent dry weather) for a more conclusive result. Results can be summarized by showing the percentage change in model input and the resulting percentage change in model output.

NYC Comment 839) Appendix G, Section 3.7.2, page 39: The impact of changes to runoff coefficient is obfuscated by the simultaneous application of different factors on the runoff coefficient, and the lack of a summary table relating the scale of the change in input to the scale of the change in model output. A table to summarize percentage change in input runoff coefficient and resulting change in model output should be created.

NYC Comment 840) Appendix G, Section 3.7.2, page 39: The impact of a plus or minus 10% change in sanitary flow rates is shown as having a "minimal" effect on annual discharge volume. This sensitivity result would also benefit from a summary table. A table to summarize percentage change in input runoff coefficient and resulting change in model output should be created.

NYC Comment 841) Appendix G, Section 3.7.2, page 39, last sentence: NCG presents a qualitative "visual inspection" of results of the sensitivity analysis and an inappropriate use of the word "uncertainty" (which should not appear as an uncertainty analysis was not performed.) The sentence should be replaced with the following, and as noted above, the bullets at the bottom of the page should be replaced with a table clearly showing the relationship between fixed percentage changes of model inputs with resulting percentage changes of model outputs: "The results of the sensitivity analyses indicate the percentage changes in each tested model input and the resulting percentage change in each modeled output, as summarized in Table G3-X."

NYC Comment 842) Appendix G, Section 3.7.2, page 38-40: The methodologies for assessing the frequency of CSO discharges and the duration of discharges have not been documented in the NCG Draft RI. CSO frequency is understood to account for inter-event time of rain events and wet weather flow conveyance in a given sewer system. The City has developed procedures that have been accepted by NYSDEC for use in CSO long term control planning evaluations, for the frequency estimation. The +/-20% variation in frequency of overflows and +/-10% variation in the duration of discharges in the document can be lower with the use of right methodology. The NYSDEC accepted methodologies for frequency and duration in the final RI.

NYC Comment 843) Appendix G, Section 3.9, page 43: Second bullet regarding rainfall thresholds needs to be removed unless the derivation of these values can be substantiated as indicated above (Section 3.5, Page 31, last paragraph, comment).

NYC Comment 844) Appendix G, Section 3.9, page 43: The last paragraph concerning the sensitivity analyses should be deleted pending a revised sensitivity analysis that uses the 2015 model version and a more straightforward set of input conditions that vary by certain percentages so that the impact on model output can be easily compared. The term "uncertainty" in the existing write-up is used inappropriately and should be removed, as percentage changes in model output derived from changes in model input do not indicate "uncertainty."

NYC Comment 845) Appendix G, Section 3.9, page 43: Variability in rainfall, runoff coefficient, and sanitary inflow have been inaccurately characterized as uncertainty. Using an inappropriate and unjustifiable large range of variation in runoff coefficient, NCG wrongly concluded that the predictions of the 2015 geo-neutral point source model would have a range of uncertainty of +/-25%. As shown in NYCDEP, 2012 and the 2015 model documentation shared by NYCDEP with NCG, the correlation between monitored and modeled CSO volumes are generally within the tolerance limits established based on WaPUG, 2002. The weight-of-evidence approach to calibration used by NYCDEP was also reviewed in detail with NCG in early 2013. Large variations in runoff coefficients used unjustifiably by NCG wrongly weaken the correlation significantly. The final RI sensitivity analysis must not use inappropriate large variation in the runoff coefficient.
http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/infoworks-citywide-recalibration-report.pdf
http://www.ciwem.org/wp-content/uploads/2016/05/Code-of-Practice-for-the-Hydraulic-Modelling-of-Sewer-Systems.pdf

NYC Comment 846) Appendix G, Section 4.2.2, page 47, last paragraph: The City's hydrodynamic modeling and measurement analyses indicate that Newtown Creek experiences a reverse salinity gradient caused by non-traditional estuarine circulation so that Newtown Creek does not behave simply as a typical tidal channel as the NCG indicates. The typical tidal channel characterization should be removed.

NYC Comment 847) Appendix G, Section 4.2.2, page 47, third paragraph: It is inappropriate to describe currents during wet weather events using depth averaged velocity data. Depth averaged ADCP velocity current measurements cannot be used to determine the effect of point sources on currents because ADCPs do no detect currents at the top of the water column where freshwater discharged by point sources is transported. Rather, the effect of point sources is best understood by analyzing measured and modeled currents at discrete depths (i.e., bins) which may show the net direction of velocity currents at different depths (i.e. toward the East River near the surface and toward upstream near the bottom). In particular, a consideration of discrete depth velocity patterns is crucial to determining net transport in English Kills.

NYC Comment 848) Appendix G, Section 4.2.3, page 48, last paragraph: The discussion of the effects of freshwater on salinity should include groundwater.

NYC Comment 849) Appendix G, Section 4.2.3, page 48, second paragraph of the Section, Tables G4-4 through G4-9: The tables list sensor depths above the bed. The sensor depths from below surface (i.e. Mean Sea Level or NAVD 1988, etc.) should be provided. For example,

a sensor depth reported as 2 feet above the bed could be in water of different depths such as 5 feet or 15 feet. There would be substantially different temporal variations of salinity at such different water column depths despite both water column sensor depths being 2 feet above the bed.

NYC Comment 850) Appendix G, Section 4.2.3, page 48, second paragraph of the Section: In Draft RI Tables G4-4 through G4-9 the reported salinity does not include the first decimal place. It is difficult to judge whether or not there is a spatial gradient in salinity. A spatial gradient in salinity would be an indication of a freshwater source (i.e. groundwater).

NYC Comment 851) Appendix G, Section 4.2.3, page 48, and Table G4-8 and G4-9 (starting on page 197): The Phase 2 temperature mooring data captions indicate the statistics of "July to March 2014". It appears the caption should be "July 2014 to March 2015". The negative water temperature recorded by the sensors may not be reliable.

NYC Comment 852) Appendix G, Section 4.2.3, page 49, first paragraph: Phase 1 and 2 discrete temperature and salinity data were discussed, but all records are not displayed in figures and/or tables. Figures and/or tables show too few of the discrete temperature and salinity measurements.

NYC Comment 853) Appendix G, Section 4.4.2.1, page 54, third paragraph: It is not clear how the Smagorinsky horizontal mixing formation was used for the selection of the tidal boundary forcing option. The Smagorinsky formulation is more effective in controlling the density computation, not water elevations.

NYC Comment 854) Appendix G, Section 4.4.2.2, page 55: Using observed salinity at NYCDEP Harbor Survey Station E2, which is in the middle of the East River portion of the model domain, and specifying these measurements at both the southern and northern East River model boundaries is an oversimplification of salinity boundary forcing. There are temporal (i.e., daily) salinity variations at both the southern (at the Battery) and the northern (near Hell Gate) model boundaries of more than 10 psu. Further, there are 5-10 psu differences between the measured salinity at the southern and northern East River boundaries on any given day. NCG's oversimplification of salinity at the open boundaries will not accurately reproduce tidal and residual (i.e., approximately a few days to weeks) variations of salinity at the mouth of Newtown Creek. NCG Draft RI Figure G4-11 for salinity variations observed near the mouth of the Creek which shows observed salinity at Station NC310 during the summer of 2015. The figure clearly shows tidal variation of salinity during dry conditions.

Further, there is an inconsistency in the NCG specification of the salinity boundary conditions in

the East River. The Draft RI report states that salinity data observed at NYCDEP Harbor Survey E2 station in the East River were used for model boundary forcing; however, after reviewing the transferred NCG model input files, the 2015 boundary conditions for salinity appear to be a composite of decreasing values between 22 and 21.5 psu from days 0 to 188 and 15-minute time varying salinity concentrations (presumably based on NCG sonde data obtained from Newtown Creek) after day 188. NYC Figure 70 shows NCG's assignment of salinity boundary conditions. It is unclear why the variable salinity boundary conditions for 2015 were switched instead of using the consistent method applied to other years (i.e. 2012-2014).

NYC Comment 855) Appendix G, Section 4.4.5, page 57: NCG fails to model horizontal groundwater flow through the entire water column depth for model grid cells adjacent to the Creek shoreline, including only vertical groundwater flow at the sediment bed-water column interface. The groundwater input to the hydrodynamic model is therefore an underestimate.

NYC Comment 856) Appendix G, Section 4.5.1, page 60, Second Paragraph: NCG selected 1 cm for the bottom roughness length (Z_0). This value is somewhat high for the fine grained smooth sediment bed inside of the Creek which would typically be described by values ranging from 0.1 to 0.2 cm. Hydrodynamic model results may not be sensitive to the selection of Z_0 in the Creek because the tidal currents are very weak. However, NCG's selected Z_0, 1.0 cm, may impact the sediment transport model computation of bottom shear stress as compared to a more characteristic Z_0 of 0.1cm.

NYC Comment 857) Appendix G, Section 4.5.3.2, page 63: NCG's mean value of 20,000 cfs (560 cms) is too high for East River residual currents. The referenced doctoral thesis of Nickitas Georgas (2010) clearly states that NYHOPS model computed fluxes in the East River are 'somewhat overestimated and the results are not conclusive' (page 173). Historic studies cited by the NCG, including Jay and Bowman, 1975 and Blumberg and Pritchard 1997, suggest that the net flux in East River varies between 7,500 to 14,000 cfs (~200 to 400cms).

NYC Comment 858) Appendix G, Figures G4-48 through G4-53: It is not clear if the ADCP bins applied for the comparisons at each model sigma level were adjusted as the tidal elevations changed. It is likely that the ADCP measured currents at fixed distances from the bottom (standard levels) regardless of the fluctuation of the tidal water surface captured in model outputs. Please clarify.

NYC Comment 859) Appendix G, Figures G4-55 through G4-64: Current results need to be shown for more extensive time periods. Depth averaged currents are shown only for about seven days for one wet event in 2012. Currents at various depths are shown only for fourteen days in October 2012. 34 hr. low-passed currents are shown only for fourteen days in

December 2014. It is not possible to determine whether or not the model performed consistently during different wet-weather events. In particular, the limited 34 hr. low-passed current results presented are problematic, showing completely opposite directions for computed and observed currents at depth at many locations. The persistence and spatial extent of the lack of calibration requires further investigation. In addition, the selection of the vertical axis (y-axis) scale showing ±0.8 ft. s^{-1} requires adjustment to facilitate interpretation of results.

The City has plotted NCG's transmitted model outputs for 35 hr. low-passed currents on an annual basis at six locations. In particular, the City's plots of the results show that NCG model and data comparisons of low passed currents are poor at the mouth of Newtown Creek (NYC Figure 71) and fail to properly capture the net exchange between the East River and Newtown Creek.

NYC Comment 860) Appendix G, Figures G4-65 to G4-70: These figures show cumulative (i.e., for all locations) statistics on one diagram. The statistics show that NCG's model is under-computing near bottom currents and over-computing near surface currents. Similar diagrams are needed for each station to demonstrate whether or not bias is uniform in entire model domain or better/worse at specific locations.

NYC Comment 861) Appendix G, 4.5.3.5 Salinity, Figures G4-83 to G4-86: At Stations 316, EB043, and EK017, model computed salinity during dry conditions is consistently higher than the observed salinity. This may be due either to improper specification of freshwater flow from groundwater and/or inadequate specification of horizontal mixing. NCG's modeled circulation pattern does not produce the longitudinal salinity gradient. Sensitivity analyses are necessary to diagnose and correct the miscalibration.

NYC Comment 862) Appendix G, Figures G4-83 to G4-86: Tidal salinity variations observed at EK108 are not calculated by NCG's model. The model fails to capture salinity variations in English Kills because the mixing effects of the aeration system in English Kills are not incorporated in NCG's model. Further work is necessary on the hydrodynamic model calibration.

NYC Comment 863) Appendix G, Figures G4-81 to G4-101: The model salinity calibration is an indicator of the accuracy of the modeled freshwater volume, range of tidal mixing (advective and diffusive processes), and more importantly the net circulation patterns. The poor model calibration results for salinity explain the mismatch between observed and model calculated 34-hr low passed currents. Further work is necessary on the hydrodynamic model calibration.

NYC Comment 864) Appendix G, Section 5.3.3.2, page 90: 2015 geo-neutral point source model is again wrongly presented by NCG as having +/-25% uncertainty. This needs to be corrected in the NCG Draft RI based on the comment provided for FMRM Section 3.9.

NYC Comment 865) Attachment G-E, Sensitivity Runs, Figures G-E-45 through G-E-51: Bias evident in the comparisons of NCG model calculated salinities obtained for different specifications of boundary conditions is due to incorrect volume fluxes in the East River, flowing from north to south. NCG's estimate of East River volume flux is about 20,000 cfs (~570cms). On average, salinity at NCG's northern model boundary located near Hell Gate is higher than at NCG's southern model boundary near the Battery due to the influence of higher salinity in Long Island Sound as compared to New York Bay. With excessive modeled volume flux flowing toward the southern boundary at the Battery in NCG's model, the higher salinity specified for the northern boundary near Hell Gate prevails in model calculations of Creek salinity. NCG needs to adjust the elevation boundary differences between the southern and northern boundaries to optimize the computed salinity inside of the Creek.

Comments on Appendix G - FMRM, Sediment Transport Modeling

NYC Comment 866) Appendix G, Section 5.1.1, page 11: This section asserts that reducing the coupling interval between hydrodynamic and sediment transport models from 15 to 5 minutes *"produced a more accurate representation of the effects of tidal estuarine circulation on sediment transport."* This improvement in model accuracy needs to be presented explicitly.

NYC Comment 867) Appendix G, Section 5.1.2, page75: It has not been established whether the model *can "realistically simulate propwash resuspension,"* the statement should be removed.

NYC Comment 868) Appendix G, Section 5.2.1, page 77, first bullet on sediment-trap data: Contrary to the bulleted statement that gross sediment deposition decreases from downstream to upstream, if one disregards the 3 most downstream sediment traps (Draft RI Figure G5-7 data), it would be impossible to demonstrate with any certainty that a spatial trend exists for data at the remaining 13 stations from approximately CM 1 to CM 4. The bullet needs to avoid overstatement of the spatial trend (or lack thereof).

NYC Comment 869) Appendix G, Section 5.2.2, page 79: A statement is made at the bottom

of the page *that "More than 90% of the tributary deposition is due to point source sediment loads, so neglecting sediment loads from other sources (e.g., the East River) is a valid assumption."* The 90% value is based on the NCG's hydrodynamic and sediment-transport model results, which are still under review and have not be accepted as valid by EPA. This statement needs to be revised as the models are reviewed and refined.

NYC Comment 870) Appendix G, Section 5.2.2, page 81: The last paragraph lists NCG's estimated ranges for minimum required point-source loading to reproduce EPA's NSR ranges for English Kills, East Branch, and Maspeth Creek. These loading requirements were based on simplified mass-balance calculations for solids deposition in the tributaries. Spot checks of solids loading based on measured TSS concentrations and discharge from the geo-neutral point source model suggest that this measurement-predicted loading falls toward the low end of the ranges determined via the mass-balance approach. Since measured solids loading data is available, it remains unclear as to the value added by simplified mass-balance calculations deducing loading from highly uncertain NSRs. The section ends without offering any real insight as to its purpose or conclusions. The section should be deleted.

NYC Comment 871) Appendix G, Section 5.2.7, page 82: Examination of Draft RI Figures G5-26 and G5-27 suggests there is no justification for the assertion that TSS concentrations tend to decrease with increasing distance upstream. The trend needs to be demonstrated statistically.

NYC Comment 872) Appendix G, Section 5.3.1, page 84: The listing of particle size classes is misleading because the nominal diameters and size-class descriptions listed in the text do not correspond to the particle characteristics specified as model input. Model-assigned diameters and approximate settling speeds for Class 2 and Class 3 solids are presented in subsequent paragraphs, but not for the other three classes (i.e., 1a, 1b, and 4). For clarity, the modeled particle diameters (d_{50}), their description size classes (Wentworth 1922), and their nominal settling speed (Cheng, 1997) at annual mean salinity and temperature (22 ppt, 20 °C) need to be clearly listed, as for example:

- Class 1a: point-source cohesive solids, d_{50}= 4.3 ⌈m, very fine silt, w_s = 1.02 m/d
- Class 1b: East River cohesive solids, d_{50}= 7.5 ⌈m, very fine silt, w_s = 3.09 m/d
- Class 2: fine-fraction noncohesive sand, d_{50}= 70 ⌈m, very fine sand, w_s = 256 m/d
- Class 3: coarse-fraction noncohesive sand, d_{50}= 400 ⌈m, medium sand, w_s = 4016 m/d
- Class 4: NCG-postulated, cohesive, East River wash load, d_{50}= 1.0 ⌈m, clay, w_s = 0.06 m/d

NYC Comment 873) Appendix G, Section 5.3.3.2, page 84: The nominal settling speed assigned to Class 1b East River cohesive solids is 3-times faster than Class 1a point-source cohesive solids. Given the sticky, high-organic nature of point-source solids, the opposite

condition is expected, with point-source cohesive solids forming larger, denser, faster-settling organic-inorganic aggregates than East River cohesive solids. The FMRM needs to provide detailed justification for why East River cohesive solids should settle 3-times faster than point-source cohesive solids.

NYC Comment 874) Appendix G, Section 5.3.3.2, page 84: Regarding the Class 3 medium sand (d_{50}= 400 ⌠m, w_s = 4016 m/d), it seems very unlikely that the NCG can model this particle size class in low-energy Newtown Creek without exceeding the Péclet numerical stability limit. Thus, the model must treat this size class differently, essentially depositing any point-source load into model grid cells directly adjacent to the discharge. Very conservative back-of-the-envelope calculations demonstrate that 400-⌠m medium sand is essentially non-transportable in the Creek. Limited transport might occur directly at the point of discharge but would be limited to sub-grid-scale distances that cannot be resolved by the model. The FMRM needs to present explicitly how the model handles the Class 3 medium sand.

NYC Comment 875) Appendix G, Section 5.3.2, page 85: Draft RI Figure G5-30 indicates that sediment-bed bulk-dry-density initial conditions were defined as ranges of values within specified regions of the model domain. For example, the mouth region of the Creek lists a bulk-dry-density range of 0.47–0.65 g cm^{-3}. It seems more likely that spatial mean or median values were assigned to each specified region, not ranges of values. If ranges of values where actually assigned within each specified region, then the figure should present the spatial details of those initial assignments. This needs clarification.

The same general question also applies to Draft RI Figure G5-31 (silt/clay content), Figure G5-32 (fine sand content), and Figure G5-33 (medium/coarse sand content). Also, to avoid misleading perceptions, the grain-size class descriptors used in these figures should be consistent with the specific grain-size classes used in the model. Thus, Figure G5-31 presents initial conditions for "silt" (4.3 or 7.5 ⌠m), Figure G5-32 presents initial conditions for "very fine sand" (70 ⌠m), and Figure G5-33 presents initial conditions for "medium sand" (400 ⌠m).

NYC Comment 876) Appendix G, Section 5.3.2, page 85: With respect to Draft RI Figure G5-31, since silt is represented by separate grain sizes for point-source cohesive solids (Class 1a, 4.3 ⌠m) and East River cohesive solids (Class 1b, 7.5 ⌠m), it is unclear how initial conditions are defined for these two silt classes.

NYC Comment 877) Appendix G, Section 5.3.2, page 86 : Regarding the various manipulations of the 2012 Sedflume data for the Creek, the FMRM or Attachment G-J needs to include representative vertical-profile plots of the Sedflume data similar to shown on NYC

Figure 72.

NYC Comment 878) Appendix G, Section 5.3.2, page 86-88: For the various manipulations of the 2012 Sedflume data for the Creek, such noisy data indicates unreliability. A mean or median value with no depth dependency is the best that can be done with this data. Fortunately, characterization of erosion critical shear stress and erosion rate is largely moot for Newtown Creek. The City's models agree with NCG's model that shear stress in Newtown Creek rarely (approximately 1% of the time or less) exceeds critical shear stresses typical of cohesive sediments. Brief erosive events rarely occur in the City's model directly adjacent to shallow-tributary point-source outfalls when large wet-weather discharges coincide with very low tide. Smaller-scale wet-weather erosion might also occur near deeper point-source outfalls, but these are sub-grid-scale events that cannot be resolved by either model. Taken as a whole, erosional impacts on solids and contaminant fate and transport appear to be negligible in the Creek.

NYC Comment 879) Appendix G, Section 5.3.4, page 91-93: This method attempts to account for changes (⊗z) in water depth (h) due to sediment erosion and deposition by vertically averaging the velocity profile and effectively rescaling the approximate skin-friction shear stress as:

$$\tau_a = \left(\frac{h}{h-\Delta z}\right)^2 \tau$$

The bed elevation is not actually changed within the model. To justify the method, NCG cites what is apparently their modeling report for a freshwater river in Michigan. While it might be reasonable to vertically average the velocity profile for a unidirectional, freshwater river with no vertical density stratification, it is inappropriate to do so in Newtown Creek, which is a tidally oscillating, density stratified waterway with bi-directional flow in surface and bottom layers. The reason that results for Newtown Creek are "qualitatively consistent" with a model using direct geomorphic adjustments of bed elevation changes due to erosion and deposition is not because the approximate method is inherently valid for an estuarine waterway, it is merely because elevation changes in Newtown Creek are much smaller than water depth (i.e., $\Delta z \ll h$). Thus, the fundamental invalidity in applying the approximate method for Newtown Creek has little impact on modeled skin-friction shear stress (i.e., $\tau_a \approx \tau$). Given the slow rate of change of bed elevation in Newtown Creek due to erosion and deposition, one could likely model those changes for a multi-year simulation as direct adjustments to bed elevation annually without a noticeable sacrifice in model performance. This would avoid the fundamental invalidity of applying the approximate geomorphic feedback method to an estuarine waterway. The bed elevation could be updated directly more often if it was deemed useful to model performance.

NYC Comment 880) Appendix G, Section 5.4.1, page 94: Primary calibration targets for the sediment-transport model were NSRs for the Creek, despite the large uncertainty in NSRs estimated by various methods (e.g., differential bathymetry, geochronology). To achieve some transparency in quantifying that uncertainty, the EPA evaluated the various estimation methods and proposed their own NSR ranges for different regions of Newtown Creek and its tributaries. As can be seen in Draft RI Appendix G Figure G5-46, the NCG has "cherry picked" specific NSR values (horizontal blue bars) within the EPA ranges rather than taking a more unbiased approach of selecting median values as the NSR targets. In several cases, the NCG-selected NSR calibration target is located at the extreme upper or lower bound of the EPA ranges. The FMRM states that the selected NSR calibration targets *"were specific data-based values developed using differential bathymetry analysis,"* but details of this analysis were not presented. Regardless, the NCG's approach is inconsistent with EPA's assessment of NSR estimates. EPA concluded that all of the methods for estimating NSRs included ample uncertainty and no one method was significantly more valid than another. Therefore, EPA assessed all of the methods as a whole and proposed unbiased NSR estimates and uncertainty ranges. The NCG should not contradict the EPA effort by declaring—without substantiating and quantifiable evidence—that the NCG differential bathymetry analysis is more valid for selecting specific NSR calibration targets.

NYC Comment 881) Appendix G, Section 5.4.1, page 94: The City's concerns regarding the 3-times faster settling speed assigned to East River silt (Class 1b) versus point-source silt (Class 1a) also arise in this section of the FMRM. See comments on Section 5.3.1.

NYC Comment 882) Appendix G, Section 5.4.1, page 94: The section concludes with specification of the model-assigned grain-size composition of TSS at the East River boundary. In reading these few sentences and bullets, it is easy to miss that this grain-size composition was not actually measured, which represents a serious flaw in NCG's sampling program. Instead of using measured TSS grain-size distributions to define the East River boundary, NCG has taken the extreme liberty of assigning whatever grain-size distribution makes the model work. Thus, there is no way of assessing whether the fundamental model response in lower Newtown Creek is valid, because the model has essentially been "fixed" to provide the correct response by assignment of an unsubstantiated grain-size distribution at the East River boundary. One consequence of this questionable approach is the NCG's invention of a1-⌠m "wash load" sediment (Class 4), that they assert represents 37% of the solids mass entering Newtown Creek from the East River. This wash-load component was required by the NCG as the only way their model could passably simulate measured TSS concentrations in lower Newtown Creek. The City can provide ancillary data that suggest a 37% wash-load component for East River solids is

hugely excessive. However, a more productive approach is to sample East River suspended solids directly and perform appropriate grain-size analyses on those samples.

NYC Comment 883) Appendix G, Section 5.4.2.1, pages 94-96: It would be helpful if Draft RI Figure G5-49 were reformatted using the spatial partitioning displayed in Figure G5-46 and with the EPA-proposed NSR ranges included on the figure to the right of the model-predicted NSRs (i.e., red columns). From that composite figure, it would be easily observed that the model-predicted NSR for CM 0.5–1.0 exceeds the upper bound of the EPA-proposed NSR range by a fair bit and that the model-predicted NSR for English Kills barely grazes the lower bound of that EPA-proposed NSR range. Some specific discussion in this FMRM section comparing and contrasting model-predicted NSRs versus EPA-proposed NSRs for each spatial zone is also warranted. As it is, the FMRM only compares model-predicted NSRs to the NCG-selected calibration target NSRs. In making that comparison for Maspeth Creek and East Branch, the NCG makes a strong assertion *that "Deviations between predicted and data-based NSRs are probably due to uncertainty in the magnitude and composition of point source sediment loads for these two tributaries."* No quantifiable evidence to substantiate that claim is provided. There seem to be sufficient other sources of uncertainty in NSR estimates that might also contribute to the NSR mismatch.

NYC Comment 884) Appendix G, Section 5.4.2.1, pages 95-96: The last paragraph in this section describes NSR comparisons between 14-year continuous model simulations (Phase 2) versus 14-year parallel model simulations (Phase 1). This paragraph and the associated Draft RI Figure G5-51 are irrelevant to calibration of the Phase 2 model or to the Draft RI, in general.

NYC Comment 885) Appendix G, Section 5.4.2.2, page 96: *"Fines content is underpredicted in Maspeth Creek and over-predicted in English Kills, with these model-data differences likely due to uncertainty in the composition of point source sediment loads for these tributaries."*

There are many alternative possibilities for why the model-predicted fines content and measured bed data do not agree. There is no evidence that supports this assertion that the likely reason is uncertainty in the composition of point-source loads, it should be deleted.

NYC Comment 886) Appendix G, Section 5.5.1.1, pages 98: This diagnostic analysis has no relevance and should be removed. The continuous (i.e., serial) modeling approach is most appropriate and avoids additional modeling uncertainty regarding effects of one simulation year carrying over to the next. It does not matter whether superposed simulations produce similar results in this specific instance.

NYC Comment 887) Appendix G, Section 5.5.1.2, pages 98-99: In Draft RI Figure G5-60, it seems the exceptionally high model-predicted NSR near the mouth of Newtown Creek would be significantly altered if the unsubstantiated 3-times faster settling speed for East River cohesive solids (Class 1b) was set instead to the same 1m/d settling speed of point-source cohesive solids (Class 1a). The assignment of the 3-times faster settling speed for East River cohesive solids is effectively a "bandage" applied to fix problems with model response in the lower East River.

NYC Comment 888) Appendix G, Section 5.5.1.2, pages 98-99: Draft RI Figure G5-61 to Figure G5-63, as well as text in this section, give the general impression that the dominant effect of East River solids to total solids deposition does not extend beyond the downstream boundary of the Turning Basin. The figures and the text provide a somewhat biased perspective because sand deposition by point-source discharges occurs primarily upstream. Owing to the low-energy environment of Newtown Creek, any sand entering from the East River will settle rapidly near the creek mouth. Thus, the East River's contribution to solids deposition in Newtown Creek is almost wholly restricted to fine solids (d_{50} δ 63 ⌈m). In contrast, point-source discharges in the NCG model include 51% sand (by mass) for CSO and 42% sand (by mass) for stormwater, all of which deposits very near the point-source discharges and has a substantial impact on total solids deposition in the Turning Basin and in the upstream tributaries. If results in Figures G5-61 to G5-63 are re-normalized to present the relative contributions of East River and point-source fines to <u>total fines deposition</u>, the plots provide a very different perspective in that East River fines dominate total fines deposition from the mouth of Newtown Creek through the Turning Basin. In working with the NCG model, the City found that within the CM2+ region (i.e., Turning Basin), East River and point-source fines contribute approximately 65% and 35% of total fines deposition, respectively, which is a complete inversion of the total-solids-normalized results reported in Appendix G Section 5.5.1.2. This analysis of total-fines-normalized deposition is highly relevant because fine solids and sands play very different roles in contaminant fate and transport. Fine solids tend to have larger surface-area-to-volume ratios and higher organic content and play an important role in the sorption, partitioning, bioavailability, and transport of contaminants. In contrast, point-source sands are primarily inorganic, do not tend to sorb contaminants, and play a potentially ameliorative role through burial or mass dilution of contaminants. In general, the discussion in the appendix (as well as in the Draft RI text and CSM) need to be expanded to include separate fate-and-transport analyses of fine solids and sand.

NYC Comment 889) Appendix G, Section 5.5.1.3, pages 99-101: With regard to providing "quantitative insights" and for "informing the CSM", the mass-balance analyses and the associated figures in this section need to be expanded to examine transport of fine solids and sand separately, in addition to the existing total-solids-based analyses.

NYC Comment 890) Appendix G, Section 5.5.1.3, pages 99-100: *"Approximately 81% of the total sediment load from all point source discharges to Newtown Creek (approximately 890 MT/year) was discharged upstream of CM2."*

This same exact sentence is included as the second bullet point on page 101. The first occurrence of the sentence is likely a typographical error and should be corrected.

NYC Comment 891) Appendix G, Section 5.5.3, pages 104-105: See comments for Section 5.3.4. The Approximate Geomorphic Feedback (AGF) method is fundamentally invalid for a tidal, density stratified, multilayer, bi-directional, estuarine waterway like Newtown Creek. The AGF method only compares qualitatively with Direct Geomorphic Feedback because changes in bed elevation in Newtown Creek are generally very small relative to water depth.

NYC Comment 892) Appendix G, Section 5.5.4, pages 105-107: NCG wrongly asserts that because the fraction of organic carbon (f_{oc}) measured in the bed of the Creek tributaries is comparable to the measured f_{oc} of point-source solids, then all of the organic carbon in point-source solids must be G3 carbon, which is essentially inert with a half-life of the order of decades. NCG has incorrectly assigned all point-source organic carbon as G3 carbon and further asserts that this agreement is evidence validating the sediment-transport model because the model-predicted f_{oc} is now comparable to measured bed f_{oc}. This circular reasoning is invalid on many levels. The assertion that point-source solids are nearly inert ignores NCG's BOD_5 measurements, with values for CSO discharge reaching as high as 100 mg/L and with a median value of 50 mg/L. Further the assertion ignores the presence of other known sources of organic carbon in sediments of the Creek tributaries—including coal tar, NAPL, and soot carbon—are omitted from consideration if G3 point-source carbon accounts for the total f_{oc} in the sediment. NCG has assigned organic carbon reactivity fractions to point-source solids that are fundamentally invalid, and their model is predicting the "correct" sediment f_{oc} for the wrong reason. The entirety of Section 5.5.4 should be removed or rewritten extensively.

NYC Comment 893) Appendix G, Section 5.5.5, pages 107-108: The rescaling of model-predicted NSRs shown in Draft RI Figure G5-95 raises general concerns about model response at the East River boundary. Previous plots of NSRs (e.g., G5-4 and G5-5) have always presented NSRs near the mouth of Newtown Creek as spatial averages for the region of CM 0–0.5, with values around 4-5 cm/yr. The rescaled color-contouring in Figure G5-95 indicate that NSRs at the model's East River boundary range from about 20 to 30 cm/yr. Are these elevated boundary NSRs "real" or modeling artifact? The model response at the East River boundary and its potential impact on results further upstream in Newtown Creek requires additional testing

and scrutiny. Regardless, the predicted difference in NSR shown in Figure G5-96 should be presented as a fractional or percent difference. Without the potentially problematic grid cells at the boundary, Figure G5-96 still indicates an NSR difference of up to 1 cm/yr for CM 0–0.5. If the data-based and base-model-predicted NSRs in that area are approximately 4-5 cm/yr (e.g., G5-4 and G5-95), then a 1 cm/yr predicted difference due to the hard-bottom assumption in the East River represents 20-25% of the NSR. Presenting the predicted difference in NSR as a fractional or percent difference would make assessment of the relative importance of the hard-bottom assumption more transparent.

NYC Comment 894) Appendix G, Section 5.5.6, page 110: At the top of the page, the list of steps required for development of an effective prop wash re-suspension model is missing an important bullet. If prop wash does erode the cohesive sediment bed of Newtown Creek, it will be necessary to know the particle size distribution of that scoured material. If scoured material is represented primarily by cohesive clumps and aggregates, prop wash scour might be modeled more properly as a small-scale dispersal process because these larger particles will redeposit quickly to the bed. In contrast, if scoured material is broken down into very small particles, then horizontal transport of the material is more likely to occur. Thus far, the critical issue of grain-size distribution (or alternatively, characteristic settling speeds) for potentially scoured cohesive sediment has not been adequately addressed.

NYC Comment 895) Appendix G, Section 5.5.6.1.1, page 110, Table G5-14: This table requires validation with data supporting the ship characteristics listed. In particular, a characteristic maximum power of 3000 hp seems high for the modest-sized tugs that ply Newtown Creek. A review of the referenced *Newtown Creek Navigation Analysis: Kosciuszko Bridge Project (NYSDOT, 2005)* found a table listing horsepower for self-propelled tankers (power range of 450-3200 hp), but nothing for tugs. A search conducted online for tugs used by companies located on Newtown Creek found power ratings roughly of magnitude 800-2000 hp. As ship's total power is used by the prop wash re-suspension model in calculation of bed shear stress, it is important that model-assigned ship characteristics are appropriate for vessels actually transiting the Creek.

NYC Comment 896) Appendix G, Section 5.5.6.1.2, page 113: The section text and Draft RI Figure G5-108 refer to predictions of maximum bed shear stress by the hydrodynamic model. Presumably, this refers to the skin-friction shear stress not the total bed shear stress, but the text and figure need to be explicit in that regard.

NYC Comment 897) Appendix G, Section 5.5.6.1.2, page 115: The text in this section is seemingly contradictory and confusing. On one hand, it indicates that attempted correlations

between ADV acoustic backscatter (ABS) and data from coincident turbidity sensors were not reliable, and yet the bottom panels in Draft RI Figure G5-111 and G5-112 present estimated near-bed turbidity based on those unreliable correlations. As a minimum, any 15-min data from coincident-deployed turbidimeters should also be plotted in the bottom panels of Figure G5-111 and G5-112. Also, it would be helpful if the time axis was extended for a longer interval. The plots show that the (unreliable) ABS-estimated turbidity for the two suspected prop wash scour events remained elevated for at least 2.5 minutes. However, it is unclear how long ABS-estimated turbidity remained elevated before returning to pre-event levels. In Attachment G-F (Phase 2 Sediment Transport Data), the ABS-estimated turbidity plots were normalized (0-100) out of concern for the unreliability and uncertainty of the ABS-turbidity estimation. That would suggest that the ABS-estimated turbidity shown in the bottom panels of Draft RI Figure G5-111 and G5-112 should also be normalized and their y-axes should not read as NTUs.

NYC Comment 898) Appendix G, Section 5.5.6.3.2, page 119: "*The uncertainty in cross-channel ship location with respect to the ADV was overcome by assuming that the near-bed velocity data collected at the sampling location was representative of the distribution of near-bed velocity due to propwash, over a large portion of the channel.*"

It is not clear what constitutes a "*large portion of the channel*" and in what way this assumption can "*overcome uncertainty*" in the ship's cross-channel location. This assumption will bias the calculations by maximizing the presumed spatial extent of the propwash effect.

NYC Comment 899) Appendix G, Section 5.5.6.3.4, page 120: Comparison of Draft RI Figure G5-131 (no interpolation of AIS-based consecutive ship locations) and G5-132 (with interpolation of AIS-based consecutive ship locations) raises some concerns about the effect of the interpolation process. The difference in total ship days along the center channel in lower English Kills (~ CM 2.8–3.0) shows the most apparent problem location. A simple interpolation of consecutive discrete ship positions can increase the total ship days along the center channel from 51-100 per year (Figure G5-131) to 301-400 per year (Figure G5-132), a factor of 4 to 6. Similar increases in total ship days can be observed throughout the Creek. Contrary to the last sentence in this section, the interpolation process <u>does not</u> appear to *produce "a realistic representation of ship traffic in the Study Area."*

NYC Comment 900) Appendix G, Section 5.5.6.4.1.1, pages 120-122: This section presents "results" from an arbitrary modeling exercise lacking information about actual prop wash processes occurring in Newtown Creek. A lot of effort was expended, but the extreme uncertainty of the "results" renders them ineffectual. Several critical questions remain:

- What was the basis for selecting the two particle diameters for re-suspension probability? The cohesive-bed critical skin-friction shear stress for erosion must first be exceeded before the re-suspension probability applies. Spatial maps and frequency distributions of skin-friction shear stress predicted by the prop wash sub-model need to be provided.
- The selected Class 1 particle settling speeds of 10 m/d and 200 m/d correspond to effective particle diameters of 13.5 ⌈m (fine silt) and 61.5 ⌈m (coarse silt), respectively. [N.B., effective particle diameters were determined with Cheng's 1997 equation at the approximate mean annual temperature and salinity in Newtown Creek of 20 °C and 22 psu]. What was the basis for assuming that cohesive material scoured by prop wash shear stress was suspended as individual fine-grained silt particles?
- At a modeling workshop, discussion of literature indicated that scoured material re-deposited quickly to the bed, suggesting that a substantial fraction of the material may be eroded as cohesive clumps and aggregates. The prop wash sub-model needs to incorporate the critical uncertainty for the size distribution or settling-speed distribution of scoured material.
- Results of the prop wash sub-model (Draft RI Figure G5-136) indicates that substantial areas of Newtown Creek are undergoing net erosion, with the erosion rate in some regions as high as 11 cm/yr (for 2010, Draft RI Figure G5-137). Is the inference that after decades of ship traffic in the Creek that prop wash scour is still eroding the bed and continually deepening the navigation channel? How deep will the navigation channel have to erode before it achieves quasi-equilibrium and prop wash scour no longer results in net erosion?

NYC Comment 901) Appendix G, Section 5.5.6.4.1.2, pages 123-124: The 2009 multi-ship simulation exhibits the same issues as the single-ship simulation, but the results are even less credible. Despite decades of ship traffic transiting Newtown Creek, the prop wash sub-model still predicts that ship-induced net erosion is occurring over large regions of the creek, with net erosion rates as high as 151 cm/yr for one simulated case. The section concludes that the (model-assigned) settling speed of sediment re-suspended by prop wash scour will need to be greater than 10 m/d for the model-predicted NSRs to be consistent with data-based NSRs. An alternative conclusion would be that the prop wash sub-model is fundamentally flawed and is badly over-predicting the frequency, spatial extent, and magnitude of prop wash scour, as well as the magnitude of transport of model-predicted scoured sediment.

NYC Comment 902) Appendix G, Section 6.2.2, page 131: An important conclusion is missing; simulating residual currents accurately is important to predictions of sediment transport. The poor specification of the northern East River hydrodynamic boundary condition through a "calibration" process has a detrimental effect on the model's simulation of residual currents within Newtown Creek and thereby leads to inaccuracy in the sediment-transport model.

NYC Comment 903) Appendix G, Section 7.3.2, pages 135-136: As noted in comments for Section 5.5.1.2 (Diagnostic Analysis: Relative Effects of East River and Point-Source Sediment), the sediment-transport CSM needs to expand discussion on the different transport characteristics and processes of fine-grained solids (silt/clay flocs and aggregates) and coarser sands. Fine-grained solids generally include higher organic content and are potentially more important to sorption, partitioning, bioavailability, and transport of COPCs. Sand is primarily inorganic, enters the Creek almost exclusively via point-source discharge, does not generally sorb COPCs, but may still play an important role in contaminant fate and transport through burial and/or dilution of COPCs sorbed to fine-grained solids. Thus, the existing sediment-transport CSM which is focused primarily on total solids fate and transport is incomplete.

NYC Comment 904) Appendix G, Attachment G-J, Figure G-J-1, page 132: For clarity and consistency, the *x*-axis of this figure should be rescaled by an order of magnitude to reflect the actual model-assigned depositional critical shear stress of 0.1 dyne/cm^2.

NYC Comment 905) Appendix G, Attachment G-J, Figure G-J-2, page 133: By extending the *x*-axis out to 3 dyne/cm^2, this figure provides a misleading view of the probability of deposition for non-cohesive sediment in the Newtown Creek model. Modeled skin-friction shear stress very rarely exceeds 1 dyne/cm^2 (and over a very limited spatial extent), so the depositional probability of 70-∫m (very fine) sand is rarely less than 85%, and the depositional probability of 400-∫m (medium) sand is essentially 100% at all times. Adding a vertical line marking the model's 90th percentile value for skin-friction shear stress would help make this point clear. Adding vertical lines for several other percentile values would make the plot more informative.

NYC Comment 906) Appendix G, Attachment G-J, Figure G-J-4, page 135: Adding something to the figure to show the envelope of applicability to the Newtown Creek model would be helpful, such as a vertical line marking the model's 90th percentile value for skin-friction shear stress.

NYC Comment 907) Appendix G, Attachment G-J, Figure G-J-5, page 136: This figure would be more useful if it was configured to be representative of conditions in NCG's Newtown Creek model. The City's previous analysis of the Phase 1 sediment-transport model found that particle shielding had negligible effect on model response, primarily because the grain-size distribution of the bed was not strongly bimodal (i.e., not comprised primarily of two distinctly different grain sizes). For diagnostic purposes, it would be useful to see a frequency distribution of the particle shielding factor predicted by the NCG's Newtown Creek model.

NYC Comment 908) Appendix G, Attachment G-I, Figures G-I-2, G-I-5, and G-I-10, comment:

"Uncertainty in D_{trib} exists due to uncertainty in dry density data." Figures G-I-4, G-I-7, and G-I-8 include a comment that "Bed Consolidation Does Affect Calculated D_{TRIB}."

Another comment in Attachment G-M (referenced in comments on Attachment G-M) refers to discussion in Attachment G-I regarding vertical variations in sediment dry density (i.e., "bed consolidation effects") affecting NSR calculations. However, other than the single-line comments in the figures, there is no actual discussion in Attachment G-I of dry-density uncertainty or bed consolidation and how they affect the NSR or D_{trib} calculations. Discussion needs to be added.

NYC Comment 909) Appendix G, Attachment G-K, Section 1.1.1, page 4: There are notational inconsistencies for several equations in this section. In Equations G-K-8 and G-K-9, ${}^{S}V_{nb}\left(X_p, Y_{cl}\right)$ should be: ${}^{S}V_{nb}\left(X_p, r\right)$, where *r* is a function of both Y_{cl} <u>and</u> H_p. Equations G-K-11 and G-K-12 have similar notational inconsistencies.

NYC Comment 910) Appendix G, Attachment G-K, Section 1.1.1, page 4: Check Equations G-K-13 and G-K-14. Y_{cl} is measured from the ships centerline, which is halfway between the two propeller axes; therefore:

$$r_1 = \left[\left(0.5W_p - Y_{cl}\right)^2 + H_p^2\right]^{0.5}$$

$$r_2 = \left[\left(0.5W_p + Y_{cl}\right)^2 + H_p^2\right]^{0.5}$$

Confirm these equations with the simple case of a point on the bed directly under the centerline, such that $Y_{cl} = 0.$ In which case, the radii from both propeller axes to that point become $r_1 = r_2 = \left[\left(0.5W_p\right)^2 + H_p^2\right]^{0.5}$.

NYC Comment 911) Appendix G, Attachment G-K, Section 1.1.1, page 5: *"Note that for a twin propeller ship, the efflux velocity (V_0) is calculated using 50% of the total applied power (i.e., the total applied power is assumed to be equally split between the two propellers)."*

Does this sentence mean that 50% of P_{hp} was used in Toutant's equation (G-K-2)? In which case, P_{hp} might be better defined as "applied power per propeller (horsepower [hp])." Presumably, "total ship power" was never actually used in Toutant's equation; instead, for twin-screw ships, 50% of the calibrated log-normal applied power (e.g., Figure G5-122) was used. Please confirm.

NYC Comment 912) Appendix G, Attachment G-K, Section 1.1.2, page 5: Unclear if equation valid right at $X_p/D_p = 3$?

NYC Comment 913) Appendix G, Attachment G-K, Section 1.1.2, page 5: Examination of Equations G-K-5, G-K-15, and G-K-16 show that the curves are discontinuous at their specified limits, but nowhere near as badly as Maynord's 2-zone equations.

NYC Comment 914) Appendix G, Attachment G-K, Section 1.1.2, page 5-6: Equation G-K-18 must use the corrected equations for r_1 and r_2 provided in the prior comment for equations G-K-13 and G-K-14. Equations G-K-17, G-K-18, and G-K-19 show similar notational inconsistencies.

NYC Comment 915) Appendix G, Attachment G-K, Section 1.2, page 6, Equation G-K-20: Fundamentally, the friction factor should be a function of near-bed turbulence and physical bed roughness. Maynord's (2000) approach (i.e., Equation G-K-20) ignores these physical constraints and derives a simple empirical relationship based on a ratio of propeller diameter versus distance from the propeller axis to the bed. Generally, Maynord's entire approach for determining prop wash scour has been discounted over concerns that his empiricism was too site and vessel specific and not suitable for generalization. Similar concerns apply to Equation G-K-20. Any uncertainty in that equation directly impacts the calculation of prop wash bed shear stress.

NYC Comment 916) Appendix G, Attachment G-K, Section 1.3, page 9: Owing to issues of numerical stability, the prop wash re-suspension sub-model distributes all model-calculated mass scoured from the bed uniformly throughout the entire water column. NCG justifies this procedure secondarily by observing that turbidity plumes may occur behind ships transiting the Creek. This weak justification ignores that such turbidity plumes may result from re-suspension of an unconsolidated "fluff layer" resting on the bed surface and might not even signify scour of the bed itself. If prop wash scour does actually occur, the unanswered question of solids size distribution becomes germane. Some fine fraction of scoured mass may be distributed throughout the water column to form a turbidity plume, while larger clumps and aggregates redeposit rapidly to the bed. Essentially, the prop wash re-suspension sub-model maximizes transport of model-calculated scoured mass by distributing that entire mass uniformly throughout the water column; however, no evidence is provided to justify that vertical distribution. Nor does the subsequent modeled settling of material scoured consider the solids-size distribution or settling-speed distribution of the re-suspended mass, because those distributions for material scoured via prop wash are entirely unknown. The erosion, settling, and re-deposition calculations of the prop wash re-suspension sub-model remain pure speculation.

NYC Comment 917) Appendix G, Attachment G-K, Section 1.4, page 10: At several points in the FMRM (e.g., Section 7.2.4) statements are made that the prop wash re-suspension sub-model produces *"realistic results that are qualitatively correct."* Even with the "qualitative" qualifier this is an overstatement of the sub-model's performance. Sub-model limitations and uncertainty are much more extensive than are presented in Attachment G-K Section 1.4 and include the following issues and concerns:

- A number of equations for efflux velocity (V_0) have been proposed in the literature, with resulting values varying by at least 10-20%. This is, perhaps, the simplest and least controversial of the terms required by the prop wash sub-model.
- Toutant's equation for propeller thrust is not only wholly empirical, it is dimensionally inconsistent. Thrust (a force) is derived from one empirical term with units of power (hp) added to another empirical term with units of velocity squared times power. This empiricism is of concern here and in other calculations because much of the study on prop wash has been conducted with large, powerful tugs and self-propelled barges that transit the Mississippi, Illinois, and Ohio Rivers. It remains unclear whether these empirical equations downscale appropriately for the smaller and less-powerful vessels that ply Newtown Creek. A case in point is the empirical, 2-zone scheme for prop wash velocity developed by Maynord (2000), which when applied to smaller vessels results in extreme discontinuities in the velocity solutions at the interface of the two zones and particularly unrealistic velocities greater than 10 propeller diameters astern. Maynord's scheme was

not generalizable to conditions that deviated significantly from those under which the empirical relationships were derived.

- The prop wash sub-model employs empirical equations from Lam et al. (2011) to calculate velocity of the propeller jet astern and laterally from ships centerline in what is essentially a 4-zone scheme. Lam et al. describe their scheme as "state-of-art", which it may well be. Nevertheless, the issue of empirical generalization remains a concern. It is also worth noting that Lam et al. include a comment from another paper (Fuehrer et al. 1987) that the empirical equation for efflux velocity is in error by as much as $\pm$ 20%.
- The prop wash scheme of Lam et al. (2011) completely sidesteps the issue of calculating bed shear stress from near-bed velocity of the propeller jet, so the prop wash sub-model reverts to a quadratic drag equation (Equation G-K-19) proposed by Maynord (2000). Physically, the drag coefficient should scale with bed roughness and also distance astern to account for the growing boundary layer; however, Maynord's drag coefficient (Equation G-K-20) scales solely on the ratio of propeller diameter versus distance from the propeller axis to the bed (i.e., D_p/H_p). Again, the issue of generalizability is a concern.
- Presuming that bed shear stress can be determined with acceptable accuracy (a questionable proposition at the moment) and that it exceeds the critical erosion shear stress for the bed, the issue of how bed material is scoured becomes germane. Results from the ADV data suggest that elevated shear stress at a point on the bed from prop wash may only last 10s of seconds as a ship passes by. Cohesive beds subjected to impulse excess shear stress tend to erode by mass failure (i.e., sections of the bed surface lift off the bed) not grain by individual grain. Understanding and quantifying the size distribution or settling-speed distribution of scoured material will be essential to effectively modeling the process. Larger cohesive clumps and aggregates will redeposit quickly back to the bed. Finer fractions may be suspended throughout the water column and transported longer distances by tidal currents and thermohaline circulation. This issue remains unexplored as of yet.
- The scheme derived for spatial interpolation of consecutive ships location appears to amplify the total ship days in some areas of Newtown Creek by factors of 4 to 6; thereby, exaggerating impacts of ship traffic in these areas.
- Results of the sediment-transport model with prop wash scour included (e.g., Draft RI Figures G5-136, G5-143, G5-144) predict that large areas of Newtown Creek are net erosive, implying that prop wash scour from transiting ships continues to deepen the navigation channel. This result seems very counterintuitive. After decades of ship traffic in Newtown Creek, one would expect that the principal transit pathways would already be scoured to a depth at which the bed no longer erodes. That is, the system has achieved a condition of quasi-equilibrium, in which prop wash scour may redistribute recently deposited material but no longer deepens the bed. Thus, model results that predict erosion over large areas of Newtown Creek should be viewed with skepticism.

- Taken as a whole, the uncertainty in the prop wash model remains unacceptably high and model results are not supportable, even qualitatively.

NYC Comment 918) Appendix G, Attachment G-L, Section 1.1, page 2: In the last paragraph, the bulleted reasons ("primary causes") for poor agreement between model-predicted and measured TSS concentrations (i.e., constant East River TSS concentration, constant point-source TSS concentration, and neglecting autochthonous solids production) are presented as fact. They are, however, speculation and have not been proven; nor has any effort made to prove them.

NYC Comment 919) Appendix G, Attachment G-M, Section 1.3, page 3: The first sentence indicates that vertical variations in dry density of bed sediment (i.e., bed consolidation) and its effects on NSR calculations are in Attachment G-I; however, that discussion does not exist.

NYC Comment 920) Appendix G, Attachment G-M, Section 1.3, page 3: With regard to subsurface dry density presented in Draft RI Figure G-M-14, the spatially averaged values should be shown with $\pm$ 1 standard deviation so variability of the data may be assessed.

NYC Comment 921) Appendix G, Attachment G-M, Section 1.3, page 3: *"Generally, the subsurface sediment dry density is greater than the surface sediment dry density, which is due to the effects of bed consolidation."*

The statistical results should be reported.

NYC Comment 922) Appendix G, Attachment G-M, Section 1.3, Page 3, Figure G-M-15: The spatial distribution of NSRs with subsurface sediment dry density included based on the calculations shown is missing a more detailed and transparent presentation of the data variability/uncertainty for the subsurface dry density. Figure G-M-15 or the subsequent Figures G-M-16 through G-M-19 need more explanation or revision.

ED_001427_00000388-00323

City Comments on NCG Draft RI Appendices H-J

Appendix H is the BHHRA, which is currently due April 7. The City will provide comments on that document separately.

Appendix I is the BERA which is undergoing further development and is currently anticipated to be submitted in April. The City will provide comments on that document separately.

Appendix J refers to the DAR and does not contain any significant additions from the RI Work Plan. This document needs to include a plan and schedule for including data from all upland sites which impact the Creek. Because the NCG work is deficient, EPA should develop and implement plans separately and independently or direct the City to undertake this work as a respondent.

References

Anchor Environmental, LLC, 2007. Draft Remedial Investigation Report – Operable Unit 6 (OU-6), Laurel Hill Site, Maspeth, New York. Prepared for Phelps Dodge Refining Corporation. May 2007.

Anchor QEA, 2014a. Preliminary Modeling Results Memorandum, Draft. Remedial Investigation/ Feasibility Study, Newtown Creek. June 2014.

Anchor QEA, 2014b. Phase 2 Field Sampling and Analysis Plan – Volume 2. Remedial Investigation/ Feasibility Study, Newtown Creek. November, 2014.

Anchor QEA, February 4, 2016. October 1, 2015 NAPL Presentation Comment and Response Matrix for EPA Comments —EPA Comments Submitted on October 26, 2015, on the October 1, 2015 NAPL Presentation and EPA Comments Submitted on November 19, 2015, on the October 22, 2015 Ebullition Presentation—Comment No. 6.

Ankley, G., L. Burkhard, P. Cook, S. Diamond, R. Erickson, and D. Mount, 2002. "Assessing Risks from Photoactivated Toxicity of Polycyclic Aromatic Hydrocarons to Aquatic Organisms", Chapter 15 in PAHs: An Ecotoxicological Perspective, P. Douben (ed.), West Sussex, UK: John Wiley and Sons.

Blumberg, A.F., and D.W. Pritchard, 1997. Estimates of the transport through the East River, New York. *Journal of Geophysiscal Research*, 102(C3):5685-5703.

Burkhard, L.P., 2000. Estimating Dissolved Organic Carbon Partition Coefficients for Nonionic Organic Chemicals. *Environmental Science and Technology*, 34(22):4663-4668.

Cave, K.A., and J.T. Smullen, 2004. CDM portion of NPDES Dataset taken from NSQD 2004.

Cheng, N.S., 1997. Simplified Settling Velocity Formula for Sediment Particle. *Journal of Hydraulic Engineering,* 123(2):149-152.

C.K. Wentworth, 1922. A scale of grade and class terms for clastic sediments. *The Journal of Geology*, *30*(5), 377-392.

Friedman, C.L., R. Lohmann, R.M. Burgess, M.M. Perron, and M.G. Cantwell, 2011. Resuspension of Polychlorinated Biphenyl - contaminated Field Sediment: Release to the Water Column and Determination of Site - specific K_{doc}. *Environmental Toxicology and Chemistry*, 30(2), 377-384.

Georgas, N., 2010. Establishing Confidence in Marine Forecast Systems: The Design of a High Fidelity Marine Forecast Model for the NY/NJ Harbor Estuary and its Adjoining Waters. Ph.D. Dissertation, Stevens Institute of Technology, Hoboken, New Jersey.

Gray, J. R., G.D. Glysson, L.M. Turcios, and G.E. Schwarz, 2000. Comparability of suspended-sediment concentration and total suspended solids data. *US Geological Survey Water-Resources Investigations Report, 00-4191, 20.*

Greeley and Hansen, 1982. Infiltration/Inflow Analysis, 201 Facilities Plan, Volume 3. Prepared for NYCDEP. December 1982.

Jay, D.A., and M.J. Bowman, 1975. The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound. State University of New York, Marine Sciences Resources Center. Technical Report No. 23, December 1975.

Jonker, M.T., and A.A. Koelmans, 2002. Sorption of Polycyclic Aromatic Hydrocarbons and Polychlorinated Biphenyls to Soot and Soot-like Materials in the Aqueous Environment: Mechanistic Considerations. *Environmental Science and Technology*, 36(17):3725-3734.

Kwan, C., April 18, 2014. Regarding: EPA Transmittal of Final Phase 2 Groundwater Investigation. Attachment: Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites. Email to Jim Quadrini of Anchor QEA

Lam, W., G.A. Hamil, Y.C. Song, D.J. Robinson, and S. Raghunathan, 2011. A review of the equations used to predict the velocity distribution within a ship's propeller jet. *Ocean Engineering*, 38(1):1-10.

Leggette, Brashears & Graham, Inc., 1981. Expanded Investigation of Hydrocarbon Contamination in the Shallow and Regional Aquifer Systems and Discussion of Dewatering at the Old Barge Slip. Prepared for Mobil Oil Corporation. August 1981.

Litten, S., 2003. Contaminant Assessment and Reduction Project (CARP) Water. Bureau of Water Assessment and Management, Division of Water, NYSDEC. August 2003.

LMS (Lawler, Matusky & Skelly Engineers), 1992. Newtown Creek Water Quality Facility Planning Project: Subtask 2.3 and 2.4 Sewer System Monitoring and Rainfall Monitoring, Final. Prepared for NYCDEP. February 1992.

Maestre, A., and R.E. Pitt, 2005. The National Stormwater Quality Database (NSQD), Version 1.1, A Compilation and Analysis of NPDES Stormwater Monitoring Information. Prepared for EPA Office of Water. September 2005.

Maynord, S.T., 2000. Physical Forces near Commercial Tows. Interim report for the Upper Mississippi River-Illinois Waterway System Navigation Study. ENV Report 19. March 2000.

Misut, P.E., and J. Monti, 1999. Simulation of Ground-Water Flow and Pumpage in Kings and

Queens Counties, Long Island, New York. *U.S. Geological Survey Water-Resources Investigations Report*, 98 - 4071.

Mount, D., S. Diamond, R. Erickson, M. Simcik, and D. Swackhamer, 2001. Linking Exposure and Dosimetry to Risk from Photo-activated Toxicity of PAHs. Presented at the 2001 Annual SETAC Meeting, Baltimore, MD.

NYCDEP, 2012. Comments on the Model Recalibration Report, the Hunts Point Model and Tallman Island Model. <http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/recalibration-report-comments-and-responses.pdf> Accessed March 17, 2017

NYCDEP, 2012. INFOWORKS Citywide Recalibration Report: Updates to and Recalibration of October 2007 NYC Landside Models. June 2012. <http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/infoworks-citywide-recalibration-report.pdf> Accessed March 17, 2017.

NYSDEC, 2014. Decision Document - Former Paragon Oil Terminal Petroleum Remediation Project, Greenpoint, Brooklyn, Kings County, Site No. S224083 & Apollo Street Creek Parcels Petroleum Remediation Project, Greenpoint, Brooklyn, Kings County, Site No. S224122. June 2014.

NYSDEC, January 21, 2016. Email from Ian Beilby to EPA with comments on Anchor QEA's 'Multiple Lines' Presentation

NYSDOT (New York State Department of Transportation), 2005. Newtown Creek Navigation Analysis: Kosciuszko Bridge Project. September 22, 2005.

Rusticus, S.A., and C.Y. Lovato, 2011. Applying Tests of Equivalence for Multiple Group Comparisons: Demonstration of the Confidence Interval Approach. *Practical Assessment, Research & Evaluation*, 16(7):1-6.

Texaco. May 7, 2015. Texaco Objection to Draft Data Applicability Report Addendum, 2015-05-07

The Louis Berger Group, Inc., Battelle, and HDR/HydroQual, 2014. Remedial Investigation Report for the Focused Feasibility Study of the Lower Eight Miles of the Lower Passaic River. Prepared for EPA Region 2 and US Army Corps of Engineers Kansas City District.

US Navy, 2003. Guidance for environmental background analysis, volume II: sediment (NFESC User's Guide UG-2054-ENV, April 2003).

EPA, 1973. Combined Sewer Overflow Study for the Hudson River Conference. Office of

Research and Monitoring. EPA-R2-73-152. January 1973.

EPA, 1983. Final Report of the Nationwide Urban Runoff Program, Final Draft Vol. 1, WH-554, Water Planning Division. December 1983.

EPA, 2002. Calculating upper confidence limits for exposure point concentrations at hazardous waste sites. EPA Office of Emergency and Remedial Response. OSWER 9285.6-10, December 2002.

EPA, 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metals Mixtures (Cadmium, Cu, Lead, Nickel, Silver and Zinc). Office of Research and Development. EPA 600/R-02/011. January 2005.

EPA, 2012. Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Procedures for the Determination of the Freely Dissolved Interstitial Water Concentrations of Nonionic Organics. EPA/600/R-02/012. Office of Research and Development. December 2012.

EPA, 2013. ProUCL Version 5.0.00 Technical Guide: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Office of Research and Development. EPA/600/R-07/041, September, 2013.

EPA, March 31, 2016. Technical Review Comments Category 2/3 NAPL Evaluation Presentation Dated February 4, 2016 - Newtown Creek RI/FS Oversight.

Uusitalo, L., A. Lehikoinen, I. Helle, and K. Myrberg, 2015. An overview of methods to evaluate uncertainty of deterministic models in decision support, *Environmental Modelling and Software*, 63:24-31.

Viana, P.Z., K. Yin, and K.J. Rockne, 2012. Field Measurements and Modeling of Ebullition-facilitated Flux of Heavy Metals and Polycyclic Aromatic Hydrocarbons from Sediments to the Water Column. Environmental Science and Technology 46(21):12046-54.

Walter Anthony, K. M., and P. Anthony, 2013. Constraining spatial variability of methane ebullition seeps in thermokarst lakes using point process models. *Journal of Geophysical Research: Biogeosciences*, 118(3), 1015-1034.

Weston Solutions, Inc., 2009. Expanded Site Inspection Report – Newtown Creek. Prepared for U.S. Environmental Protection Agency. Document Control No. 524-2AAEFX. July 2009.

Wastewater Planning Users Group (WaPUG), 2002. Code of practice for the hydraulic modelling of sewer systems: Version 3.001. November 2002 (Amended December 2002). <http://www.ciwem.org/wp-content/uploads/2016/05/Code-of-Practice-for-the-Hydraulic-Modelling-of-Sewer-Systems.pdf> Acesssed March 17, 2017.