

DRAFT

Amazon HQ2 Infrastructure Sub Committee

Infrastructure/Resiliency measures required to address climate change/sea-level rise preclude conventional development on waterfront parcels

Three of the five Amazon proposed sites defining its proposed second headquarters campus (HQ2) are on the East River waterfront and directly interface with estuary (arm of the sea) conditions. Evidence on adjacent sites already shows degradation from rising tides which are changing dramatically and pose severe risk including possible displacement to the upland community. This paper outlines the specific features of the designated parcels, their vulnerabilities including risk to the *entire* area if mishandled and possible resilient solutions.

The misname of the body of water known as the East River prevents us from fully understanding its protective and sheltering qualities. It is a tidal strait and unlike a river where water flows in one direction, it experiences brackish flows in two directions twice a day. Part of the greater estuary of New York Harbor, it naturally filters runoff, provides a unique and plentiful food source for fauna and fish and a breeding site for migrating species. However, at the HQ2 proposed location, its most important function is to provide a crucial buffer to the vagaries of the sea.

Prior to European settlement, a Long Island Indian tribe controlled much of what is now Long Island City. Known as the Mespeatches, which loosely translates to “at the bad waterplace”, they knew better than to build their shelters in the low lying swampy area along the water, choosing instead the high ground of Cavalry Cemetery for their settlement. However, they frequented the waterfront for its rich productivity of plant and animal life found only in the rare and unique fresh/salt water environment of a typical estuary. They certainly would not have referred to it as a river. Biologists describe New York Harbor as one of the most important estuaries on the planet and the crowd of weekend fishers on the 44th Drive pier proves its continued productivity today.

With the advent of the railroad, specifically the Long Island Rail Road in the 1850s, and subsequent industrialization, the area was slowly “dewatered” by filling in the swamp with construction debris and other unwanted material. This dubious mix provides the substrate upon which the surface roads and development parcels rest. As we know from grammar school science, water eventually erodes land and seeks its own level. All five HQ2 parcels were under brackish water during and after the battering of Superstorm Sandy in 2012. This storm caused loss of life in NYC and \$65B worth of damage overall, second only to Hurricane Katrina in the history of US record keeping. However, the event also provided a gift – it showed us that flooding occurred exactly where the water used to be. Overlaying the 1776 British Revolutionary War map (pre-dewatering) indicating a shoreline full of bays, streams and deltas with the flood map resulting from Superstorm Sandy: it is almost a complete match. Water erodes land and seeks its own level – we need to heed the warning.

The Intergovernmental Panel on Climate Change (IPCC) has, year after year, underestimated its predictions for sea-level rise. This is due in part to lack of adequate data on polar and glacier ice melt as well as Greenland ice melt. Results of initial data collection indicate an insidious melting much worse than originally predicted. Hence, the latest estimate for sea-level rise by 2100 is five to six feet. The New York City Panel on Climate Change is estimating a 31 inch rise by 2050. In LIC we do not have to rely on these predictions – the phenomenon of “sunny day flooding” (high tide flooding during calm, dry weather) is already occurring in portions of Gantry State Park and elsewhere. Furthermore, the National Oceanic and Atmospheric Administration (NOAA) has just declared 2018 as the fourth warmest year in recorded history. Global warming is a direct cause of increased intensity and frequency of storms. New York City has yet to experience anything close to other US cities where as much as 50 inches of rain has fallen from one storm system. Yet, one inch of rain in LIC can trap merchants in their shops along Vernon Boulevard due to inadequate drainage.

Every current flood map places Hunters Point in the worst flood zone of those without wave action. NYC Office of Emergency Management designates the area in the highest level for evacuation in the event of a storm. FEMA maps place the “base flood elevation” at 12 feet for all five HQ2 parcels. Manhattan, where the flood risk does not stretch as far inland as it does in LIC, has initiated a comprehensive plan to address coastal protection and resilience. Known as Rebuild by Design (the Big U) it has fallen short of the required funding, but planning continues. The City has *no* plan for the Brooklyn/Queens coast. This leaves private developers employing measures (walls and berms) on their individual parcels. This will not work. At first, it will push the water onto someone else’s property (the inland community) and then eventually fail since water erodes land, including walls over time. In addition, when the sewer system is overwhelmed due to sudden downpours, runoff gets trapped by the same berms and walls trying to keep the water out. Finally, Hunters Point suffers from an extremely high water table minimizing absorption by the soil. It is so high that most green infrastructure measures used across the city do not work here.

Major risk insurers (AIG, Allianz) are being forced into unconventional means to raise needed capital to manage funds under the heading of “catastrophe bonds”. In the last 10, years insurers’ payout has approached \$150B per year, much of which is attributed to climate change. Swiss Re has stated, “Extreme weather events heightened by climate change, coupled with the fact that much new development is in flood prone land, is making the problem worse”. Will HQ2 fit into this category? Government incentives encouraging major development in a floodplain just at the commencement of an era of unprecedented sea-level rise are certainly put into question, legally and ethically. Within the complex negotiations of public land conveyance, who will ultimately be responsible for taking on the risk of climate disruption? Will this be another burden on the taxpayer if a FEMA rebuild is required?

Developing a headquarters, while protecting the inland community, is a very serious and complex matter. The process should start with understanding the risk. Both New York State Department of Environmental Conservation and Mayor’s Office for Recovery and Resiliency offer sea-level rise facts and analysis methodology to determine risk by geographical area. The Department of Building regulations unfortunately rely on FEMA mapping which is based on historical data with some “freeboard” allowance rather than on vetted projections. This under estimate, along with lack of comprehensive resiliency plan

for the Brooklyn/Queens coast, will not adequately protect the inland community. There are a number of companies that model and analyze risk based on climate data, topography, and hydrology. One of the most promising is Jupiter which has recently collaborated with Brooklyn College to produce a report and modeling methodology to calculate simultaneously storm surge and rainfall to evaluate urban flood risk along the city's coastline. The critical scenarios produced by this effort will be invaluable to any developer contemplating a project in the LIC floodplain.

Once the full risk is determined and analyzed, use of the land and placement of buildings hopefully will be modified to allow for absorption and temporary retainage of flood waters. One can just look at the adjacent failed construction site to the north where engineered sheet piling was not enough to hold back the East River. Known as "Lake Vernon" it is, not only home to many species including rarely seen migrating birds, but serves as a buffer from the ravages of the East River experienced by the inland community. Nature on its own has accomplished this, but the recently completed Hunters Point Park South accomplished resilience through design by employing native specie wetland planting, culverts to hold river water, bioswales, sacrificial walkways and minimal use of structural protection. Significantly, the space required for these combined measures is no less than 200 feet between the shoreline and the roadway. It is also at a much higher elevation than the parcels surrounding Anable Basin. It becomes obvious that significant portions of the HQ2 waterfront sites would have to be developed with "soft" edges to provide the needed sponge to protect the inland community from frequent flooding. Furthermore, the waterfront will change dramatically over the next few decades. The 2030s will see significant flooding, the 2050s sacrifice of first floor areas and beyond probably full retreat. Thus, the measures employed in the initial design for this site are crucial.