FROM

NAME & TITLE	AVA RICHARDSON, DIRECTOR
AGENCY NAME & ADDRESS	OFFICE OF SUSTAINABILITY 8TH FLOOR, 417 EAST FAYETTE STREET
SUBJECT	CITY COUNCIL BILL #23-0448/URBAN RENEWAL - INNER HARBOR PROJECT I - AMENDMENT 21

CITY of BALTIMORE

MEMO

TO The Honorable President and
Members of the City Council
City Hall, Room 400
100 North Holliday Street

DATE: February 5, 2024

The Office of Sustainability is in receipt of City Council Bill #23-0448 – Urban Renewal – Inner Harbor Project I – Amendment 21. This bill seeks to amend the Urban Renewal Plan for Inner Harbor district to accommodate certain aspects of the proposed Inner Harbor Redevelopment Project by amending the Development Area Controls. The bill augments language in the Land Disposition and Standards and Controls sections of the Inner Harbor Renewal Plan that relate to the size of the facilities (Section V.B.) and servicing (Section V.D) - which collectively make changes, such as allowing for residential uses and the parameters for determining the total square feet of gross building area, maximum permitted height and building requirements in specified development areas.

CCB#23-0448 in combination with CCB# 23-0444 – Charter Amendment Inner Harbor and CCB# 23-0446 – Zoning C-5-IH Amendment - present an opportunity to align waterfront development with the foundational principles for climate mitigation, adaptation and community-wide climate resilience outlined in the city's 2023 Disaster Preparedness and Planning Project (DP3), the 2024 Climate Action Plan and other related plans across the city. The Office of Sustainability takes many climate risks and threats into consideration as the city is continuously exploring strategies, policies, legislation and other innovations that support a vision to make Baltimore:

> *"... a resilient city whose daily activities reflect a commitment shared by all people who work, live, and play in Baltimore City to reduce or eliminate impacts from current and future hazards, especially those exacerbated by climate change."* [i]

Achieving this vision relies on the latest available data, research and analysis related to climate-related risks and vulnerabilities. Collectively, our climate plans across the city address climate vulnerabilities and detail mitigation strategies informed by communities and subject matter experts. This bill report details these strategies, references specific recommendations relevant to CCB# 23-0448 and highlights considerations for resilient waterfront development.

The City's Disaster Preparedness and Planning Project or DP3 calls for increasing the resilience of waterfront buildings and infrastructure by designing projects to be resilient to projected sea-level rise, raising bulkhead heights, integrating flood protection systems, enhancing waterfront design guidelines to mitigate flooding, and strengthening waterfront zoning and permitting. Mitigation strategies in Baltimore's DP3 provide recommendations to (1) Protect people and property while improving essential, critical infrastructure, and enhancing natural systems (2) Avoid hazard-related costs through pre-emptive actions and (3) Proactively implement hazard mitigation strategies to reduce future impacts and promote a resilient and sustainable future for the city. Hazard mitigation and climate adaptation are complementary

efforts with the shared goal of reducing the long-term risk for people and increasing the safety of communities. While hazard mitigation encompasses all natural hazards, climate adaptations focus on current and projected impacts of climate change. Mitigating the impacts of climate change across the city requires a clear understanding of past, present and future climate risk, vulnerabilities and the city's adaptive capacity.

Climate Risks and Vulnerabilities

Risk and vulnerability are dependent upon population density, critical infrastructure, and mitigation actions. The metropolitan area of Baltimore is most vulnerable to coastal storm events, flooding and sea-level rise related hazards due to the area's high population density and infrastructure near the waterfront. The entire City has been identified as at potential risk to flood hazard due to projected increases in precipitation frequency and intensity; however, the highest risk is in the mapped Special Flood Hazard Area (SFHA). All assets in Baltimore City, as described in the Section 3 of the DP3 (Risk Assessment), are exposed and potentially vulnerable to the 1-percent and 0.2-percent annual chance of flooding. With a population of 591,489, only 1,767 Baltimore City residents are living in the 1-percent annual chance floodplain, or 0.3-percent of Baltimore City's total population, and an estimated 4,982 residents are living in the 0.2-percent annual chance floodplain. Tables 4-8 and 4-12 in the 2023 DP3 (pages 4-46 & 4-50) summarize the populations and buildings in flood hazard areas by City Council District.

**Note: The term "500-year flood" is a flood that has a 0.2-percent chance of being equaled or exceeded each year. The 500-year flood could occur more than once in a relatively short period of time. Statistically, the 0.2-percent (500-year) flood has a 6-percent chance of occurring during a 30-year period of time, the length of many mortgages.*

Table 4-8. Estimated Number of Persons Living in the 1-percent and 0.2-percent Annual Chance Flood Event Hazard Areas

City Council District	Total Population (American Community Survey 2021)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
1	43,739	545	1.2%	1,845	4.2%
2	45,252	11	<0.1%	38	0.1%
3	42,257	40	0.1%	40	0.1%
4	45,027	35	0.1%	35	0.1%
5	43,601	92	0.2%	194	0.4%
6	41,604	3	<0.1%	18	<0.1%
7	39,638	155	0.4%	169	0.4%
8	46,396	453	1.0%	653	1.4%
9	35,869	0	0.0%	0	0.0%
10	41,521	94	0.2%	205	0.5%
11	48,022	276	0.6%	1,557	3.2%
12	37,130	44	0.1%	151	0.4%
13	38,768	0	0.0%	0	0.0%
14	42,664	20	<0.1%	77	0.2%
Baltimore City (Total)	**591,489**	**1,767**	**0.3%**	**4,982**	**0.8%**

Source: U.S. Census Bureau 2021, ACS; FEMA 2021

Table 4-12. Estimated General Building Stock Located in the 1- and 0.2-Percent Annual Chance Flood Event

City Council District	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Building Stock Located in the Flood Hazard Area							
			Number of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost of Buildings in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost of Buildings in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
1	22,781	$42,726,169,218	355	1.6%	$2,372,968,741	5.6%	1,118	4.9%	$6,418,069,021	15.0%
2	12,746	$19,773,061,274	34	0.3%	$300,652,743	1.5%	61	0.5%	$682,509,700	3.5%
3	14,274	$14,195,099,773	14	0.1%	$13,592,422	0.1%	14	0.1%	$13,592,422	0.1%
4	14,536	$12,686,748,697	12	0.1%	$20,062,527	0.2%	12	0.1%	$20,062,527	0.2%
5	12,637	$18,575,913,421	69	0.5%	$611,011,446	3.3%	106	0.8%	$710,241,382	3.8%
6	15,009	$19,159,968,457	9	0.1%	$102,676,305	0.5%	18	0.1%	$185,144,919	1.0%
7	17,409	$18,007,600,793	87	0.5%	$294,741,816	1.6%	113	0.6%	$525,443,214	2.9%
8	14,350	$14,208,439,442	140	1.0%	$123,507,485	0.9%	203	1.4%	$169,432,640	1.2%
9	21,371	$21,990,875,897	9	0.0%	$118,076,220	0.5%	12	0.1%	$180,701,840	0.8%
10	16,334	$33,621,448,750	112	0.7%	$1,036,363,378	3.1%	226	1.4%	$2,097,828,285	6.2%
11	17,184	$62,344,674,213	260	1.5%	$3,339,495,321	5.4%	715	4.2%	$4,895,998,388	7.9%
12	15,436	$33,041,741,651	62	0.4%	$715,051,723	2.2%	129	0.8%	$1,128,850,670	3.4%
13	18,095	$19,432,245,395	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
14	15,694	$17,744,799,580	9	0.1%	$32,687,979	0.2%	32	0.2%	$78,395,700	0.4%
Baltimore City (Total)	**227,856**	**$347,508,786,561**	**1,172**	**0.5%**	**$9,080,888,105**	**2.6%**	**2,759**	**1.2%**	**$17,106,270,708**	**4.9%**

Source: Maryland Department of Planning 2020, 2022; RS Means 2023; FEMA 2021

Flooding contributes to public health concerns as floodwaters may carry hazardous materials and waterborne illnesses through a community. If floodwaters are slow to recede, vector-borne diseases may increase as mosquitoes and other insects breed near stagnant waters. Additionally, water entering homes produces mold, which poses a threat to the health and safety of residents. Below we elaborate on flood, sea-level rise and coastal hazards based on data and analysis from the 2023 DP3:

- *Flood Risks:* According to the United States Environmental Protection Agency (EPA), the East Coast suffers the most frequent coastal flooding and has experienced the largest increases in the number of flood days. When comparing data from 1950-1959 to data from 2011-2020, Baltimore City is experiencing, on average, 5.4 more average number of flood days per year according to the EPA's Climate Indicator (EPA 2022). Floods are one of the most frequent and costly natural hazards in Baltimore City in terms of human hardship and economic loss, particularly to communities that lie within flood-prone areas or floodplains, of a major water source. Floods can be exacerbated by other hazards such as sea level changes, increased precipitation or severe storms.

Section 4.5 of the DP3 cross references the Baltimore City 2020 Nuisance Flood Plan which describes the probability of future hazard events under sea level rise scenarios. By 2050, an referred to as 'Zone Three' - which includes the area of this proposed development - can expect a 300% increase in areas affected by nuisance flooding and a 512% increase by 2100. **Current floodplain maps do not account for sea level rise scenarios or increases in intense precipitation events.** An estimated three percent of Baltimore City's overall land, primarily in the Inner Harbor area and the Fells Point Historic District, is within the coastal floodplain. By the end of the century, approximately 115,200 acres, or 180 square miles, of currently dry land along Maryland's coastline is expected to be inundated, coupled with more frequent and extreme precipitation events (City of Baltimore 2018). Lower Fells Point and areas along Inner Harbor have historically been the areas most impacted by nuisance floods.

An increase in development, particularly in low-lying and coastal areas, will worsen flooding and related challenges. As the population increases in flood prone areas, so may the number of people exposed to flood risk. To limit the impact of flooding in the future, waterfront developers should design proactive adaption and hazard mitigation solutions into development

plan such as those detailed in the DP3. Relevant mitigation strategies from the DP3 are detailed in this bill report as well as standards for waterfront development such as the Waterfront Alliance's WEDG Design Guidelines, the Climate Readiness Framework for Coastal Cities and a 2023 report produced by consultant SCAPE focused on the Inner Harbor's costal risks.

- *Sea-Level Rise Risks:* According to Maryland's 2023 Sea-Level Rise Report, "*...sea-level rise in Maryland has been and will continue to be greater than the global average. Beyond the effects of negative vertical land motion (VLM) due to regional geological processes, sea-level rise at Baltimore is projected to be about 17% greater than for global mean sea-level rise in 2100 under the Current Commitments emissions pathway*." Projections estimate sea levels in Baltimore rising up to 1.78 feet in 2050, 2.66 feet in 2070, and 4.25 feet in 2100 compared to current levels. (University of Maryland 2023) As sea levels rise, the starting elevation of coastal flooding events will also increase. This means coastal floods are likely to reach a higher elevation and push farther inland. As a result, the floodplain will expand and the **base flood elevation* (BFE)** will rise.

**Note: The base flood elevation is defined as the elevation of the base flood in relation to a specified datum used as the standard for the National Flood Insurance Program to dictate the lowest level at which a living space can be built without being impacted by floods.*

- *Coastal Hazards:* The entire population of Baltimore City is vulnerable to coastal storm events; especially those communities located on or near the Chesapeake Bay. The metropolitan areas of Baltimore are most vulnerable to coastal storm events due to high population density and critical infrastructure near the bay. Hurricanes, tropical cyclones, coastal and tidal flooding, and more can severely impact the daily lives and overall safety of the people in coastal areas of Baltimore City. Table 6-5 lists the number of people located within each storm category for the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) area. Based on historic and recent events, it is highly likely that coastal storm events will continue to occur in Baltimore City. In addition, as the climate continues to change, the probability for future events such as tropical cyclones, hurricanes, storm surge, etc. may likely increase in quantity and severity. It is anticipated that the city will continue to experience direct and indirect impacts from coastal storm events into the future. Table 6-4 lists the probability of future occurrences of coastal storm events. The probability of these hazards occurring in Baltimore City within any given year is 19.4% chance for coastal flood; 4.2% for tropical cyclones; and 2.8% chance for storm surge/tide events.

Table 6-4. Occurrence of Coastal Storm Events

Title	Number of Occurrences (1950-2022)	% Chance of Occurrence in Any Given Year
Tropical storm	3	4.2%
Hurricane	6	8.2%
Storm Surge/Tide	2	2.8%
Total	19	26.03%

Source: NCEI 2023
Note: With so many sources reviewed for this plan update, loss and impact information for many events could vary. Therefore, the accuracy of monetary figures discussed is based only on the available information in cited sources in relation to Baltimore City specifically.

Table 6-5. Population Located in the SLOSH AREA

City Council District	Total Population (American Community Survey 2021)	Number of Persons Located in the SLOSH Category 1 Storm Surge Hazard Area		Number of Persons Located in the SLOSH Category 2 Storm Surge Hazard Area		Number of Persons Located in the SLOSH Category 3 Storm Surge Hazard Area		Number of Persons Located in the SLOSH Category 4 Storm Surge Hazard Area	
		Number of Persons	Percent of Total	Number of Persons	Percent of Total	Number of Persons	Percent of Total	Number of Persons	Percent of Total
1	43,739	577	1.3%	2,662	6.1%	4,483	10.2%	5,481	12.5%
2	45,252	0	0.0%	0	0.0%	0	0.0%	0	0.0%
3	42,257	0	0.0%	0	0.0%	0	0.0%	0	0.0%
4	45,027	0	0.0%	0	0.0%	0	0.0%	0	0.0%
5	43,601	0	0.0%	0	0.0%	0	0.0%	0	0.0%
6	41,604	0	0.0%	0	0.0%	0	0.0%	0	0.0%
7	39,638	0	0.0%	0	0.0%	0	0.0%	0	0.0%
8	46,396	0	0.0%	0	0.0%	0	0.0%	0	0.0%
9	35,869	0	0.0%	0	0.0%	0	0.0%	0	0.0%
10	41,521	0	0.0%	9	<0.1%	70	0.2%	310	0.7%
11	48,022	3	<0.1%	55	0.1%	1,309	2.7%	3,387	7.1%
12	37,130	0	0.0%	0	0.0%	25	0.1%	354	1.0%
13	38,768	0	0.0%	0	0.0%	0	0.0%	0	0.0%
14	42,664	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Baltimore City (Total)	**591,489**	**580**	**0.1%**	**2,726**	**0.5%**	**5,886**	**1.0%**	**9,532**	**1.6%**

Source: U.S. Census Bureau 2021, ACS; NOAA 2023
Notes: ACS (American Community Survey); NOAA (National Oceanic and Atmospheric Administration)

Recommendations

Analysis from a 2023 report entitled - *Baltimore Inner Harbor Promenade Sea-level Rise & Coastal Flooding* - completed by consultant SCAPE noted that sea-level rise risks in Baltimore's Inner Harbor are increasing. The combined risks of sea-level rise, flooding and costal hazards such as more intense storms – make development decisions all the more critical, especially those along the water's edge. The SCAPE report raises a timely question of how long the Inner Harbor needs to be functional before additional major investments are made the adapt to the above listed climate risks and vulnerabilities. Recommendations from a comprehensive analysis of waterfront risks associated with the redevelopment of the Inner Harbor are summarized. The recommendations call on Baltimore City government to utilize a particular set of planning parameters and factors when developing guidelines and establishing standards for the redevelopment of the Inner Harbor Promenade and adjacent waterfront redevelopment. The final report is available upon request.

- *Recommendation 1:* Document project definition and key performance objectives for the project to provide a basis for risk tolerance assumptions that will inform key decisions regarding sea level rise and use those to confirm and validate the assumptions and conclusion.
- *Recommendation 2:* Design for a service life that will perform in the near-term and maintain functionality without major overhaul through **2080, but building for adaptability through at least 2100** is advisable for the Inner Harbor Promenade redesign. Projections for 2050 should also be considered in designing near-term measures that may be upgraded and in prioritizing adaptation of areas that may become highly susceptible to flooding by 2050.
- *Recommendation 3:* Assume and plan for an emission scenario that estimates a 2.8 - 4.6 degree increase in average global temperatures which correspond with an estimated 1.5 meter (4.92 ft) of sea-level rise, at a minimum.
- *Recommendation 4*: Given the criticality of the Inner Harbor Promenade to the city, the generational nature of the reconstruction project, the desired integration of critical infrastructure to adjacent building and public spaces (e.g. access and electricity supply), an aversion to risks associated with the Inner Harbor and all waterfront development is advised.

- *Recommendation 5*: Identify performance parameters for the near term and long term and consider the project's and the city's adaptive capacity. This recommendation is based on low risk tolerance, the potential for other factors such as changing conditions in the built environment, increases in storm intensity/ frequency, and rapid ice melt scenarios.

Image 1 to follow shows flood scenarios covered in the report Inner Harbor report.

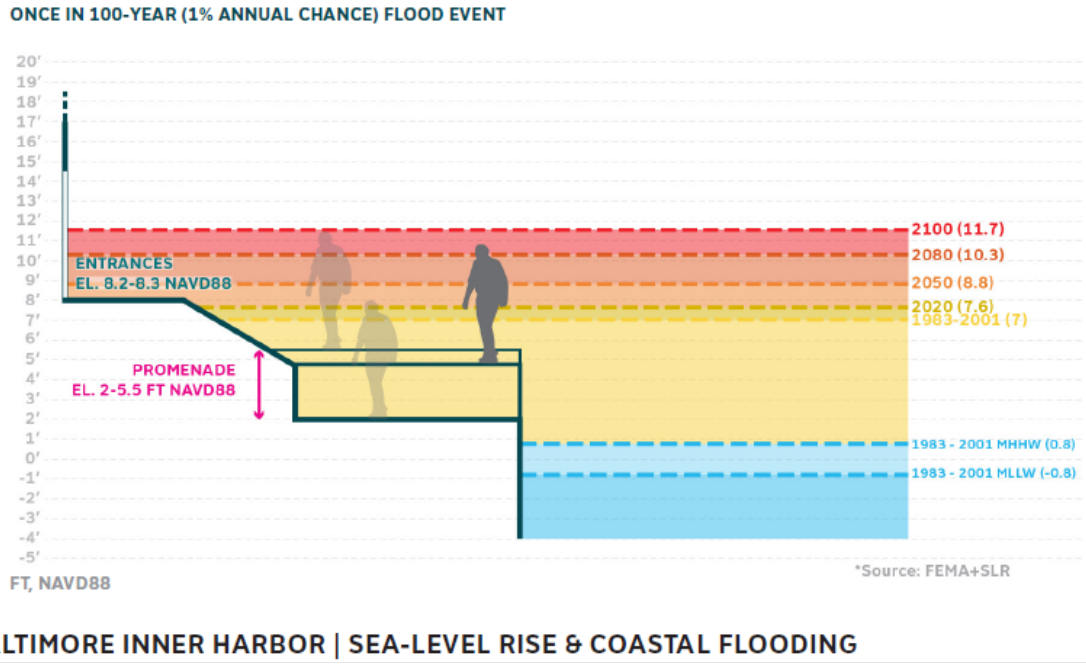

Image 1: Projected levels for 2020, 2050, 2080, and 2100 shown relative to the existing Harborplace Pavilions & Inner Harbor Promenade are shown in the SCAPE report to illustrate future flood levels to be taken into account in planning for reconstruction of the promenade and future development of the waterfront.[ii]

Mitigation Strategies from the 2023 Disaster Preparedness & Planning Project Plan

The Mitigation Strategies chapter in the city's DP3 are intended to reduce the risk of climate-related and human caused hazards. The strategies are based on hazard impacts, asset vulnerability, Baltimore City's capabilities and adaptive capacity. Actions are specific activities, such as policies, projects, and studies, that stakeholders identify to reduce risk. Actions relevant to CCB# 23-0448, CCB# 23-0446 and CCB# 23-0444 from the plan that better align with this vision are listed below for ease of reference.

- *Action B-2:* Enhance City building codes that regulate development within the regulatory floodplain or the designated Critical Area, to integrate anticipated changes in climate change
    - *B-2-1:* Design new projects to be resilient based on sea level rise projections based on best available data and adaptable to longer term impacts
    - *B-2-5:* Identify alternative buildable land to deter development in the regulatory floodplain where feasible, *when not feasible develop and share construction Best Practices for development within the regulatory floodplain*

While the Urban Renewal Plan will not establish building codes or specific designs for redevelopment within the Inner Harbor Project I area, the Urban Renewal Plan does establish permitted uses and standards for parking within the area. The amendments offered in this bill report will better align the Urban Renewal Plan with standards and best practices that will reduce risk to people and property as the area is redeveloped.

Below, additional actions relevant to the redevelopment of the Promenade and other public infrastructure, and future development and redevelopment are listed for reference. The actions below will be incorporated into future policies, plans, and guidelines to ensure that waterfront redevelopment in this area and across the city's waterfront are mitigating for current and projected climate risks. A complete list of mitigation strategies can be found in the Mitigation Action Plan of the 2023 DP3, beginning in page 14-8.

- *Action IN-12:* Enhance the resiliency of Baltimore City's waterfront to better adapt to impacts from hazard events and climate change
    - *IN-12-1*: Raise bulkhead height along shoreline areas most at risk
    - *IN-12-3*: Encourage the development of integrated flood protection systems that use structural (engineering) and nonstructural (wetlands) measures
    - *IN-12-4:* Review and enhance coastal area design guidelines to better mitigate the impacts of flooding
- *Action IN-21:* Encourage the integration of climate change and natural hazards into private and State planning documents, systems, operations, and maintenance.
    - *IN-21-1:* Incorporate consideration of hazards and climate adaptation efforts into all plans, systems, operations, and maintenance
    - *IN-21-3:* Ensure hazard scenarios, utilized in vulnerability assessments, are at a minimum 25% greater in intensity and impact than historical record events to date
- *Action IN-22:* Develop City policy which requires new city government capital improvement projects to incorporate hazard mitigation principles.
    - *IN-22-1:* Discourage new public projects in hazard-prone areas such as floodplains or the coastal high hazard areas.
    - IN-22-2: Utilize hazard resistant design requirements that exceed minimum standards for critical facilities

Floodplain Regulations

Floodplain regulations are meant to protect people and property while making the City more resilient to the impacts from natural disasters and climate change. Below-grade parking areas may sustain significant structural damage if floodwater rises higher than anticipated in the designs, and structural failure in below-grade areas could result in partial or complete failure of a building. National Flood Insurance Program (NFIP) regulations allow the construction of below grade parking garages in a mixed-use building in which the total floor area devoted to non-residential uses is at least 25% of the total floor area within the building. NFIP regulations are the standards required for Baltimore's compliance as a community participating in the program.

Recommendation: Approve with amendments.

Amendments:

- Remove parking requirement of 3,000 – 4,500 and instead utilize underlying zoning (Page 2, Line 30)
- For Development Areas 13 and 15A, modify the parking requirements to align with Federal floodplain and National Flood Insurance Program regulations (Page 3, Line 23 and Page 5, Line 5)
- In Section 5, add "floodplain, Critical Area," following "fire" (Page 6, Line 6)

The desire for residential use in the Inner Harbor district supports long-standing goals to revive economic activity in downtown Baltimore as a hub for commerce, social engagement,

entertainment and a key connection to the Chesapeake Bay. Investments in waterfront development must also consider compounding risks associated with coastal development from sea-levels rise, the damages from coastal flooding, storm surges - all exacerbated by climate change complexities. For every dollar spent on mitigation projects, losses from future disasters can be reduced by at least $6 (FEMA 2019). Embedding proactive coastal resilience measures into the redevelopment of the Inner Harbor can prevent future risks to people, critical facilities or infrastructure and avoid future hazard mitigation or recovery costs. When viewed as an opportunity for enhanced harmony between environmental sustainability and economic prosperity, waterfront development also holds the prospect of improving marine habitats, enhancing biodiversity and promoting equity. Other resources with guidance on coastal and waterfront development can be accessed by clicking the links below.

Additional Information and References to Relevant Environmental Regulations

- Waterfront Edge Design Guidelines
- Climate Readiness Framework for Coastal Cities
- Compendium of Federal Nature-based Resources for Coastal Communities, States, Tribes, And Territories
- Application Guide for the 2022 Sea Level Rise Technical Report
- Requirements for Dry Floodproofed Below-Grade Parking Areas Under Non-Residential and Mixed-Use Buildings (fema.gov)

cc: Ms. Nina Themelis, Mayor's Office
The Honorable Eric Costello, Council Rep. to Planning Commission
Ms. Marcia Collins, DPW
Mr. Chris Ryer, Planning Director
Mr. Eric Tiso, DOP
Ms. Jenny Morgan, BCRP
Mr. Geoffrey Veale, Zoning Administration
Ms. Stephanie Murdock, DHCD
Ms. Ebony Thompson, Law Dept.
Mr. Francis Burnszynski, PABC
Ms. Natawna Austin, Council Services

---

[i] *Vision Statement from the 2023 Disaster Preparedness and Planning Project*

[ii] *North American Vertical Datum of 1988 (NAVD 88)*