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MEMORANDUM

TO:	Julie Wright David J. Powers and Associates	DATE:	March 15, 2019
FROM:	Charles D. Anderson, PE	JOB#:	DPOW.103.18
SUBJECT:	Water Quality and Hydrology Section Update for Newark Area 4 EIR Checklist		

Introduction

The purpose of this memorandum is to confirm that the water quality and hydrology impacts for the proposed project are consistent with the Newark Areas 3 and 4 Specific Plan ("Specific Plan") within Area 4 and do not result in new or substantially more significant impacts that would require new mitigation measures when evaluated against the 2015 Recirculated Environmental Impact Report (REIR) for the Specific Plan.

Description of Proposed Development in Area 4

The proposed project would reduce the total area within Area 4 to be developed from about 316 acres analyzed in the REIR to about 181 acres. The unit count has also decreased from approximately 675 (the number used to estimate impacts in the REIR) to approximately 469. The golf course that was analyzed in the REIR is no longer proposed. In summary, the revised project has less intensive development than the project analyzed in the REIR. Figure 1 shows the revised project, noting that with the exception of the proposed trail/EVA access across Area 4 to Mowry Avenue, no development is proposed in either Sub-Area D or Sub-Area E.

Changes to Appendix G: Hydrology and Water Quality Report

Section 3.8 (Hydrology, Flooding, and Water Quality) of the REIR is based on a Hydrology and Water Quality Impact Analysis prepared in November 2008 and included as Appendix G of the REIR. For the REIR Checklist, changes to the project have been evaluated against the conclusions of REIR Appendix G, including any changes to relevant regulations since 2008.

1.1 Regulatory settings

No Changes

1.2 Environmental settings

No Changes

1.3 Surface Water Hydrology

References to the FEMA Flood Insurance Study for the City of Newark were updated from the effective date of February 9, 2000 referenced in Appendix G of the REIR to August 3, 2009 as listed in Section 3.8 of the REIR. Mapped flood hazard areas remain unchanged compared to mapped flood hazard areas noted in the REIR, but the 2009 map is presented on the North American Vertical Datum of 1988 (NAVD) rather than the National Geodetic Vertical Datum of 1929 (NGVD). For reference, the local conversion between vertical datums is:

Elevation (NGVD) + 2.7 feet = Elevation (NAVD)

The conversion to the 2009 vertical datum map does not result in new or substantially more significant impacts compared to the information provided in the REIR. There have been no changes to the applicable FEMA FIRM map since the REIR and the 100-year flow values remain unchanged.

1.4 Groundwater

References in the REIR to the 2006 ACWD Groundwater Monitoring Report can be updated to reflect the most recent 2017 ACWD Groundwater Monitoring Report. Table 1-2 from Appendix G of the REIR can be updated as below:

Table 1-2: Groundwater Quality Test Results Updated per 2017 ACWD Groundwater Monitoring Report

	2006 Report		2017 Report	
Aquifer	TDS (ppm)	Chloride (ppm)	TDS (ppm)	Chloride (ppm)
Newark (site well #1)	7,410	3,500	--	--
Newark (site well #2)	18,900	8,800	2,100	732
Newark (site well #3)	35,700	24,900	--	--
Centerville	540	176	1,100	489
Fremont	382	14	237	10
Deep	480	136	440	89

As described in the REIR, the project would not rely on site well water. Therefore, the updated information in the 2017 Report does not alter the project's environmental impacts or result in the need for new or revised mitigation measures. It is not clear why the water quality at Site Well #2 improved so dramatically over 11 years while measured water quality from the Centerville Aquifer deteriorated; however, the change in water quality is not relevant to the analysis of project impacts, as the project would not exacerbate any existing groundwater quality issues. Also the project is not located within an area of groundwater recharge for water supply aquifers.

Previously Analyzed Impacts

Potential changes to impacts analyzed in the REIR are evaluated using the sequence presented in Appendix G of the REIR.

Thresholds of Significance

None of the thresholds of significance based on Appendix G of the CEQA Guidelines and the regulatory setting requirements described in Appendix G of the REIR are affected by changes to the project description. Table 2 evaluates whether any change to the impacts identified in the REIR would occur as a result of the revised project.

Table 2: Summary of Project Impact Evaluation Checklist

Impact	Impact Evaluation in REIR	Changes in Regulations or Circumstances	Impact Evaluation of Revised Project
Impact HYDRO-1: Violate Water Quality Standards or Waste Discharge Requirements	Less than significant impact after mitigation.	No changes.	No change. The revised project would not violate any water quality standards as administered through the NPDES permit. The potential to increase pollutants and sedimentation will still be mitigated through REIR mitigation measures requiring preparation of a Stormwater Pollution Prevention Plan (SWPPP) and Stormwater Management Plan (SWMP). Wastewater from the project site would still be delivered via piped sanitary sewer lines to the sanitary sewer treatment plant, subject to the requirements of the NPDES permit and the Union Sanitary District (USD).
Impact HYDRO-2: Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge	Less than significant impact.	ACWD released its 2017 ACWD Groundwater Monitoring Report.	No change. The new information regarding groundwater monitoring results from the 2017 ACWD Groundwater Monitoring Report is not significant because the project will not use or deplete groundwater. As discussed in the REIR, estimated water demands for the project were included in the Water Supply Assessment for the Plan Area and impacts were found to be less than significant. Thus, the increase in water demand due to project development would not increase groundwater pumping. Water demand for the revised project would be lower than the demand identified in the REIR and original WSA, due to the fact that fewer residential units are proposed than studied in the REIR. Therefore, the revised project still would have a less-than-significant impact on groundwater supplies. In addition, the revised project would result in less impervious surface than studied in the REIR and would still have a less-than-significant impact on groundwater recharge.

Impact	Impact Evaluation in REIR	Changes in Regulations or Circumstances	Impact Evaluation of Revised Project
Impact HYDRO-3: Substantially Alter Drainage Patterns Resulting in Increased Erosion or Siltation	Less than significant after mitigation.	No changes.	No change. The revised project scope is smaller than the project identified in the REIR. It would have more pervious land and fewer residential units, resulting in less impervious area and storm water runoff that can result in erosion or siltation compared to impacts identified in the REIR. Area 4 remains exempt from NPDES C.3 hydromodification (HMP) due to tidal influence in Mowry Slough. REIR Mitigation Measure HYDRO-5 remains effective for addressing the potential for increased erosion during construction.
Impact HYDRO-4: Substantially Alter Drainage Patterns Resulting in Increased Flooding	Less than significant impact.	No changes.	No change. The project scope is smaller and proposes fewer residential units, resulting in less impervious area, more groundwater recharge, and therefore generally less storm water runoff that could potentially result in flooding. Impacts would remain less than significant.
Impact HYDRO-5: Create or Contribute Runoff Water That Would Exceed the Capacity of Existing or Planned Storm Water Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff	Less than significant impact for surface water quantity. Less than significant impact after mitigation for surface water quality.	All references to the California Storm Water Best Management Practice Handbook can be updated to the 2015 edition.	No change. The changes to the Storm Water BMP Handbook do not alter the REIR analysis or conclusion. References can be updated, however, to cite to the most current edition (2015) of the Storm Water BMP Handbook. The quantity of storm water runoff would be reduced with the revised project compared to the project studied in the REIR because the revised project would result in a reduction in the amount of impervious area onsite. Despite a reduction in the quantity of storm water runoff, the same sources of potential storm water runoff pollution would remain. Therefore, the same mitigation measures identified in the REIR are still required to reduce impacts to less-than-significant levels.

Impact	Impact Evaluation in REIR	Changes in Regulations or Circumstances	Impact Evaluation of Revised Project
Impact HYDRO-6: Otherwise Substantially Degrade Water Quality	Less than significant impact.	No changes.	No change. The project scope is smaller with less proposed developed area. This results in a reduction in runoff volume and a smaller potential pump capacity increase. See Tables 3 and 4, below. Water quality would remain protected by compliance with the NPDES permit, SWPPP, and SWMP.
Impact HYDRO-7: Place Housing within a 100-Year Flood Hazard Area	Less than significant impact after mitigation.	A new Preliminary Flood Insurance Rate Map (FIRM) is pending appeal and likely to become effective in 2019.	No change. The revised FIRM would increase base flood elevations within Area 4. However, the Newark Municipal Code already requires that the lowest adjacent grade to a new residence be at an elevation above the increased base flood elevations. Therefore, with implementation of Mitigation Measure HYDRO-7 identified in the REIR, impacts would remain less than significant.
Impact HYDRO-8: Place within a 100-Year Flood Hazard Area Structures that Would Impede or Redirect Flood Flows	Less than significant impact.	No changes.	No change. As discussed in the REIR, fill placed in Area 4 would not impact flooding in the area or downstream since the impedance of tidal conveyance cannot influence the water surface elevation in San Francisco Bay. Impacts would remain less than significant.
Impact HYDRO-9: Expose People or Structures to a Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding as a Result of Levee or Dam Failure	Less than significant impact.	Update to the Calaveras Dam construction project: Dam construction started August 2011 and is expected to be complete in April 2019.	No change. All housing pads would be above the 100-year base flood elevation, which assumes outboard levee failure. The REIR identified Calaveras Dam as the only dam that would contribute to Newark's inundation hazard area; however, Calaveras dam construction is expected to be completed in April 2019 and thus would reduce impacts identified in the REIR. Impacts would remain less than significant.
Impact HYDRO-10: Expose People or Structures to Inundation by Seiche, Tsunami or Mudflow	Less than significant impact.	No changes.	No change. The change to the project description would not alter any of the impacts identified in the REIR with respect to seiche, tsunami or mudflow. Impacts would remain less than significant.

Detailed Discussion of Impact Analysis for Impact HYDRO-6 and HYDRO-7

To support the evaluation of Impact HYD-6, Appendix G of the REIR presents calculations to determine the changes in pump discharge required to maintain the total volume of water in the system in the existing condition since the groundwater table is very shallow and exposed at the ground surface.

Area 4 is a hydrologically closed system so the total volume of water stored in the system is determined primarily by the volume of water pumped into Mowry Slough. Any change in volume or discharge can potentially be mitigated by a commensurate change in the pumping rate. REIR Appendix G Table 3 and Table 5 can be modified to reflect the revised project description, as shown in Table 3 and Table 4 presented below.

Table 3: Runoff Volume Coefficients for Post-Project Condition in Area 4

	REIR				UPDATED			
	Area Open (acres)	Area Developed (acres)	% Developed	Weighted C	Area Open (acres)	Area Developed (acres)	% Developed	Weighted C
Existing Condition	452	0	0%	0.45	430.1	0	0%	0.45
Post-Project Condition	236.2	215.8	48%	0.59	248.7	181.4	42%	0.58

Table 4: Runoff Volume Calculations Updated for Revised Project Description

		REIR			UPDATED		
Return Period	P (inches)	Existing	Post-Project	Reqd. Pump Capacity Increase for No Change in Ponded Elevation (gpm)	Existing	Post-Project	Reqd. Pump Capacity Increase for No Change in Ponded Elevation (gpm)
2-yr	1.66	28	37	2,020	28	35	1,750
10-yr	2.84	46	63	2,750	46	59	2,990
25-yr	3.41	55	76	4,030	55	71	3,600
100-yr	4.22	68	94	4,930	68	88	4,450

The changes to Table 3 and Table 4 do not result in any new or substantially more severe impacts compared to impacts identified in the REIR and therefore do not result in the need for any new mitigation measures. The project would not substantially degrade water quality and such impacts would remain less than significant.

Impact HYDRO-7 refers to the placement of housing within a 100-year flood hazard area. As described herein, a preliminary FIRM for Newark was distributed subsequent to the completion of the DEIR; however, the new preliminary FIRM does not alter any impacts or mitigation measures identified in the REIR.

During preparation of the REIR in 2014 and early 2015, the Federal Emergency Management Agency (FEMA) performed detailed coastal engineering analyses and mapping of the San Francisco Bay shoreline within the Specific Plan area. The 2014 draft work maps for southern Alameda County were prepared by the Alameda County Flood Control and Water Conservation District under a Cooperating Technical Agreement with FEMA. FEMA conducted a Flood Risk Review meeting for the Alameda County cities south of the San Mateo Bridge, including Newark, on February 23, 2017. FEMA distributed the preliminary FIRM panels, FIS report, Summary of Map Actions (SOMA) and GIS database for southern Alameda County on September 1, 2017. Due to the appeal process, the updated flood hazard mapping is not yet effective, but the preliminary FIRM is excerpted herein as Figure 1.

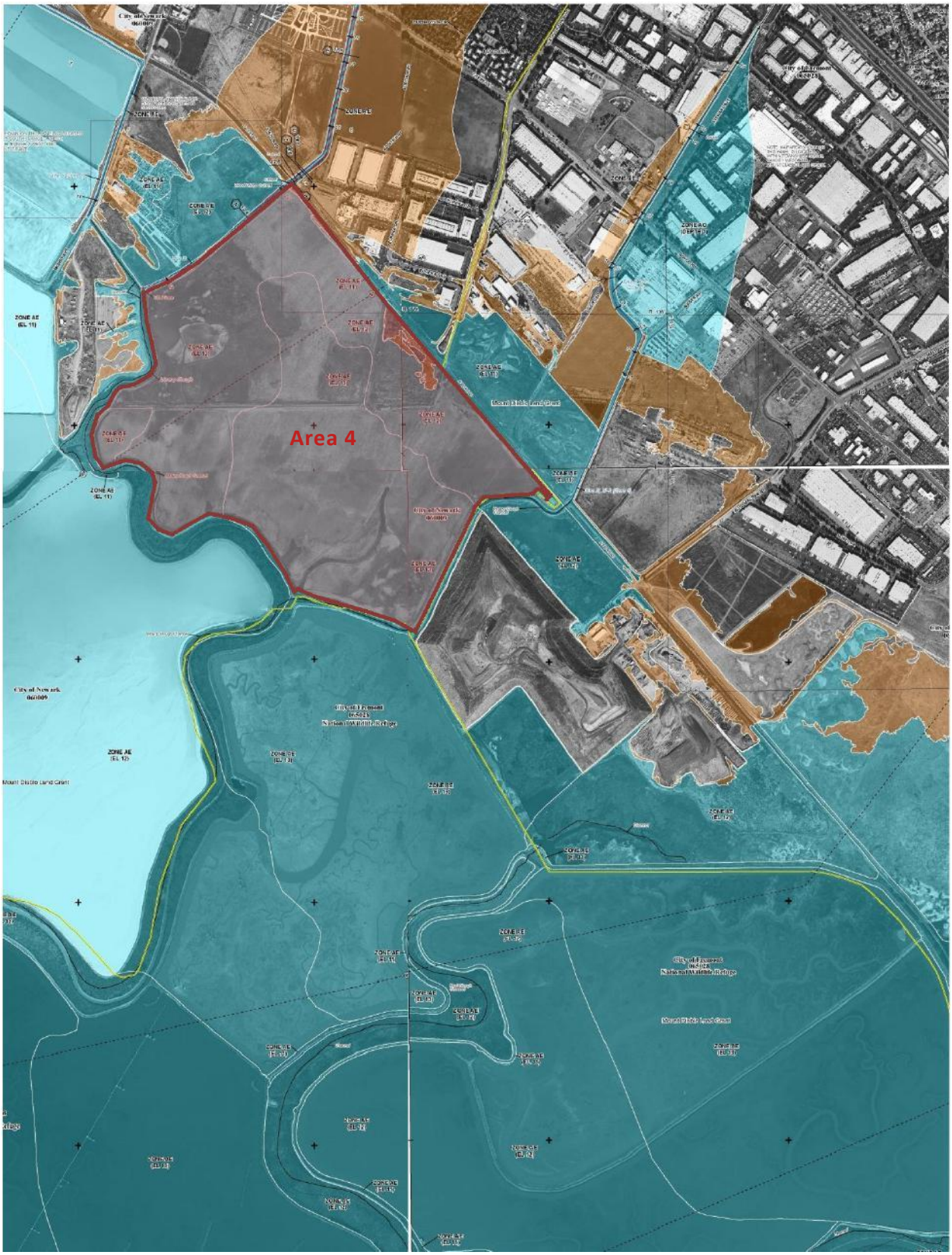

Figure 1: Preliminary FIRM for Alameda County

The preliminary FIRM shows mapped 100-year base flood elevations within Area 4 that range between 11 feet NAVD and 13 feet NAVD. The mapped base flood elevation onsite has therefore increased in by one to two feet. Based on the Preliminary FIRM for Alameda County, the Municipal Code's minimum building pad elevation (11.25 feet NGVD or 13.93 feet NAVD equivalent) remains above the maximum preliminary mapped base flood elevation of 13 feet NAVD. Accordingly, the analysis of flooding in the REIR already accounted for the fill necessary to raise residences outside the flood zone, even accounting for the anticipated increase in base flood elevation. Impacts remain less than significant after mitigation.

Mitigation Measures

The REIR lists mitigation measures associated with hydrology and water quality. These are excerpted herein as Table 5, along with an evaluation of whether revisions or additions to the REIR mitigation measures are required. The revised project does not necessitate any changes to the mitigation measures identified in the REIR or any additional mitigation measures and, as shown in Table 5, REIR impact conclusions would not change.

Table 5: Summary of Mitigation Measures Checklist

Project Impact in RDEIR	Mitigation Measure in REIR MMRP	Evaluation of Mitigation Measure Effectiveness for the Revised Project
Impact HYD-1: The proposed project could provide substantial sources of polluted runoff and degrade water quality downstream of the Specific Plan site.	**MM HYD-1.1:** All development projects within the Specific Plan shall comply with the NPDES permit requirements, the City of Newark's ordinances, policies, and processes, and other applicable local, state, and federal requirements.	No change to mitigation measure. A review of the current editions of the referenced NPDES permit requirements, ordinances, policies and other requirements shows no changes are needed. Mitigation measure remains feasible and effective.
	MM HYD-1.2: All development projects within the Specific Plan shall include post-construction water quality BMPs and incorporate low impact development (LID) techniques.	No change to mitigation measure. Post-construction water quality BMPs shall conform to the appropriate NPDES permit requirements at the time of implementation. Mitigation measure remains feasible and effective.
	MM HYD-1.3: BMPs shall be designed in accordance with engineering criteria in the California Storm Water BMP Handbook for New and Redevelopment (California Storm Water Quality Association, 2003, California Storm Water Best Management Practice Handbook – New Development and Redevelopment) or other accepted guidance and designs shall be reviewed and approved by the City prior to issuance of grading or building permits for the roadway or driveways.	No change to mitigation measure. There is no change to this mitigation measure. As noted above, a 2015 update to the Storm Water BMP Handbook is available. Mitigation measure remains feasible and effective.

Project Impact in RDEIR	Mitigation Measure in REIR MMRP	Evaluation of Mitigation Measure Effectiveness for the Revised Project
	MM HYD-1.4: All development projects within the Specific Plan shall implement storm water management program measures, such as street sweeping and litter control, outreach regarding appropriate fertilizer and pesticide use practices, and managed disposal of hazardous wastes.	No change to mitigation measure. Mitigation measure remains feasible and effective.
Impact HYD-2: Construction activities could contaminate runoff from the Specific Plan site.	**MM HYD-2.1:** All development projects within the Specific Plan area shall file a Notice of Intent (NOI) with the State Water Resource Quality Control Board and prepare a Storm Water Pollution Prevention Plan (SWPPP).	No change to mitigation measure. Mitigation measure remains feasible and effective.
	MM HYD-2.2: The SWPPP shall include an erosion control plan that prescribes measures that are to be implemented during grading activities and treatment measures to trap sediment once it has been mobilized, at a scale and density appropriate to the size and slope of the catchments involved.	No change to mitigation measure. Mitigation measure remains feasible and effective.
	MM HYD-2.3: The Specific Plan developer(s) shall implement Best Management Practices (BMPs) for reducing the volume of runoff and pollution in runoff to the maximum extent practicable during demolitions, site excavation, grading, and construction. All measures shall be included in the project's SWPPP and printed on all construction documents, contracts, and project plans.	No change to mitigation measure. Mitigation measure remains feasible and effective.
	MM HYD-2.4: BMPs shall be implemented in accordance with criteria in the California Stormwater BMP Handbook for Construction (California Storm Water Quality Association, 2003, California Storm Water Best Management Practice Handbook – Construction) or other accepted guidance and shall be reviewed and approved by Alameda County prior to issuance of grading or building permits.	No change to mitigation measure. Mitigation measure remains feasible and effective. As noted above, the California Storm Water Best Management Practice Handbook has been updated. However, there have been no changes in the Storm Water BMP Handbook that would alter the effectiveness of the mitigation
	MM HYD-2.5: The Specific Plan developer(s) shall identify the SWPPP Manager who will be the responsible party during the construction phase to ensure proper implementation, maintenance, and performance of the BMPs.	No change to mitigation measure.

Sea Level Rise

Within the proposed Specific Plan area, residential structures would be most directly impacted by global climate and sea level changes. As described in the REIR, a historic rate of sea level rise of 1.3 mm per year (0.4 foot per century), has been estimated for San Francisco Bay.[1]

As defined in the McAteer-Petris Act of 1969, the Bay Conservation and Development Commission (BCDC) has jurisdiction over land within 100 feet of the shoreline of San Francisco Bay, which includes the tidally influenced Mowry Slough by definition. The nearest proposed residential units in Area 4 are located at least 650 feet from Mowry Slough and are therefore not subject to BCDC jurisdiction, nor BCDC permit requirements to address resilience to future sea level rise. Nevertheless, for informational purposes only, this report updates the sea level rise information described in the REIR to reflect updated sea level rise projections.

At the time the REIR was prepared, the best scientific data available suggested mid-century sea level rise of 16 inches (1.3 feet) and 55 inches (4.6 feet) sea level rise by 2100 and a 50-year planning horizon for projecting sea level change.[2]

In April 2017, a working group of the California Ocean Protection Council Science Advisory Team (OPC-SAT), supported and convened by the California Ocean Science Trust, published *Rising Seas in California: An Update on Sea-Level Rise Science* to "provide guidance to state agencies for incorporating sea-level rise projections into planning, design, permitting, construction, investment and other decisions."[3] This document "reflect[s] recent advances in ice loss science and projections of sea-level rise…[and] provides a synthesis of the state of the science on sea-level rise." This document was further updated based on review comments and finalized in March 2018.

OPC-SAT recommends a five-step decision framework to evaluate the consequences and risk tolerance of various planning decisions. This framework can then be used to guide the selection of appropriate sea-level rise projections and develop "adaptation pathways" that increase resiliency to sea level rise and include contingency plans if projections are exceeded or prematurely reached. The recommended decision framework, which is applied to the revised Newark Area 4 plan as described herein, is:

1. Identify the nearest tide gage.
2. Evaluate project lifespan.
3. For the nearest tide gage and project lifespan, identify the range of sea level rise projections.
4. Evaluate potential impacts and adaptive capacity across a range of sea-level rise projections and emissions scenarios.
5. Select sea level rise projections based on risk tolerance and, if necessary, develop adaptation pathways that increase resiliency to sea level rise, with contingency plans if projections are exceeded.

OPC anticipates updating their guidance document periodically, and at a minimum of every five years, based on advances in climate change science and the release of relevant, peer-reviewed studies from the Intergovernmental Panel on Climate Change (IPCC) and other assessments.

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1 National Oceanographic and Atmospheric Administration (NOAA), 2001.
2 ASCE San Francisco Section Symposium on Climate Change and Coastal Systems, September 28, 2007.
3 Griggs, G, Arvai, J, Cayan, D, DeConto, R, Fox, J, Fricker, HA, Kopp, RE, Tebaldi, C, Whiteman, EA (California Ocean Protection Council Science Advisory Team Working Group). "Rising Seas in California: An Update on Sea-Level Rise Science." California Ocean Science Trust, April 2017.

Nearest Tide Gage

For the purpose of examining project resilience to future sea level rise, the nearest tide gage is located at the San Francisco Presidio, near the Golden Gate. The current state of practice is to assume that changes in stillwater tidal datums at the Presidio will manifest to other locations within San Francisco Bay including Mowry Slough.

Project Lifespan

The proposed Specific Plan would abide by Newark's Municipal Code Flood Ordinance, which provides flood protection for the life of the project. A 50-year planning horizon is assumed for the life of the project. This sea level rise impact update will focus on project sea level rise by 2070 as well as the end-of-century 2100).

Sea Level Rise Projections

The April 2017 OPC-SAT report provides a range of future relative sea level rise estimates at the San Francisco tide gage under a number of emissions scenarios, which are labeled as "Representative Concentration Pathways" or RCPs, following a convention established by the IPCC Fifth Assessment. There are four RCPs, named for the radiative forcing level in watts per square meter predicted by 2100: RCP 8.5, 6.0, 4.5 and 2.6.

Each RCP represents a combination of socioeconomic conditions, policy choices and technological considerations with RCP 8.5 often referred to as a scenario in which there are few global efforts to limit or reduce emissions, so that global CO2 emissions nearly double between 2015 and 2050. RCP 2.6 on the other hand, represents a future more closely aligned with the goals of the United Nations Framework Convention on Climate Change (UNFCCC) 2015 Paris Agreement, which calls for limiting global mean warming to less than 2° C and achieving net-zero greenhouse gas emissions in the second half of this century. RCP 8.5 is generally considered to be an upper bound for California's sea level response projections. The H++ extreme sea level rise scenario presented in the Fourth National Climate Assessment is included, but is generally not intended for planning purposes.

Table 6 is copied in its entirety directly from the 2018 OPC Guidance document (Table 1 in that document), and summarizes sea level rise projections and probabilities of occurrence for the gage at San Francisco. In Table 6, "Low Emissions" refers to the RCP 2.6 scenario while "High Emissions" refers to the RCP 8.5 scenario. The columns present estimates of future sea level rise with associated probabilities of non-exceedance. For example, sea level rise estimates for each of the emissions scenarios have a 66 percent chance (one standard deviation) of lying within the range labeled "likely".

Table 1: Projected Future Sea Level Rise (in feet) at San Francisco

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)						H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE			1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds…	*66% probability sea-level rise is between….*			*5% probability sea-level rise meets or exceeds…*	*0.5% probability sea-level rise meets or exceeds…*	
					Low Risk Aversion		**Medium - High Risk Aversion**	**Extreme Risk Aversion**
High emissions	2030	0.4	0.3	-	0.5	0.6	0.8	1.0
	2040	0.6	0.5	-	0.8	1.0	1.3	1.8
	2050	0.9	0.6	-	1.1	1.4	1.9	2.7
Low emissions	2060	1.0	0.6	-	1.3	1.6	2.4	
High emissions	2060	1.1	0.8	-	1.5	1.8	2.6	3.9
Low emissions	2070	1.1	0.8	-	1.5	1.9	3.1	
High emissions	2070	1.4	1.0	-	1.9	2.4	3.5	5.2
Low emissions	2080	1.3	0.9	-	1.8	2.3	3.9	
High emissions	2080	1.7	1.2	-	2.4	3.0	4.5	6.6
Low emissions	2090	1.4	1.0	-	2.1	2.8	4.7	
High emissions	2090	2.1	1.4	-	2.9	3.6	5.6	8.3
Low emissions	2100	1.6	1.0	-	2.4	3.2	5.7	
High emissions	2100	2.5	1.6	-	3.4	4.4	6.9	10.2
Low emissions	2110*	1.7	1.2	-	2.5	3.4	6.3	
High emissions	2110*	2.6	1.9	-	3.5	4.5	7.3	11.9
Low emissions	2120	1.9	1.2	-	2.8	3.9	7.4	
High emissions	2120	3.0	2.2	-	4.1	5.2	8.6	14.2
Low emissions	2130	2.1	1.3	-	3.1	4.4	8.5	
High emissions	2130	3.3	2.4	-	4.6	6.0	10.0	16.6
Low emissions	2140	2.2	1.3	-	3.4	4.9	9.7	
High emissions	2140	3.7	2.6	-	5.2	6.8	11.4	19.1
Low emissions	2150	2.4	1.3	-	3.8	5.5	11.0	
High emissions	2150	4.1	2.8	-	5.8	5.7	13.0	21.9

Most of the available climate model experiments do not extend beyond 2100. The resulting reduction in model availability causes a small dip in projections between 2100 and 2110, as well as a shift in uncertainty estimates (see Kopp et al. 2014). Use of 2110 projections should be done with caution and with acknowledgement of increased uncertainty around these projections.

Adaptive Capacity

Newark's Municipal Code requires residential structures to be "elevated to or above the base flood [100-year] elevation or to a minimum of six inches above the building pad which shall be at a minimum elevation of 11.25 feet on the National Geodetic Vertical Datum (NGVD), whichever affords the greater degree of flood damage protection."

Current practice is to treat sea level rise as a datum change. So as sea levels rise, not only will the occurrence of storm-related high sea level, or surge, events increase, but so will the base flood stillwater elevation by an amount equal to the datum change. The REIR concludes that fill placed within the project site to a minimum elevation of 11.25 feet NGVD provides 3.75 feet of freeboard above the effective one-percent stillwater elevation of 7.5 feet and 3.25 feet of freeboard over the regulatory base flood elevation of eight (8) feet NGVD.

As shown on Figure 1, the maximum base flood elevation within Area 4 that will likely be effective at the time of construction is 13 feet NAVD (10.3 feet NGVD).

Based on the Preliminary FIRM for Alameda County, the Municipal Code's minimum building pad elevation (11.25 feet NGVD or 13.95 feet NAVD equivalent) is less than one foot above the mapped base flood elevation of 13 feet NAVD.

From Table 6, this minimum building pad elevation provides resilience against the high range of likely (66 percent probability) sea level rise through the year 2040, which is not mid-century nor at the end of the life of the project. To provide resilience against the likely future sea level rise assuming RCP8.5 through the 50-year Project life (2070), minimum building pad elevations would be 13 feet NAVD plus 1.9 feet, or 15 feet NAVD. This is one foot higher than the municipal code minimum. The future sea level rise for this condition is highlighted with a red box in Table 6.

Adaptation Pathways

Given proposed setbacks to developed neighborhoods within Area 4 and the amount of remaining open space, taking an adaptive approach to end-of-century sea level rise is reasonable. This also suggests that a "low risk aversion" approach is appropriate for initial project construction. Adaptive alternatives could include future levees or floodwalls built on top of or outside of the initial fill placement. It may also be noted that the OPC-SAT reports account for a range of estimates for the increase in future mean sea level, but do not include any increase to the storm surge itself. Quantitative estimates for the increased storm surge have not been made, and are unlikely to be determined in the foreseeable future; again arguing for an adaptive approach to future sea level rise.

While the specific sea level rise estimates have changed since the REIR was published, the conclusion in the REIR that the only quantifiable flood risk impact to Newark due to climate change is the increase in sea level rise remains valid. While an adaptive strategy against rising sea level, which might include an additional foot of elevated fill at building pads, can take advantage of more complete climate change data and predictions, the impact analysis and conclusions in the REIR remain unchanged. In addition, as stated in the REIR, "[g]iven the uncertainty in these sea level rise projection scenarios, it is not clear that the additional foot of fill needed for theoretical protection against rising one-percent storm surge for an additional ten years or so, particularly when the weight of such additional fill accelerates ground settlement. A regional area-wide adaptive strategy against rising sea level, which might include an earthen levee or structural floodwall, may be more appropriate and can take advantage of more complete climate change data and predictions in the future." There are no new or substantially more significant impacts from the project and no new mitigation measures are required.

Other Hydrology/Water Quality Effects of Climate Change

The sea level rise update contained herein describes the expected changes and uncertainties of sea level increases based on peer reviewed work completed by others since the REIR was published. A consensus of how climate change will affect extreme storm events in the project area, however, has yet to be determined, and continues to be uncertain. It remains unknown whether the net effect of changes in precipitation timing and intensity will result in an increase of local runoff in Alameda County, and conclusions reached in the REIR about the uncertainty in the precise effects of sea level rise and climate change on the project are unchanged.