

# San Francisco Bay Conservation and Development Commission

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March 1, 2022

*Via electronic mail only:* [Bob.Beck@sfgov.org; Jing.Ng@tidgsf.com]

Treasure Island Development Authority  
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ATTENTION: Robert Beck

Treasure Island Community Development, LLC  
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ATTENTION: Charles Shin and Jing Ng

**SUBJECT: Revise and Resubmit Reports**, Treasure Island Five-Year Sea Level Rise Monitoring Report – First Report, (BCDC Permit No. 2016.005.00)

To Permittees:

Thank you for submitting the first Treasure Island Five-Year Sea Level Rise Monitoring Report (Monitoring Report or Report) pursuant to Special Condition II.C.1 of BCDC Permit No. 2016.005.00 and received by BCDC on October 26, 2021. The digital pdf report was entitled, “Moffatt & Nichol/Treasure Island Development Project/5-Year Sea Level Rise Monitoring Report Produced for Treasure Island Development Group/October 2021.”

Pursuant to the permit Special Conditions II.C, a report is due every five years following the date of permit issuance, with the initial report due October 1, 2021. Accordingly, the permittees, Treasure Island Development Authority (TIDA) and Treasure Island Development Corporation (TIDC), are required to provide a sea level rise (SLR) Monitoring Report for the public access required by Special Condition II.C based on the August 2016 Assessment and Strategy report (Assessment and Strategy or original assessment) prepared by Moffatt & Nichol Engineers.

As required in Special Condition II.C, the Assessment and Strategy is an iterative document that can respond to changing conditions at the site, projections for sea level rise, evolving science, and modified state guidance in the future, supporting innovative approaches to protecting the public access at Treasure Island (or TI). The Monitoring Report required by the permit serves to identify where there have been changes in site conditions, science, or guidance and planning across the region to evaluate whether the Assessment and Strategy should be revised because the underlying assumptions about risk and adaptation of the public access required by the Permit have changed.



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BCDC has reviewed the Monitoring Report pursuant to the requirements of BCDC Permit No. 2016.005.01 Special Condition II.C. After careful review, BCDC appreciates the information provided in the initial submission of this report but has determined that the report requires significant revisions on the basis that it is incomplete pursuant to Special Condition II.C.1.e(2.) Sea level rise science and guidance have evolved since the preparation of the Assessment and Strategy in 2016, and these changes should be evaluated in the Monitoring Report. Additionally, a more detailed evaluation of the site conditions should be undertaken and incorporated into the Monitoring Report to ensure it is consistent with the requirements of the permit.

The request requires additional information regarding the following: A discussion of the new federal guidance of the Federal Emergency Management Agency (FEMA) base flood elevations (BFEs) in relation to the project; a discussion of the higher SLR projections curves from the state and federal agencies and when adaptation might be appropriate; additional data of trends in vertical land movement and settlement in relation to finished grades of the public access; protocols of flood reporting in the required public access; analysis of best available science of the risk of shallow groundwater rise; and evaluation of the original report based on the above recommendations.

### **Permit Requirements and Actions Pursuant to Section II.C**

Special Condition II.C.1 of BCDC Permit No. 2016.005.01 requires in full:

- “1. **Five-Year Monitoring Report.** Every five years following the date of permit issuance—with the initial report due on or around October 1, 2021—the permittees shall submit to the Commission staff a Monitoring Report generally based on the *Sea Level Risk Assessment and Adaptation Strategy for Rising Sea Levels* (“Assessment and Strategy”) prepared by Moffatt & Nichol Engineers dated August 1, 2016 (V.3), which shall reflect the best available science and include: up-to-date sea level rise projections; global projections of sea level rise based on downscaled Global Climate Models; sea level rise projections for the San Francisco Bay Area; tidal datum and extreme tides datum; updated modeling in tidal dynamics and Bay hydrological process; tide gauge data over the subject five-year period; a comparison of updated projections on sea level rise v. projections cited in the August 1, 2016 Assessment and Strategy document; and an assessment as to whether remediated lands located within the public access area required herein are or would be vulnerable to flooding. In addition, the Monitoring Report shall:
  - a. Describe whether the 2016 Assessment and Strategy report is consistent with the most up-to-date guidance from state and federal agencies, including, but not limited to, the Commission, the U.S. Army Corps of Engineers, the State of California Ocean Protection Council, and Federal Emergency Management Agency (“FEMA”);
  - b. Present data on land settlement since 2016 throughout public access areas required herein to be acquired through periodic topographic surveys of the project site by licensed surveyors based on benchmarks, which shall be installed as approved by or on behalf of the Commission through plan review, as required in Special Condition A;

- c. Present data based on observations of water levels at the public access, including measurements of water levels over the subject five-year monitoring period and photographic evidence (with date, location, hour, and actual tide levels recorded at tide gauges) of completed and planned public access areas during king tide events;
- d. Document any occurrence of flooding at the public access areas required herein, including date, location, recorded tide level, rainfall (amount and duration), source of flooding (e.g., shoreline overtopping or stormwater system backup), duration of flooding, damage or cleanup necessary, and duration of access closure; and
- e. An assessment of the Assessment and Strategy report, including a recommendation as to whether it should be revised based on findings, site conditions, sea level rise and storm projections, and updated policy guidance.

Within 30 days of receipt of the Monitoring Report, the Commission staff shall conduct a review in consideration of, among other things, the best available science, most recent state, and federal guidance, and BCDC policies then in-effect. Within 30 days of receipt of the Monitoring Report, the permittees shall be notified by or on behalf of the Commission as to whether:

- (1) The Commission accepts the Monitoring Report and recommends no changes to the permittees' approach, including the 2016 Assessment and Strategy report, or the original permit;
- (2) The Commission recommends revisions to the Monitoring Report on the basis that it is incomplete; or
- (3) The Commission requires revisions to the 2016 Assessment and Strategy report and/or the original permit based on findings and information contained in the Monitoring Report that reveal circumstances substantially different from those described in the 2016 Assessment and Strategy report, where such revisions are necessary to protect public access of the size and usability required by this permit."

## Monitoring Report

This review of the Monitoring Report is conducted pursuant to the requirements of BCDC Permit No. 2016.005.01 Special Condition II.C. Pursuant to Special Condition II.C.1.e.2 and after careful review, BCDC recommends revisions on the basis that the Monitoring Report is incomplete. Such recommendations include the following revisions to incorporate updated guidance, changes in site conditions, and evolving science.

1. **Consistency With Most Updated Guidance from Federal and State Agencies.** Special Condition II.C of the permit requires that the Monitoring Report "[d]escribe whether the 2016 Assessment and Strategy report is consistent with the most up-to-date guidance from state and federal agencies, including, but not limited to, the Commission, the U.S. Army Corps of Engineers, the State of California Ocean Protection Council, and Federal Emergency Management Agency ("FEMA")."

Section 4 of the Report, under “Findings and Conclusions,” states that the original Assessment and Strategy report remains consistent with the most up-to-date state and federal SLR projections, including Intergovernmental Panel on Climate Change (IPCC AR6,) the US Army Corps of Engineers (USACE 2021,) and the State of California Ocean Protection Council (OPC 2018) over the last five-year period. In addition, the Monitoring report included the most recent base flood elevations (BFEs) of the site from the Federal Emergency Management Agency (FEMA 2021.) Finally, the findings and conclusions presented the sea level trend of 2.9 mm per year based on the NOAA (2020) satellite altimeter radar measurements that shows the change in mean sea level for the North Pacific Region since 1992 and a linear trend of 2.0 mm per year based on the San Francisco tide gauge data for the same period.

**BCDC Staff Recommendation.** Although the Monitoring Report incorporates the most updated SLR projections from state and federal agencies for the San Francisco Bay Area and includes these projections over the last five-year period, it does not provide a discussion of the latest FEMA 2021 Base Flood Elevations (BFEs) in relation to the project. The FEMA 2021 BFEs are not incorporated into the 2016 Assessment and Strategy, so they represent new federal guidance that should be included and addressed in the Monitoring Report. The FEMA BFE or 100-year storm water level is the federal flood standard and baseline elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year ([www.FEMA.gov](http://www.FEMA.gov).) The FEMA BFE is also a regulatory flood standard for insurance purposes.

For reference, the 2016 Assessment and Strategy did not use the FEMA Coastal Study of local BFE, or preliminary Flood Insurance Rate Maps (FIRMs) for the County of San Francisco. Instead, its flood vulnerability analysis was based on a site-specific study by Moffatt & Nichol in 2009 that calculated 100-year storm event that incorporated wind waves and wave run-up that resulted in design flood elevations or Total Water Level elevations (TWLs). In 2016, the calculated TWLs used in the report’s analysis were higher than the FEMA preliminary maps of the time.

Currently, the Monitoring Report offers the new elevation findings from the FEMA 2021 BFEs that now range from +11 to +14 feet<sup>1</sup> at the island, as described in Section 3.6, but the report does not address the new BFEs in the relation to the estimated TWLs in 2016. Therefore, BCDC staff recommends revising the Monitoring Report to compare and discuss the most recent FEMA flood elevations with the calculated TWLs in the original assessment. The information will help understand whether the new FEMA BFE elevation ranges may have any impacts on the proposed finished elevation at the required public access. Finally, the FEMA 2021 BFEs should be discussed in relation to the proposed finished elevations along the perimeter of Treasure Island as illustrated in Figure 3-3 of the original assessment.

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<sup>1</sup> All elevations are referenced In the North American Vertical Datum of 1988 (NAVD88)

2. **Updated Sea Level Rise Projections.** The Monitoring Report compares the updated projections from IPCC AR6, USACE 2021 and 2018 OPC guidelines with the project's adopted SLR projection, and it notes that the USACE high scenario and the OPC 0.5% probability SLR projections are higher than such adopted targeted projections. However, the report concludes that the project's adopted approach to SLR adaptation remains applicable since it relies on monitoring of the actual SLR and is not tied to a fixed SLR projection, and that, therefore, the timing for implementation of adaptation would vary based on actual SLR levels.

At the time of permit issuance, the permittees adopted a SLR risk assessment based on the 2016 Assessment Strategy report that relied on the evaluation of risk as a function of the likelihood of an impact from SLR by a certain time and the consequences of that impact. The risk evaluation was based on guidance from the Coastal and Ocean Working Group of the California Climate Action Team or CO-CAT 2013. Consequently, the permittees decided to design the project considering very low risk of sea level rise related impacts to occur over a 70-year duration, based on 2000 sea levels. According to the report, over this period, even with the most aggressive projection of sea level rise, the increase in sea level would reach 36 inches between 2075 and 2080 (Figure 2-4 of original assessment.) The strategy would not be tied to SLR projections but establish trigger mechanisms for adaptation for various phases of the project.

As such, the project adopted thresholds whereby the permittees would implement adaptation actions in the face of rising sea levels. The implementation strategy relied on two thresholds: (1) When a 30-inch SLR had occurred (compared to 2000 levels) planning would be initiated to adapt to a minimum of 36-inch SLR projection (or higher) for Project Phase 1 that includes the Cityside Park located in the southern and western portions of Treasure Island, and (2) when a 12-inch SLR had occurred (compared to 2000 levels) planning would be initiated to adapt to a minimum 36-inches SLR (or higher) for project parks and open spaces included in Phases 2-4 of the northwest, northern end and east sides of Treasure Island.

**BCDC Staff Recommendations.** BCDC recommends additional changes to ensure the Monitoring Report is consistent with the 2018 OPC Guidance and the approach to evaluating the viability of public access as outlined in BCDC's 2021 Climate Change Guidance<sup>2</sup> Document. These resources outline methods to incorporate flexibility when selecting climate scenarios to ensure that project design is consistent with updates to best available science.

Since the Monitoring Report Sections 3.4 and 3.5 compare the project adaptation strategy (Figs 3-4 and 3-5) to steeper SLR projection curves of the USACE 2021 high scenario and the 2018 OPC 0.5% probability projections, the report should discuss the potential of the shifted timing for adaptation, as visualized in the steeper projection curves versus the project's elevation thresholds in the referenced report figures, to include the following:

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<sup>2</sup> <https://www.bcdc.ca.gov/bpacc/San-Francisco-Bay-Plan-Climate-Change-Policy-Guidance.html>

- a. Whether water level thresholds could occur earlier and faster than originally anticipated. More pointedly, the report should address the more significant timeline difference between the project's original strategy and the 2018 OPC 0.5% probability projections as the threshold elevations have the potential to occur 10-12 years earlier than projected, perhaps as early as 2034 for Phases 2, 3 and 4;
  - b. Whether the financing mechanism to fund the implementation of adaptation, pursuant to the permit's Findings and Declarations III.6.e on the funding for adaptation measures, could be impacted by the reduced timeline of implementation; and
  - c. Whether the duration for implementation of adaptation in the original assessment should be revised to consider possible impacted timelines for the initiation of planning and construction. Special Condition II.D requires SLR adaptation planning and implementation. In response, Section 4.4 of the 2016 Assessment and Strategy report estimates a duration of *8 years* to implement of adaptation measures that includes initiation of planning and construction to improve the shoreline protection system for Phase 1 at the required public access when SLR levels reach 30 inches and completed before 36 inches, compared to 2000 levels, and an estimated duration of *11 years* for Phases 2 to 4 at the required public access when SLR levels reach 12 inches and completed before 16 inches, compared to 2000 levels.
3. **Vertical Land Movement and Settlement.** Special Condition II.C requires the Monitoring Report, in part, to “[p]resent data on land settlement since 2016 throughout public access areas required herein to be acquired through periodic topographic surveys of the project site by licensed surveyors based on benchmarks, which shall be installed as approved by or on behalf of the Commission through plan review...”
- The report Section 3.7, under “Vertical Land Motion (VLM) and Settlement,” reports that the development is currently under construction and public access areas and shoreline improvements have not yet been completed; therefore, land settlement has not been monitored. Further, the report Section 4 of the findings and conclusions adds that available coastal LiDAR data from 2010 and 2018-2019 indicates that the shoreline areas have been stable.

**BCDC Staff Recommendation.** BCDC staff believes the Monitoring Report should incorporate data beyond LiDAR indicating any trends in VLM or settlement since the issuance of the permit, along with a review of available independent research and science that discusses VLM and settlement at Treasure Island and Yerba Buena Island. For example, a published article by Shirzaei and Burgmann (2018) details documented land subsidence and provides data specific to Treasure Island and Yerba Buena. This article is an example of the type of material that can be reviewed and included in the resulting assessment. BCDC recommends Including into the Monitoring Report:

- a. Any data or plans for past, current, and future construction benchmark locations near the project's anticipated public access areas;

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- b. A presentation and analysis of any other elevation data collected via monitoring or construction efforts and analyzed to determine any observed VLM or settlement;
- c. A review of existing scientific data from independent efforts that indicates any VLM or settlement at the project site, including rates of settlement in the past, present, and estimated future; and
- d. An assessment of SLR projections incorporating site-specific VLM and settlement to determine if the initial findings of the report are adequate.

4. **Observations of Water Levels at the Public Access.** Special Condition II.C requires the Monitoring Report to “[p]resent data based on observations of water levels at the public access, including measurements of water levels over the subject five-year monitoring period and photographic evidence (with date, location, hour and actual tide levels recorded at tide gauges) of completed and planned public access areas during king tide events...”

The report’s Section 4 of the findings and conclusions asserts that over the most recent 5 years, the highest water level recorded at the San Francisco tide gauge reached 7.8 feet during the most recent five-year period, and that there have not been any instances of flooding observed at the TI development since the start of construction.

**BCDC Staff Recommendation.** The Monitoring Report should note the proposed finished grades of the public access completed or under construction to compare those to the recorded water level. Furthermore, the Monitoring Report should provide photographic evidence of tide levels for completed or planned public access areas including areas where remediation of contaminated lands has occurred during flood events pursuant to Special Condition II.C.2 and 3 under “Flood Reporting” and “Remediated Lands,” respectively.

5. **Documentation of Flooding Occurrences at the Public Access.** Special Condition II.C. provides that the Monitoring Report should “[d]ocument any occurrence of flooding at the public access areas required herein, including date, location, recorded tide level, rainfall (amount and duration), source of flooding (e.g., shoreline overtopping or stormwater system backup), duration of flooding, damage or cleanup necessary, and duration of access closure...” The Monitoring Report asserts that there have not been any instances of flooding observed at the TI development since the start of construction.

**BCDC Staff Recommendation.** To ensure that the Monitoring Report incorporates the most accurate information, the Monitoring Report should include a description of the protocol to report flooding along the required Public Access area.

6. **Groundwater and Potential Mobilization of Contaminants.** The permit requires the Monitoring Report to “reflect the best available science” and include updated Bay hydrological processes and an “assessment as to whether remediated lands located within the public access area required herein are or would be vulnerable to flooding.” As the science of sea level rise and climate change evolve, the Monitoring Report should keep pace with new developments to incorporate the latest science in the assessment of the risk and adaptation of the required public access.

The study of shallow groundwater rise is an emerging field of research that has developed since the project's permit issuance. Risk to flooding from emergent groundwater, shallow groundwater rise, and the potential mobilization of contaminants from such flooding should be incorporated into the Monitoring of the site.

Current publicly available research and assessment methods allow the robust review of this critical issue at the time of this response. The implications of anticipated groundwater rise can be dramatic without intervention including compromised shoreline protection, mobilized contamination, damaged underground infrastructure, and much more. BCDC's Adapting to Rising Tides (ART) Program maintains a webpage of resources<sup>3</sup> on this issue and can provide further guidance as necessary.

**BCDC Staff Recommendation.** BCDC recommends revising the Monitoring Report to incorporate data on risk from groundwater flooding. Based on the data provided, it may be necessary to update the Assessment and Strategy to incorporate groundwater rise dynamics into the design of the public access. This update may include:

- a. A comprehensive study of the influence of sea level rise on groundwater depth, dynamics, and impact on the project due to flooding and contamination, at the scale of the original assessment to adequately determine impacts of hydrological processes beyond the 100-foot shoreline band;
- b. An analysis of the change in groundwater depth over time based on existing monitoring data;
- c. Updated flood maps that incorporate best available science of SLR and groundwater rise;
- d. Mapping and data for contaminated sites that could impact public access areas;
- e. Analysis of how shallow groundwater rise may impact existing or planned adaptation strategies for the life of the project;
- f. An analysis of how groundwater rise will impact existing and planned contamination remediation strategies;
- g. An analysis of the existing state of the contamination cleanup efforts on Treasure Island and their potential for impacts on the project due to groundwater rise; and
- h. An assessment of how the project design or adaptation may need to be amended to incorporate additional strategies, given this new information.

Land settlement is an area of increasing concern relative to groundwater and potential mobilization of contaminants. As a result, the Monitoring Report information on land settlement will be important for reviewing risk from groundwater flooding.

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<sup>3</sup> <http://www.adaptingtorisingtides.org/portfolio/shallow-groundwater-rise/>



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- 7. Assessment of the Assessment and Strategy.** Special Condition II.C of the permit requires an assessment of the Assessment and Strategy, including “a recommendation as to whether the Assessment and Strategy report should be revised based on its findings, site conditions, sea level rise and storm projections and updated policy guidance.” Section 4 of the Monitoring report concludes that the project’s adopted approach to SLR adaptation remains applicable.

**BCDC Staff Recommendation.** BCDC staff recommends incorporating the above recommendations in the Monitoring Report and evaluating the 2016 Assessment and Strategy based on a Monitoring Report more consistent with the requirements of Special Condition II.C.

The staff appreciates the information provided in the initial submission of this report. BCDC staff recognizes that it has requested some significant revisions and looks forward to working with TIDA and TIDC to ensure the Monitoring Report is consistent with the requirements of BCDC Permit No. 2016.005.01 so as to establish a model for future Monitoring Reports submitted pursuant to Special Condition II.C. BCDC staff request that a revised Monitoring Report and re-evaluation of the original report be resubmitted within 90 days of receipt of this letter. If more time is needed, BCDC requests to work with TIDA on a proposed timeline to be proposed within 14 days of receipt of this letter.

If you have any questions, please do not hesitate to call me at (415) 352-3670. I can also be reached by email at [rafael.montes@bcdc.ca.gov](mailto:rafael.montes@bcdc.ca.gov).

Respectfully,

DocuSigned by:  
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