

CALIFORNIA COASTAL COMMISSION

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January 23, 2015

Lawrence Goldzband, Executive Director
San Francisco Bay Conservation and
Development Commission
455 Golden Gate, Suite 10600
San Francisco, CA 94102

Attn: Brenda Goeden, Sediment Program Manager

Re: Coastal Commission Staff Comments on BCDC Review of Sand Mining Applications in
San Francisco Bay

Dear Mr. Goldzband:

The California Coastal Commission (Commission) staff is providing the comments below for the San Francisco Bay Conservation and Development Commission (BCDC) to consider during its review of the above-referenced applications submitted by Jerico Products, Hanson Marine Operations, and Suisun Associates for 10 year permits to mine a total of 2.04 million cubic yards/year ($y^3/yr.$) from the Central and Suisun Bays in San Francisco Bay. As discussed below, the Commission has a responsibility for review and comment on actions such as these, and on behalf of the Commission, the staff recommends:

1. Consideration of extraction limits that are more appropriate for an eroding coastal system that has limited sources of new sand;
2. Focusing extraction efforts to areas where sand transport has been identified as going into the Bay; and
3. Development of a robust monitoring program to improve characterization of the linkages between and effects of sand mining in SF Bay and erosion of SF Bar and Ocean Beach.

The activities require permits from the U.S. Army Corps of Engineers and are located outside the portion of the California coastal zone that is within the jurisdiction of the California Coastal Commission (Commission). Typically, under Section 307 (c)(3) of the federal Coastal Zone Management Act (16 USC § 1456 (c)(3)(B)), when federally permitted activities outside the Commission's jurisdiction would have "reasonably foreseeable effects on ... any coastal use or

resource,” the Commission has the opportunity to submit a request to the Office for Coastal Management (OCM) for permission to review the activity” (15 CFR § 930.53 and 930.54). If such permission is granted, the applicant for the federal license would need to submit a consistency certification directly to the Commission for its review.

However, under state law, the California Coastal Act proscribes an alternative review process for activities located outside the Commission’s jurisdiction but subject to BCDC’s jurisdiction. Because the sand mining activities would be located entirely within San Francisco Bay, and well east of the dividing line between our respective agencies’ jurisdictions (i. e., east of a line drawn from Point Bonita in Marin County to Point Lobos in San Francisco County), the alternative review process called out under Section 30330 of the Coastal Act applies, as follows:

With respect to any project outside the coastal zone that may have a substantial effect on the resources within the jurisdiction of the San Francisco Bay Conservation and Development Commission, established pursuant to Title 7.2 (commencing with Section 66600) of the Government Code, and for which any certification is required pursuant to the Federal Coastal Zone Management Act of 1972 (16 U.S.C. 1451, et seq.), such certification shall be issued by the Bay Conservation and Development Commission; provided however, the commission may review and submit comments for any such project which affects resources within the coastal zone.

Absent this Coastal Act provision, the Commission staff would have requested OCM permission to review the federally permitted sand mining proposals, based on the reasonable likelihood they would exacerbate shoreline erosion at Ocean Beach. Historically, the Commission staff has monitored federal agency notices for dams, sand mining, and other hydrological modifications with the potential to reduce sand transport to the coast. For sand mining proposals located inland of the coastal zone, the Commission staff has only agreed to refrain from requesting OCM permission to review the activities’ coastal effects in situations where sand mining proponents have, at the Commission staff’s request, provided sufficient evidence that the levels proposed would not cause or exacerbate shoreline erosion (in particular where existing structures are threatened, inducing the need for shoreline armoring). However, for sand mining in BCDC’s jurisdiction, under the above Coastal Act provision, in this case the Commission staff instead urges BCDC to limit its authorizations to mining levels that would similarly avoid exacerbating beach erosion in areas within the Commission’s jurisdiction.

The Commission staff’s primary concern over coastal resources within the Commission’s coastal zone is the potential for continued and increased levels of sand mining within the bay to increase erosion outside the bay, in particular, at southern Ocean Beach, a growing erosion “hot spot” that

involves major federal, state, and city efforts and expenditures to plan for inevitable shoreline retreat affecting major public transportation and sewage treatment infrastructure.¹ We are concerned the proposed sand mining in the Bay would reduce sand inputs to the San Francisco Bar (SF Bar), which both feeds sand to Ocean Beach and shelters the beach from the full force of large storm waves. The Commission staff has reviewed the materials provided on the BCDC and the State Lands Commission (SLC) websites concerning this issue. As BCDC's July 11, 2014 Sediment Transport and Sand Mining Background Report notes:

The trend of overall sediment loss in San Francisco Bay, and sand loss in particular, has been well-documented by researchers. From 1959 to 2009, the total amount of sediment in San Francisco Bay fell by 190 million cubic yards.³⁰ From 1997 to 2008, the rate of sediment loss in Central Bay (3 centimeters per year across the Bay floor) was nearly three times higher than during the 1947-1979 period³¹; most of this erosion was from sandy areas. In sediments found at the mouth of the Bay, the percentage of sand decreased while the percentage of mud increased from 1997 to 2008.³² Finally, a recent analysis of bedforms (underwater sand dune formations) found that they are shorter than would be predicted by local water currents and hydrodynamics, indicating that the system is erosional.³³

From 1873 to 2005, the San Francisco Bar lost an average of 80 centimeters in elevation across its entire area, contracted in diameter, and migrated an average of 1 kilometer towards the shoreline.³⁴ This likely resulted from reduced tidal flows due to historic filling, diking, and sedimentation of the Bay, and from decreased amounts of sediment leaving the Bay as a result of hydrologic modifications upstream, mining, and dredging.³⁵ The erosion and contraction of the San Francisco Bar has effectively resulted in more sand being delivered to northern Ocean Beach, and less to southern Ocean Beach.³⁶ Additionally, modeling has demonstrated that changes to the Bar affect wave energy reaching the shoreline, with northern Ocean Beach being protected, and southern Ocean Beach being more exposed.³⁷ These changes help explain recent accretion at Baker Beach, Crissy Field, and northern Ocean Beach, and partially explain erosion at southern Ocean Beach.

¹ City of San Francisco and federal government agencies spent roughly \$750,000 in 2012 and \$580,000 in 2014, on short-term erosion solutions (email communications, National Park Service, 1/12/15). San Francisco Planning & Urban Research Association (SPUR) planning documents projects hundreds of millions of dollars of public funds will be needed to implement a long-term management plan to address the erosion issues. These projections include approximately \$50 million to relocate the Great Highway, and approximately \$150 million for a combination of measures to restore the beaches in the area (with just over \$24 million alone for continued sand relocation from north Ocean Beach to south Ocean Beach).

http://www.spur.org/sites/default/files/migrated/anchors/Ocean_Beach_Master_Plan052012.pdf

*(Historically, the mean high tide line at Ocean Beach was landward of the Great Highway; the beach was artificially extended seaward in the early 1900s.³⁸)*² [References repeated in footnote 2 below]

Based on the information in that background report, as well as the numerous USGS and other studies cited in it, the following dynamics stand out:

- historic sediment inputs into the bay have been vastly reduced (particularly compared with hydraulic mining eras (1850s-1920s));
- at least 200 million cubic meters (m³) of sediment lost from the San Francisco Bay Coastal System over the 50 year period between 1959 and 2009;^{3, 4}
- approximately 85%-95% of sand outflows due to mining are not being replenished,
- erosion levels are greater over time in the mined areas compared to non-mined areas;
- flood control and other hydrological modifications implemented in the watershed during the latter half of the 20th century have significantly reduce the potential for major flood events to deliver major quantities of sand sized sediment to the bay and ocean; and
- not only has the height and areal extent of the SF Bar been reduced, but sand grain size at the SF Bar are also diminishing, further lessening its ability to protect the outer shoreline.

When these factors are combined with Sea Level Rise projected to occur over the remainder of the 21st century, there can be no question that Ocean Beach is not in an equilibrium state, that shoreline erosion will continue or accelerate, and that attempting to even simply maintain the

² 31 Ibid.; Theresa A. Fregoso, Amy C. Foxgrover, and Bruce E. Jaffe, *Sediment Deposition, Erosion, and Bathymetric Change in Central San Francisco Bay: 1855-1979* (U. S. Geological Survey, 2008).

32 Patrick L. Barnard, Jeff E. Hansen, and Li H. Erikson, "Synthesis Study of an Erosion Hot Spot, Ocean Beach, California," *Journal of Coastal Research* 28, no. 4 (2012): 903–22.

33 Patrick L. Barnard et al., "Sediment Transport Patterns in the San Francisco Bay Coastal System from Cross-Validation of Bedform Asymmetry and Modeled Residual Flux," *Marine Geology* 345 (2013): 72–95.

34 Kate L. Dallas and Patrick L. Barnard, "Anthropogenic Influences on Shoreline and Nearshore Evolution in the San Francisco Bay Coastal System," *Estuarine, Coastal and Shelf Science* 92, no. 1 (2011): 195–204.

35 K. L. Dallas and P. L. Barnard, "Linking Human Impacts within an Estuary to Ebb-Tidal Delta Evolution," *Journal of Coastal Research Special*, no. 56 (2009): 713–16.

36 Jeff E. Hansen, Edwin Elias, and Patrick L. Barnard, "Changes in Surfzone Morphodynamics Driven by Multi-Decadal Contraction of a Large Ebb-Tidal Delta," *Marine Geology* 345 (2013): 221–34.

37 Dallas and Barnard, "Anthropogenic Influences on Shoreline and Nearshore Evolution in the San Francisco Bay Coastal System."

38 Patrick L. Barnard, Jeff E. Hansen, and Li H. Erikson, "Synthesis Study of an Erosion Hot Spot, Ocean Beach, California."

³ Patrick L. Barnard et al., "Sediment Transport in the San Francisco Bay Coastal System: An Overview," *Marine Geology* 345 (2013): 3-14.

⁴ One cubic meter = approx.. 1.3 cubic yards.

status quo will be a challenge. The dynamics of sediment in so large a region and watershed are complex, and putting the contributions from sand mining to the overall changes in transport system is an obviously difficult task.

In looking at the above trends, we find it difficult to rectify the evidence of long-term erosion throughout the San Francisco Bay system with the modeled conclusion cited in the SLC EIR that an additional 10 years of sand extraction at past permitted rates would reduce sand transport through the Golden Gate on the order of 5,000-7,000 y³/yr., and that significant impacts “are not likely to exist outside the immediate vicinity of the lease areas...”. The EIR’s technical report (EIR Appendix G - Coast and Harbor Engineering, Technical Report, Sand Mining Resource Evaluation and Impact Analysis, June 22, 2009) further states:

Since the vast majority of the mined material has been accounted for immediately adjacent to the lease areas, it appears that sand mining in Central Bay is not likely to cause measurable sediment depletion in areas outside the mining areas, such as the San Francisco Bar, Ocean Beach or other areas.

This analysis does not take into consideration any of the sediments entering the system from the surrounding small watersheds or any of the known in-bay transport of sediment from Ocean Beach. The net current velocities used in the model show none of the in-bay currents that are significant transport mechanisms for movement of sediments into the Bay. The examination of the mine area sediment budget has not included all the sediment sources, thus likely underestimating the difference between identified sediment losses and losses from mining activity, as well as the general impacts that could be attributed to the larger Bay-Bar system from mining activities.

Of more significance is that the SF Bar has developed through normal bay-shoal dynamics. One validation of the model’s ability to predict impacts to the San Francisco Bar from existing mining or from changes to mining amounts would be its ability to recreate historic changes to the SF Bar from historic changes in sediment supplies and hydrodynamic conditions. However, the model used to determine that mining will have minimal impacts on the sediment supply to SF Bar has not been tested to replicate the changes to the Bar that have been observed recently, and it is not clear whether all the sources of sediment into the Central Bay were included in the sediment budget.

While the technical report’s conclusion was based on numerical modeling studies, it may not adequately reflect long-term, and extremely complex, dynamics. If physical studies (such as tracer studies) were to be designed to confirm or refine these estimates, we might consider the estimates more reliable. Even if they were, however, the long terms trends (reduced sediment inputs, reduced grain size, greater coastal erosion and Sea Level Rise) are likely to render them meaningless.

As noted earlier, the City of San Francisco and the Federal Government have made major commitments of time, staff and financial resources to reduce or stem erosion at Ocean Beach and protect the vital infrastructure that is now or will soon be threatened by on-going erosion. Given the uncertainties as to the precise transport mechanisms for sediment transport from the lease areas

to the open ocean coast, we would disagree with any public policy decision that attempts to maximize private industry profits in the face of such extensive public expenditures to grapple with the outer coast erosion issues. An appropriate response would be to limit mining to sustainable amounts (considering natural replenishment), at least until such time that additional confirmation of its impacts can be further documented.

Knowledge of sediment dynamics and the linkages between sediments in San Francisco Bay and sediments on SF Bar and in the Ocean Beach littoral cell has increased significantly since sand mining activities started in the Bay. Public policy needs to consider new science as it develops and not perpetuate activities that result in major avoidable impacts to critical public resources.

Accordingly, given the evidence that mined areas are not being replenished (with only 5-15% replenishment of mined sand quantities), we recommend limiting permitted amounts to 15% of historic mining levels (the upper estimate of the replenishment value), at least until such time as the sediment transport mechanism can be further studied to provide assurances that the mining is limited to sustainable levels.

With 2.24 million $y^3/yr.$ representing past maximum permitted levels, such an approach would bring permitted levels down to about 335,000 $y^3/yr.$, which is close to the range of the amounts mined over the last 5 year period (averaging approximately 400,000 $y^3/yr.$ from 2009 through 2013, according to tables supplied by BCDC, and which thus may also represent current market conditions). We would also point out that the longer the mining levels can remain at levels similar to sand inputs, the longer the economic benefits accruing from the mining can continue into the future.

We also recommend that BCDC seriously consider the suggestions made by USGS that mining activities focus in areas of bayward-directed sediment transport. USGS suggested:

To minimize the impacts of aggregate mining in west-central San Francisco Bay on the coastal sediment supply, lease sites could be targeted in areas of net sediment transport convergence, such as the area of accretion in Pt. Knox Shoal (northern section of PRC709 North) and the three zones of convergence in the lease site to the south (PRC7779 West). At the very least, mining should be focused along bayward-directed sediment transport pathways, such as PRC2036 in Point Knox Shoal, where ongoing heavy mining has resulted in significant local erosion (mean depth increase of >2 m during the survey interval) but does not appear to directly impact sediment supply to the mouth of San Francisco Bay. Conversely, mining along distinct seaward-directed pathways, such as the southern section of west-central San Francisco Bay (PRC709 South and PRC7780 South), would directly limit the supply of sediment to the open coast. Similarly, navigational dredging practices could be more efficiently managed by placing spoils along pathways that will keep sediment in the estuarine-coastal system, but not along convergent pathways that might lead to additional navigational hazards.

Unless BCDC determines that the localized biological implications of implementing this approach are unacceptable, it would appear from a purely sediment supply perspective that focusing mining efforts on areas where they would have a more delayed effect on transport to the open ocean could reduce (or at least delay) adverse effects on ocean beach sediment supply.

Finally, while the scientific understanding of the Bay-Ocean sediment dynamics has clearly advanced since the start of sand mining, uncertainties remain about the detailed connections between sand extraction from the Bay and sand depletion from the outer coast. We recommend the development of a peer-reviewed, scientifically defensible monitoring program designed to better clarify:

- Sediment transport rates, volumes and pathways within SF Bay and between the Bay and SF Bar and Ocean Beach;
- Major drivers for transport from the Bay to the ocean coast, such as episodic flood events, storm waves, or tidal currents;
- Threshold levels of sediment transport from the Bay to sustain SF Bar in its current configuration; and
- Mining locations and volumes that support the identified thresholds.

Toward this end, we recommend that BCDC require, as part of its permit action, that the applicants develop and implement a detailed sediment monitoring program, designed to advance understanding of these four identified concerns. The monitoring plan should include seasonal and annual bathymetric surveys of the mined areas and SF Bar, seasonal and annual tracer studies undertaken in conjunction with current and turbidity measurements at the mined areas, and grab samples of sediment from the mined areas and SF Bar. The monitoring plan should identify the monitoring efforts, expertise necessary to undertake each study, timing for studies, and methods for public dissemination of studies results on an annual or more frequent basis.

We recommend the applicants also fund an expert panel that reports to BCDC's Engineering Criteria Review Board, that will review and approve the monitoring plan and review and provide feedback on all monitoring results and reports, and that serves for the duration of the permit or until such time that the panel can assert that no further understanding of the Bay-Ocean sediment dynamics is possible or necessary to establish appropriate long-term sand excavation locations and volumes.

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In conclusion, we recommend serious consideration of: (1) limiting mining volumes; (2) focusing mining to areas where sand transport has been identified to be moving bayward, rather than towards the open ocean; and (3) monitoring transport within the Bay-Ocean system. We appreciate the opportunity to comment on this important public policy matter. Please do not hesitate to contact me at (415) 904-5289 or Dr. Lesley Ewing, Senior Coastal Engineer, at (415) 904-5291, with any questions you might have.

Sincerely,



MARK DELAPLAINE
Manager, Energy, Ocean Resources,
and Federal Consistency Division

DR. LESLEY EWING, Ph.D., PE
Senior Coastal Engineer

cc: North Central District Office
U.S. Army Corps of Engineers, S.F. District (Sahrye Cohen)