JERICO PRODUCTS SAND MINING OPERATIONS ON MIDDLE GROUND LEASE

San Francisco Regional Water Quality Control Board Permit Application

October 2013

PERMIT APPLICATION INFORMATION PACKAGE

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1. PROJECT DESCRIPTION

1.1. Purpose and Proposed Action

The project applicant, Jerico Products, Inc. (Jerico), proposes to mine sand from a 367-acre area of submerged lands known as Middle Ground Island Sand Shoals, adjacent to Middle Ground Island in Suisun Bay (Middle Ground, Figure 2-2). Jerico has mined sand historically from this location since the late 1970's, under various agency permits as periodically amended and extended, including WDR's for sand mining, which authorized mining of up to 250,000 cubic yards of sand annually.

Jerico is now seeking authorization to mine up to 150,000 cubic yards of sand annually at Middle Ground for a period of ten (10) years.

1.2. Background and History

Two marine aggregate companies currently harvest sand commercially from the San Francisco Bay and the western Delta (the Bay-Delta estuary), including Hanson Marine Operations (Hanson), and Jerico.[1] The Sand Miners harvest sand from specified areas of San Francisco Bay that are leased from the California State Lands Commission (SLC) or, in the case of Middle Ground, owned privately by the Grossi family.

The purpose of marine sand mining is to obtain marine aggregate that is primarily used for construction activities within the greater San Francisco Bay area, either as fill and base material or as an ingredient in readymix concrete and hot mix asphalt. Sand obtained from the Bay-Delta estuary is used, for example, in the construction and maintenance of highway and freeway systems, commercial and public buildings, and residential construction. Marine sand mining is a critically important component of the scarce permitted sand reserves in the Greater San Francisco Bay Area.

Sand mining has occurred within the Bay-Delta estuary for more than seven decades. Channel and harbor dredging to remove sand and other sediment deposits originally began in San Francisco Bay in the 1800s. Sand dredging was necessary to keep shipping channels clear from the high-energy sand waves that accumulated on the Bay floor. Since then, sand mining has evolved beyond dredging to maintain shipping channels and, in fact, today maintenance dredging is a distinct process and enterprise. Commercial sand mining – separate from maintenance dredging – began within the Bay-Delta estuary in the 1930s.

The history of Jerico Products, Inc., headquartered in Petaluma, California, dates back over 100 years, when Pioneer Shell, owned by Hanns Beck, dredged oyster shells in the Bay with a sail-powered schooner, the Alma. In the 1960s, Mike Lind, current owner of

[1] Hanson and Jerico are referred to collectively in this document as the "Sand Miners"

Jerico Products, began working for Pioneer Shell. In the late 1970s, Morris Shell, formerly Pioneer Shell, began sand mining at Middle Ground Shoal in Suisun Bay, Chipps Island, and New York Slough in the Delta. After Mike Lind's acquisition of Morris Shell, he changed the name of the company to Jerico Products, Inc.

Hanson and Jerico currently both mine the Middle Ground parcel under separate leases with the Grossi family.

1.3. Project Objective

Jerico's project objective is to obtain renewal of all necessary permits and approvals to continue mining sand at an economically viable level in San Francisco Bay for the next 10 years. Jerico proposes mining up to 150,000 c.y. annually from the Middle Ground lease for a period of 10 years.

Mining in the Bay-Delta estuary allows the Sand Miners, as part of activities that have been ongoing for decades, to continue to provide an adequate supply of sand for their customers within the Bay Area. This supply of sand from the Bay-Delta estuary serves Bay Area customers and reduces the need to import materials by truck from the Central Valley or other diminishing land-based sources and, therefore, reduces traffic over Bay Area highways.

2. SAND MINING LOCATIONS

Collectively and historically, the Sand Miners harvested sand from three general regions within the Bay-Delta estuary, including Central San Francisco Bay, Carquinez Strait, and Suisun Bay, which includes the Middle Ground Shoal region of western Suisun Bay, and the channels of Suisun Bay and New York Slough within the eastern portion of Suisun Bay (Figure 2-1). The sites in the Carquinez Strait were mined by RMC/CEMEX, and are no longer being mined, nor are the leases active.

The bottom of the Bay-Delta estuary is owned by the State, held in trust by the State Lands Commission for the people of California, as well as by private parties in some circumstances. The two areas where Jerico conducts marine sand mining, the Suisun Associates and Middle Ground leases, are both located underwater in Suisun Bay. The area specifically addressed in this application for Jerico is the Middle Ground private lease, shown in Figure 2-2, and detailed in Appendix A.

Figure 2-1 – General Areas of Sand Mining

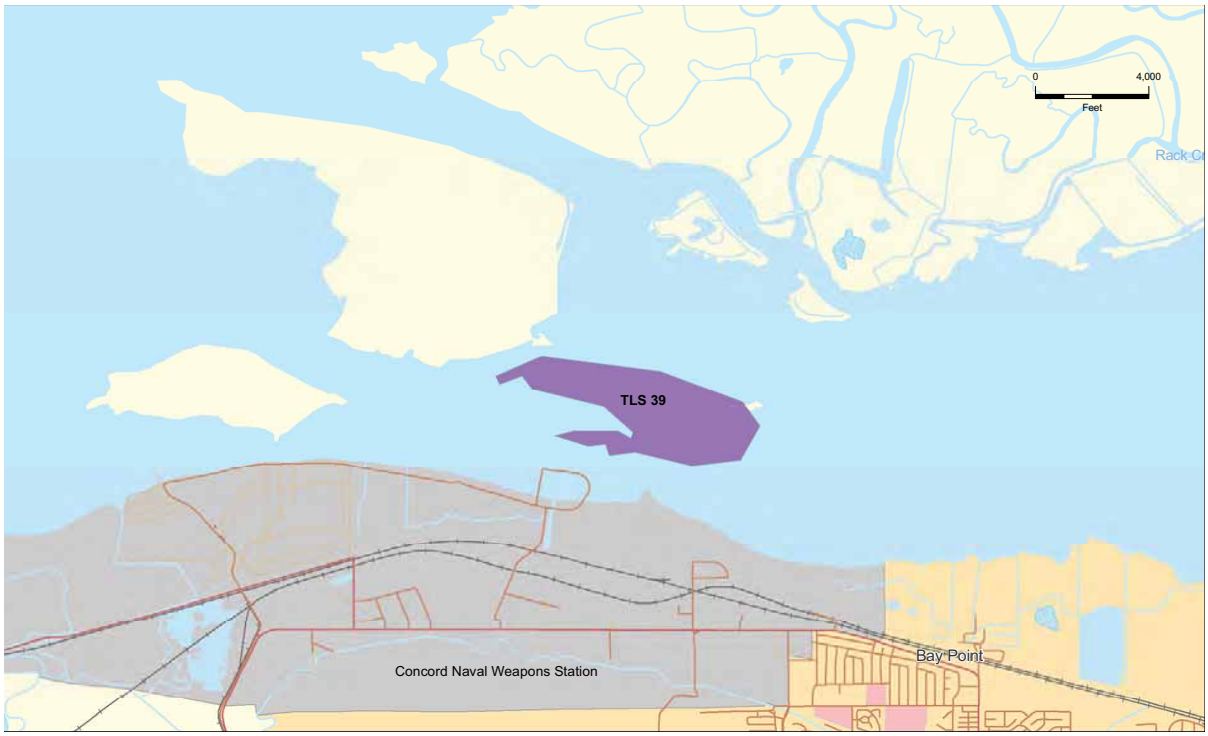

Figure 2-2 – Middle Ground Lease Location

3. SAND MINING METHODS AND EQUIPMENT

There are three general methods of hydraulic sand mining: trolling, stationary potholing, and moving potholing.

- Trolling involves mining while moving over a site, generally working back and forth along parallel pathways between markers.
- Stationary potholing involves an initial search for an appropriate sand source, followed by "stationary" mining of sand at a site, through anchoring the barge or other means. Stationary potholing may involve mining more than one specific location during a mining event, and may involve some movement within a general site.
- Moving potholing is similar to stationary potholing, in that it involves mining in a "stationary" position when an appropriate sand source is found, but also involves mining while moving in search of another appropriate stationary source.

Currently, Jerico exclusively uses the stationary potholing method. Figure 3-1 is a schematic diagram of the stationary potholing mining method.

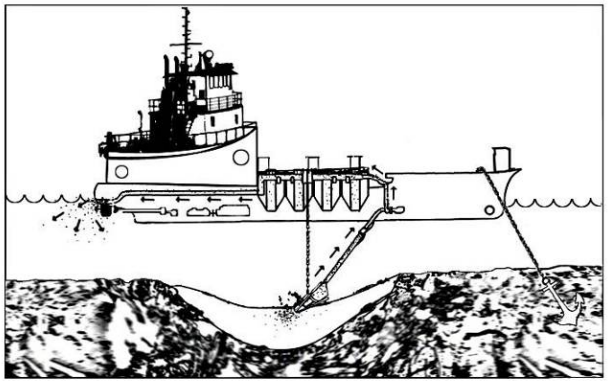

Figure 3-1: Stationary potholing method Used by Jerico in the Suisun Bay

Jerico's sand mining equipment consists of two tugboats, the *Trig Lind* and the *Petaluma*, and a hopper barge, the *J5200*, which is equipped with suction dredge equipment. The barge *J5200* is 200 feet long by 45 feet wide, with a loaded draft of approximately 12 feet and an unloaded draft of approximately 3.5 feet. The barge has a total cargo capacity of approximately 1,850 cubic yards. Additional information on the

mining equipment used by Jerico is presented in Table 3-1. Jerico's equipment and methods limit it to mining in water from approximately 15 feet to 40 feet in depth.

The *J5200* hopper barge is equipped with a hydraulic (pumping) suction system for sand mining. The hydraulic suction system includes a 14" diameter, 40-foot "drag arm" suction pipe assembly, generally mounted on the side of the barge and connected to

Table 3-1: Summary of Jerico Sand Mining Equipment and Operations

Source: Hanson et al 2004

Tugboat	**Trig Lind**	**Petaluma**
Length (feet)	75	65
Width (feet)	35	26
Draft (feet)	7	7
Barge	**J5200**	
Type	Hopper	
Length (feet)	200	
Width (feet)	45	
Draft, Loaded (feet)	12	
Capacity (cy)	1850	
Loading Chute Dimensions (L x W x H)	Flume with Loading Gates	
Loading Chute Gates (number)	13	
Screen Mesh on Loading Chute Gates	¼"	
Drag Arm		
Length (feet)	40	
Diameter (inches)	14	
Drag Head		
Dimensions (feet, L x W x H)	No drag head; 14" diameter pipe	
Jetted	No	
Grizzly	Yes, 6-in openings	
Offloading System		
Type	Excavator to Conveyor	
Offloading Sites	Petaluma, Napa, Collinsville	
Operations		
Minimum Operating Depth (feet)	15	
Maximum Operating Depth (feet)	40	
Maximum Pumping Capacity (gpm)	5000	
Type of Operation	Stationary Potholing	
Typical sand-water slurries (% composition, sand:water)	23:77 Middleground, 27:73 Suisun Bay	

large pumps installed in the barge. At the end of the drag arm suction pipe, another shorter (8'-10') section of pipe is fitted at an angle. The end of this pipe is fitted with a set of crossbars that act as a "grizzly" screen to prevent oversized material from entering the suction pipe. Jerico does not utilize a drag head per se, but simply inserts the end of the 14" suction pipe into the substrate. Figures 3-2a and 3-2b show examples of this type of equipment.

Figure 3-2a. Hopper barge and tug, illustrating hydraulic suction dredge trailing drag arm assembly.

Figure 3-2b. Hydraulic suction pipe assembly.

The suction pipe may be equipped with small external pipes that extend a few feet above the end of the suction pipe (see Figure 3-2b). These pipes pull water into the suction pipe to help create the sand-water slurry when the suction pipe is buried in the substrate such that insufficient water can be drawn through the sand substrate itself. This allows for sand to be mined without moving the suction pipe, and for the suction pipe to be inserted farther under the substrate surface. Jerico sometimes utilizes these suction pipes depending on the consolidation of the material being mined.

As mining commences, the dredge operators determine suitability of the sand for mining. Tests include grab samples to determine the gradation of the sand (coarse or fine) and visual observations of the slurry (a dark color indicates high sand to water proportion, signifying either loose, unconsolidated sand and/or finer sand). Vacuum measurements on the drag arm, density measurements of the slurry and pump RPMs give indications of the slurry density as well. As mentioned previously, Jerico exclusively employs the stationary potholing method of mining. Once the operator has determined a suitable location and the barge has been placed in position, an anchor is dropped from the bow of the barge. The barge is allowed to pivot and shift into position by drifting on the current. Once the barge has drifted to a stable position, the hydraulic suction pipe assembly is lowered into the water using a cable winch system to the substrate surface. The pump is primed and the pipe filled with water when the suction end is lower than 3 ft from the substrate surface. The suction pipe is then slowly lowered into the sand substrate – as much as 5 to 8 ft - which further stabilizes the barge, and mining begins.

If the sand is unsuitable or the substrate too difficult to mine, the operator shuts down the pump, picks up the suction pipe, and proceeds to another location, where the above process is repeated to resume mining.

Water is continually mixed with the sand to create a slurry by entering the drag pipe along with the sand through the main opening, and if necessary through the small water intake pipes that extend a few feet up the drag arm pipe. This slurry is pumped up through the pipe onto the barge utilizing a 5,000 gallons per minute (gpm) pump. The proportion of sand to water in the slurry may vary, depending on the quality and consolidation of sand being mined. Jerico experiences an average proportion of 25% sand / 75% water in the sand slurry. As sand is pumped to the barge, adjacent sand is mobilized and falls into the pothole created by the suction head. The suction end is lowered to keep it in the substrate as the pothole is deepened.

Once the sand-water slurry is pumped to the barge, it is discharged into a long loading chute, running lengthwise along the centerline of the barge. This chute has thirteen hydraulically controlled screened openings (gates) at intervals along its bottom, and the sand-water slurry flows through these gates into the barge. The gates are controlled so that sand is distributed evenly in the hopper. Figure 3-7 illustrates the loading chute and gate arrangement. That portion of the slurry that includes aggregate and material larger than the openings in the screened openings (typically ¼ inch – ½ inch), is discharged through a pipe extending below the surface of the water.

The *J5200* barge is equipped with screened overflow outlets. Water displaced by accumulating sand within the hopper barge, in addition to fine grained sediments and other material, returns to the receiving waters through surface discharges or overflow weirs or through subsurface discharges. The cargo hopper is also fitted with fine mesh screens along the bottom centerline of the barge where water that has filtered through the sand is also collected and pumped overboard.

These discharges may contain aggregates, fine sediments, aeration bubbles, and plankton, and a visible plume is sometimes created around the barge. Based on the equipment and methods used for sand mining within the estuary, commercial sand characteristically ranges in size from approximately 1 mm to 12 mm (1/2 inch), with larger and smaller particles discharged overboard. The volume of sediment discharged overboard during a typical mining event within the estuary has not been quantified. Details related to discharge plumes are provided in Appendix B.

After loading the sand, the barge returns to one of Jerico's or Jerico's customers' offload sites, located in Petaluma, Napa or Collinsville. Figure 3-4 shows these sites, as well as other Sand Miner offload sites located throughout the Bay Area.

At the offload site, a conveyer belt mounted on the barge is lowered and moved to the side, and an excavator or front-end loader is used to load the sand onto the barge conveyor belt, which transports the sand to a shore-side conveyor system, where sand is discharged into a pile at the yard for further processing and distribution.

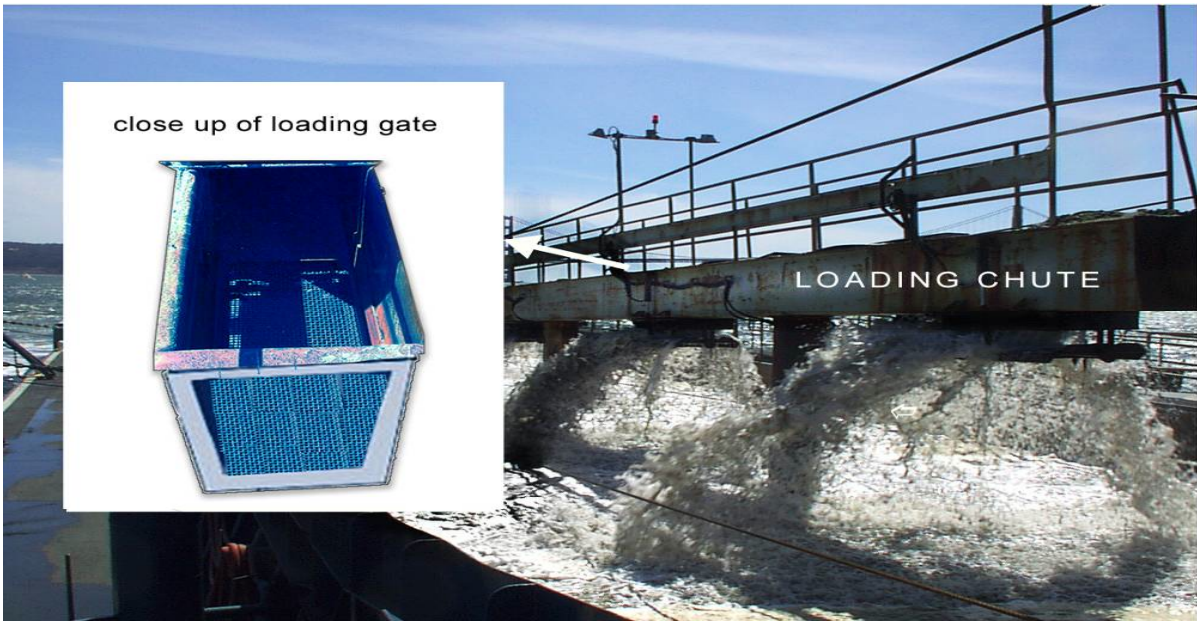

Figure 3-3. Hopper barge loading chute and gate.

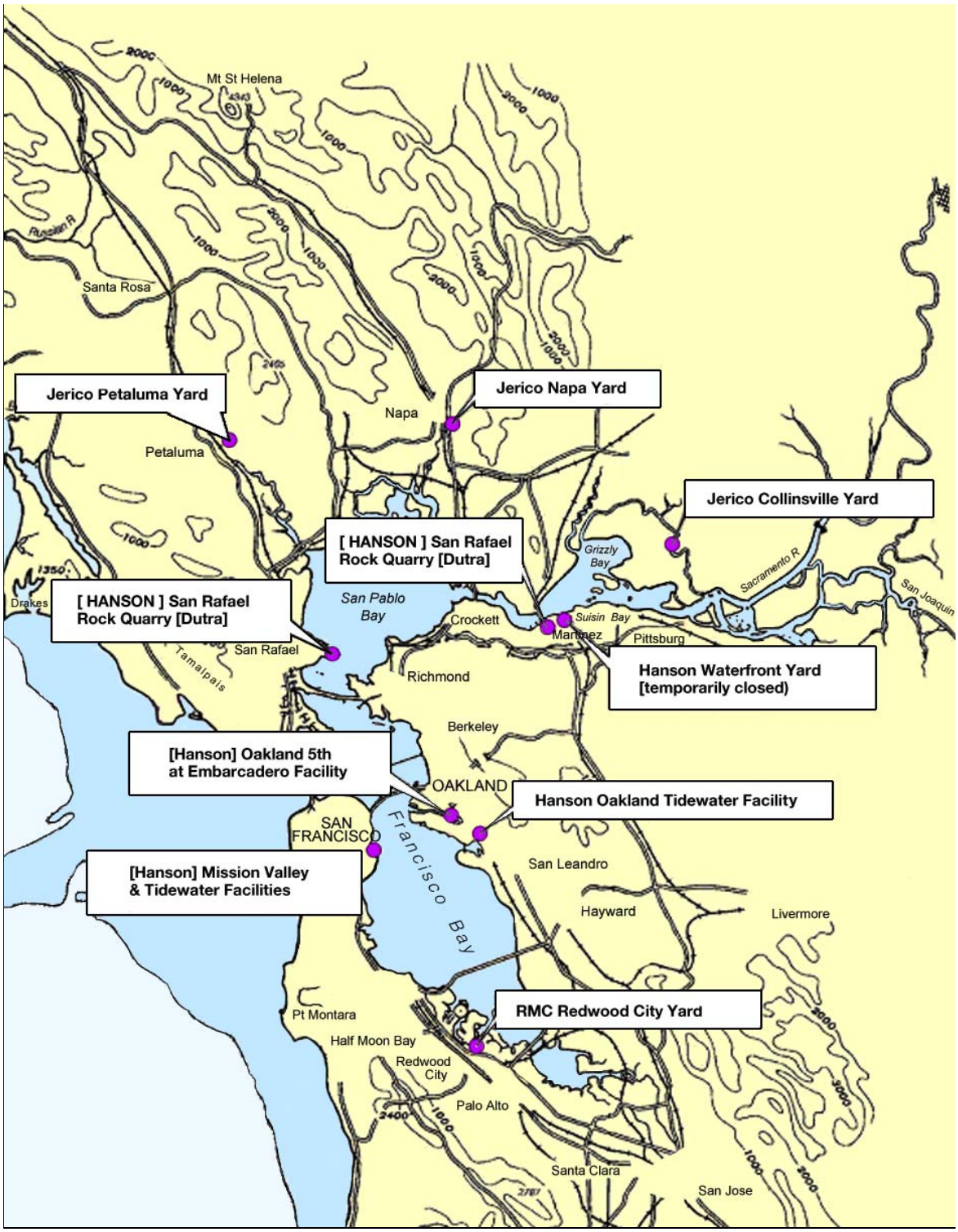

Figure 3-4. Marine sand offload locations within the Bay-Delta estuary

3.1. Characteristics of Sand Mining Events

3.1.1. Water Depth and Location

Sand mining does not occur uniformly within the region or lease areas, but rather mining activity is typically clustered within specific areas, characterized by high river or tidal velocities and sand deposits having a low percentage of fine material (silts, clay, and mud) that make the material suitable for use in construction materials. For the Middle Ground Shoal and Suisun Bay area where Jerico operates, the activity is limited to those areas of the lease that range in depth from 15-40 feet due to the physical constraints of the sand mining equipment. Existing permit conditions also limit the areas of mining, discussed in more detail in Section 5.

In general, actual mining locations are not uniformly distributed across the lease areas, but rather are clustered within areas where suitable sand deposits are known to occur. Sand mining locations are concentrated and consistent with the Sand Miners' objectives to find sands with a low percentage of fines, and to mine in areas compatible with the operating depth constraints of the equipment used. Operators typically return frequently to general areas where they have found appropriate sand deposits in the past. Mining in the Suisun Bay/Delta and Middle Ground Shoal areas is concentrated in main channel locations (generally away from side channels) that would be expected to contribute significant amounts of fines to the substrate.

3.1.2. Mining Event Duration and Harvest

Although sand mining activity may occur at any time of the day, the operation itself, i.e., mining the sand and loading the barge, typically lasts an average of 4.67 hours, during which time approximately 1,850 cy of sand is harvested. Once the barge is loaded, it travels to an upland offloading location. Depending on the mining and offloading locations, the entire operation – including loading, unloading and travel time – can take anywhere from 8 to 24 hours. Under these circumstances, from an operational perspective, the greatest frequency that the same mining vessel would disturb any single area is two times in any 24-hour period. Tidal conditions may further reduce the frequency of sand mining operations and disturbance of the sand shoals (for example, the onset of low tide at the time a barge is available to return to the sand shoal or arrive at an offload location could delay the sand mining activity).

3.2. Seasonal Distribution and Volumes of Mining Events

The amount and seasonal timing of mining volumes are largely dictated by demand for sand and the weather (seasonality). Mining volumes may also be indirectly limited by the maximum cubic yardage allowed under the respective leases and permits. This annual and regional variation is illustrated for informational purposes by the data in

Table 3-2, which totals the annual volume of sand mining by region for the years 2002-2007 for both Hanson and Jerico. Seasonally, sand mining generally peaks in the summer and early fall, when construction activity is also at a peak. Table 4 illustrates the average monthly volumes mined by Jerico during the period 2002-2007. As shown, mining activity in the period from July - October historically makes up over 43% of the total annual volume.

The seasonal distribution of sand mining volumes is dependent on weather and demand. The anticipated seasonal monthly distribution of volumes is illustrated in Table 3-3. The percentage of annual volumes mined in each month is derived from Jerico's actual historic sand mining activity in the Bay/Delta for the years 2002-2007. The actual seasonal distribution of mining in any given year in the future may vary widely depending on demand.

Table 3-2: Volume (cy) of sand harvested by region from the Bay-Delta estuary: January 2002 through December 2007 – both companies.

Source: Sand Mining Industry (Hanson, Jerico)

YEAR	CENTRAL BAY	MIDDLEGROUND /SUISUN ASSOC	TOTALS
2002	1,247,893	357,996	1,605,889
2003	1,014,801	275,274	1,290,075
2004	1,078,657	294,246	1,372,903
2005	1,145,943	294,519	1,440,462
2006	1,019,663	281,575	1,301,238
2007	889,820	242,031	1,131,851

Table 3-3: Anticipated Middle Ground Monthly Mining Volumes (c.y.)

Source: Sand Mining Industry (Jerico)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
%	4.62	5.86	5.88	7.43	8.62	9.90	10.58	10.83	10.82	10.80	8.06	6.59	100.0
Approx. Volume	6,933	8,797	8,820	11,152	12,937	14,855	15,864	16,248	16,223	16,204	12,085	9,883	150,000

4. PERMITS AND APPROVALS

4.1. Existing Permits

Sand mining in the Bay/Delta estuary is a highly regulated activity with permits issued by a variety of federal and state agencies, including the California State Lands Commission (CSLC), U.S. Army Corps of Engineers (ACOE), San Francisco Bay Conservation and Development Commission (BCDC), Regional Water Quality Control Board (RWQCB), and the State Mining and Geology Board (SMGB). Current permits held by Jerico for the Middle Ground lease are shown in Table 4-1.

Table 4-1: Permits Associated with Middle Ground Sand Mining Site

Agency	Jerico Products – Middle Ground Permit Number
CSLC	N/A – Private Lease
ACOE	24913N
BCDC	16-78
SMGB	See Note 1
RWQCB	Regional Board Order No. 95-177, as Amended by Order No. 00-048 (applies to all parcels)

NOTE 1: The SMGB has approval authority over the reclamation plans prepared pursuant to SMARA for the sand mining sites. SMGB adopted resolution 2005-02 in February 2005, approving the reclamation plans for ten marine sand mining leases in the Central Bay, Suisun Bay and western Delta. The SMGB approval of the reclamation plans for the current Central Bay, Suisun Bay and Delta sites is limited to the term of the leases that expired in 2008, and extended pending completion of SLC EIR.

These permits contain numerous conditions, limitations, and restrictions, as well as various monitoring and reporting requirements. These conditions help to avoid and minimize potential adverse effects to aquatic resources, and many are summarized in Section 5.

4.2. Pending Permit Approvals

There are a number of pending permit approval processes underway, which are summarized here.

CEQA:

The California State Lands Commission (SLC) has prepared an Environmental Impact Report (EIR) to comply with CEQA review required for the renewal of sand mining leases issued by SLC to Jerico and Hanson. It is anticipated that the EIR will be utilized as

environmental documentation by other resource agencies issuing permits for sand mining activities, including BCDC and CDFG. Timeline for this process is summarized as follows:

- July 10, 2007. Notice of Preparation (NOP) published.
- July 30, 2007. Two scoping meetings held in Oakland, California.
- July, 27, 2010 – November 27, 2010. Draft EIR released for public review with comments accepted by mail, email, facsimile transmission, and in person at two public meetings held in Berkeley, California on August 23, 2010.
- November 16, 2011 – January 3, 2012. Revised Draft EIR released for public review with comments accepted by mail, email, facsimile transmission; 12 written comment sets were received.
- January – September 2012. Final EIR prepared. CSLC staff responded to comments received, obtained additional information as needed to respond to comments, and prepared revisions to the Revised Draft EIR
- October 19, 2012. SLC hearing on the Final EIR; EIR certified by the Commission.

ACOE: Existing permit was extended through June 2014. This application is for coverage under Section 10 (Rivers and Harbors Act).

BCDC: Existing permit was extended through June 2014. Application submitted for major permit for sand mining activities with BCDC.

RWQCB: has issued a 401 Water Quality Certification/Waste Discharge Requirements as cited above.

SMGB: It is anticipated that updated reclamation plans will be applied for and issued by the SMGB for the ongoing mining activities

CDFG: Both sand mining companies have applied with CDFG for Incidental Take Permit (ITP) coverage provided by CESA Section 2081. CDFG has accepted the ITP applications, and it is anticipated that ITP's will be issued in the late 2013.

USFWS: As part of the extension of the existing ACOE permits, consultation was reinitiated with USFWS pursuant to the Endangered Species Act (ESA) for federally listed delta smelt. A biological analysis was submitted for the one- year extension, and a Biological Opinion issued by USFWS. A biological analysis for the current requested 10-year permit has been submitted.

NMFS: As part of the extension of the existing ACOE permits, consultation was reinitiated with NMFS pursuant to the Endangered Species Act (ESA), and for Essential Fish Habitat (EFH) under the Magnuson-Stevenson Fishery Conservation and Management Act (MSA). A biological analysis for the current requested 10-year permit has been submitted.

5. AVOIDANCE AND MINIMIZATION MEASURES

To avoid and minimize effects on federally listed species and their habitat within the Action Area, the following measures illustrate avoidance and minimization measures for specified species that are or will be implemented for each activity listed below. These measures were developed through existing permits and approvals, the recent CEQA process, and pending applications and processes with various responsible agencies, including the ITP process with CDFG and biological assessments for USFWS.

- When priming the pump or clearing the pipe, the end of the pipe shall be held at a height in the water column no greater than 3 ft off the bottom (NMFS 2006).

- Limited volume per year: existing State and Federal permits regulate the annual volume of sand that can be harvested from each lease area. These limits serve to reduce the potential risk of adverse effects of sand mining on subtidal habitat and aquatic resources (USFWS 2006).

- Water depth limitation to avoid sensitive habitat: in Central Bay, sand mining occurs in relatively deep water (from -30 to -90 ft MLLW). Within the region of Middle Ground Shoal and Suisun Bay, sand mining typically occurs in waters -20 to -45 ft MLLW deep, due to equipment constraints. In addition to equipment constraints, all recently issued ACOE and BCDC mining permits prohibit sand mining within 200 feet of any shoreline. The permits also prohibit sand mining within 250 ft of any water having a depth of -9 ft or less MLLW, or -30 ft MLLW, depending on the location in the estuary (USFWS 2006).

- Limited mining areas: sand mining is restricted to specific CSLC-designated lease areas. Mining is not permitted outside of the lease areas. The lease areas and specific locations within the lease areas where sand deposits occur and mining activity is most frequent are characterized by relatively high river and tidal current velocities, are areas of sediment (sand) accumulations that have a low percentage of fine sediments, and are dynamic areas with frequent natural disturbance, as evidenced by the presence of sand wave formations. These limitations reduce and avoid the risk of mining in sensitive subtidal habitat, located outside the designated lease areas (USFWS 2006).

- Monitoring actual mining locations: current sand mining permits require detailed tracking and accounting of the specific locations of each mining event. Results of the tracking are submitted to BCDC and CSLC quarterly in accordance with permit conditions. Tracking mining locations serves to ensure that mining occurs only within designated lease areas and that mining avoids sensitive subtidal habitat located outside of a lease area (USFWS 2006).

- Current restrictions on sand mining operations, as specified in the National Marine Fisheries Service Biological Opinion (NMFS 2006) and the U.S. Fish and

Wildlife Service Letter of Concurrence (USFWS 2006), serve to avoid and minimize take of delta smelt. Currently there are no Federal restrictions on longfin smelt. Due to similar life stages, however, State delta smelt restrictions and conditions will be applied to both smelt species. These conditions include restrictions on pump priming, limiting the total mining volume, prohibiting mining in areas of shallow water depth and in proximity to shorelines, restricting mining to the designated lease areas which are away from sensitive habitat, and monitoring and reporting the location of each mining event.

- The applicants shall keep the end of the pipe and drag head as close to the bottom as possible, and no more than three feet from the bottom, whenever feasible when priming the pump or clearing the pipe.

- Other avoidance, minimization and mitigation measures may be developed through ongoing processes with USWS and NMFS. Other measures may also be developed through the ongoing Incidental Take Permit process with CDFG.

- A positive barrier fish screen is being installed on Jerico's sand mining equipment in October 2013 in order to reduce and minimize the potential take of listed fist.

- To fully mitigate incidental take of CESA protected species that fish screens cannot avoid or minimize, Jerico has committed to purchase shallow water habitat. Mitigation estimates were calculated and approved by CDFW. Liberty Island has been identified as suitable habitat and Jerico is currently coordinating with Hanson and the pertinent entities to purchase required mitigation habitat for the proposed 10-year sand mining permit.

REFERENCES

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