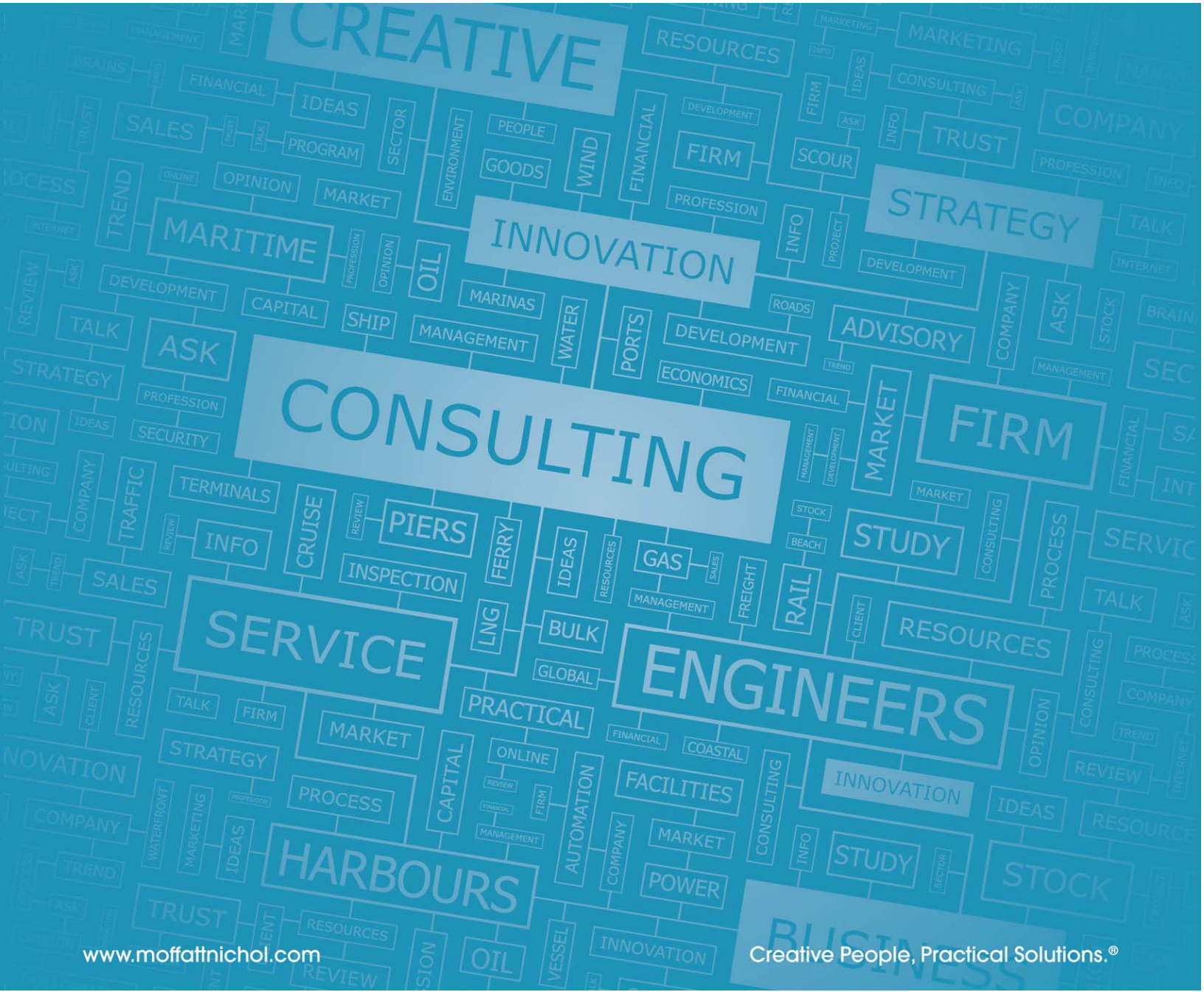
moffatt & nichol

Franks Tract ROM Cost Estimate

LOCALLY PROPOSED CONCEPTUAL DESIGN

PREPARED FOR CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

MAY 11, 2018



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1. ROM Cost Estimate

The following sections provide a Rough Order of Magnitude (ROM) cost estimate for restoration of Franks Tract per the locally proposed conceptual design shown in Figure 1[1]. The estimate is based on sourcing of materials from dredging the south-east portion of Franks Tract outside the containment berms and levees.

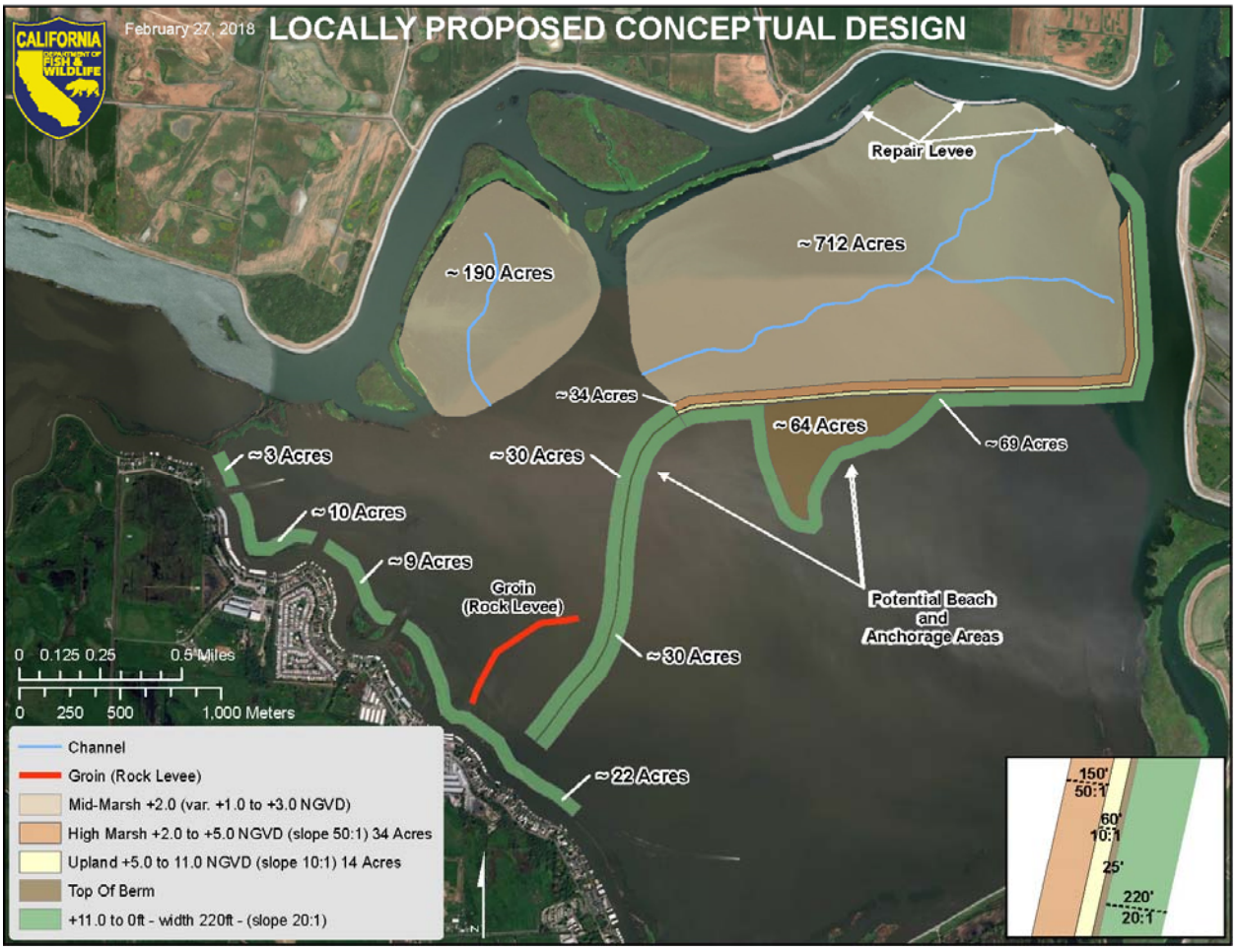

Figure 1: Franks Tract Locally Proposed Conceptual Design.

1.1. Quantities

Gross fill quantities for the primary project areas shown in Figure 1 are summarized in Table 1-1. The quantities account for the neat material placement volumes, including compensation for consolidation of the underlying peat.

[1] Franks Tract Conceptual Design B Draft v7.

Table 1-1: Gross quantities for project fill areas

Area	712 AC	190 AC	Berm	Rock Levee	Total
Fill (cy)	2,269,654	600,659	1,801,878	21,136	4,693,327
Consolidation (cy)	6,876,111	859,276	849,429	18,092	8,602,908
Total (cy)	9,145,765	1,459,935	2,651,307	39,228	13,296,235

1.2. ROM Estimate Tools, Rates, Procedures and Assumptions

The HCSS cost estimating system was utilized to develop costs. The estimates are Rough Order of Magnitude (ROM) construction costs, corresponding to AACE Class 5 estimates, without costs for design and engineering.

1.2.1. Labor Rates and Working Schedule

West coast union labor rates were used as the basis for the labor cost. These rates are fully burdened. The estimate utilizes a 7 × 24 hour per week work week schedule with standard overtimes applied to the labor. The estimate utilizes a workmen's comp rate that is over water work. The estimate used a 24-hour calendar for all operations.

1.2.2. Equipment Rates

Standard equipment rates for US work were used as a basis for the equipment costs, both rent and operations cost. The equipment rates are based on the 2016 Blue Book rates and local contractor equipment rates for marine equipment. The cost for diesel fuel used in the estimate was $3.00 per gallon.

1.2.3. Materials, Supplies, Subcontractors

1.2.3.1. Permanent Materials

The major permanent material is the rock groin. The dredge and fill materials being used in this estimate are obtained from Franks Tract and are assumed to be at no cost to the project.

1.2.3.2. Construction Supplies

Normal rates for construction supplies are based on west coast costs.

1.2.3.3. Subcontractors

Minor subcontract costs are included in this estimate for surveying.

1.2.4. Estimating Procedure

The estimate was performed by setting up bid items for all major items of work. Material Take-Offs (MTO's) were added to each of these items of work. This was further subdivided into individual work activities where crews of labor and equipment were added to perform the work along with an estimated

production rate for the crew. Permanent materials, supplies, and subcontractors were also added to the activity. The production rates used for the crews are based on history, experience and estimates from similar projects.

1.2.5. Project Management Duration

A project schedule was developed that provides an approximate construction period of 6 years or 72 months. Therefore, the management and supervision was estimated at 72 months and is included in the detailed cost estimate.

1.3. General Approach and Costs for Executing the On-Site Work

1.3.1. Mobilization and Demobilization

1.3.1.1. Floating Equipment

It is assumed that local marine contractors will be utilized for dredging, towing material, levee repairs and the rock groin. The estimate allows three months to mobilize a contractor. The estimate also assumes that the dredges may be mobilized from the Bay Area, Los Angeles area or Seattle area.

1.3.2. Material Sources

The primary source of material used for the ROM estimate is from Franks Tract. The material for the rock groin will be obtained from local quarries and transported by barge to the site.

1.3.3. Dredging at Franks Tract

1.3.3.1. Description General Work

The scope of work involves mobilization and demobilization, repair of existing levees, construction of containment berms, dredging, towing and pumping material behind the containment berms, and construction of a rock groin.

1.3.3.1.1. Repair of Existing Levees

Once a dredge is mobilized and operational, the first item of work will be the repair of the existing levees at the north end of the 712 Acres. Repair of the levees will be performed with the dredge positioned alongside the levee and excavating material in the channel, swinging 180 degrees and depositing dredged material on the damaged levee area. No on-levee work is planned because the material will not sustain the construction equipment loads. Material will be simply deposited until a significant berm is established.

1.3.3.1.2. Dredge access and construction of berms

Following the repair of the levees, the next work activity will be to construct the containment berms. The containment berms are 28,802 lineal feet in length and will require a total of 2,651,216 cubic yards of material to construct. However, the shallow depths of the area where the berms are to be built require that an access channel be dredged to allow dredges and material barges to deliver materials

to the areas where they can be offloaded and berms can be built. Starting at the northeast containment berm dredges will excavate a channel that is 176 feet in width and a total depth of 21 feet. The width is necessary to provide width for a dredge that is 72 feet wide and a 54 foot material barge plus a twenty five foot safety barrier on each side of the channel. The 21-foot depth is necessary for a loaded material barge that drafts 16 foot when fully loaded plus a five foot safety factor. The total width of the berm is approximately 455 feet. Therefore, two access channels will be necessary the full length of the berm. The total amount of material to be dredged for access is 5,413,317 cubic yards. As the dredges excavate the channel, they will cast material on each side of the channel building a temporary stockpile of material that later will be used as berm material.

Once the access channels have been excavated all the way to the 3 acres berm at the northwest end, then dredging operations will begin with dredging and transporting material to fill the access channel and construct the containment berm. One dredge will be dredging in the area southeast of the Tract and filling 3,000 cy hopper barges. This material will then be transported by towing to the placing operation where another floating derrick will be offloading and placing material back in the access channel and simultaneously constructing the berm fill. The total material to be dredged and placed in the access channel and the berm fill will be 6,429,448 cubic yards. As the access channel is filled, the dredge will use the stockpiled material, from the access channel excavation to construct the berm. Crews will fill the access channel and build the berm as they back out. It is anticipated that this berm material will be too wet and soft to allow any type of equipment to operate on it, so the surface will be very rough. After the containment berms are constructed work will begin to fill the 712 acres and the 190 acres.

1.3.3.1.3. Dredge, tow, pump material into fill areas

Once the containment berms are complete, the work of filling the 712 acres and the 190 acres inside the containment berms will begin. The plan will be to dredge material from the southeast of Franks Tract and haul it to a float plant consisting of a crane barge equipped with pumps and water jets. The pumps will be used to offload the material and pump it into the containment. The dredging operation will be a cable arm dredge excavating material and loading 3,000 cy hopper barges. Once filled the hopper barge will be towed to the pump off barge, where pumps will offload and pump the material. Once pumping is complete and the area has settled, it may be possible to land backhoes and low ground pressure dozers on the site to move the material around and create contours as well as excavate the drainage ditches shown on the plan.

1.3.3.1.4. Construct Rock Groin

The rock groin requires 39,228 cubic yards of rock to construct a rock levee. This rock will be sourced from a local quarry, loaded on barges and transported to placement. As with the berm work of dredging access channels to get to the work site, a channel will need to be excavated to build the rock groin. This will require a channel that is 2,442 feet in length and will require 445,710 cubic yards of dredging. This quantity will need to be replaced and the rock groin placed on top of the footprint of the channel.

1.3.4. Dredging Franks Tract Material ROM Cost

ROM costs for material sourcing based on dredge material is summarized in Table 6-5.

Table 1-2: Dredge Material ROM Costs

Item	Description	Quantity	Unit	Unit Price	Amount
1000	Mobilization	1	LS	$3,971,341	$3,971,341
2000	Repair Levees	40,000	CY	$5.76	$230,400
3000	Dredge Access & Construct Berm	2,651,216	CY	$34.03	$90,220,880
4000	Dredge, Tow, Pump off Dredge Material	10,605,700	CY	$9.61	$101,920,777
5000	Furnish & Install Rock Groin	39,228	CY	$302.90	$11,882,161
	Total	10,605,700	CY	$19.63	$208,225,559

1.3.5. Dredge Material ROM Cost Assumptions

The ROM cost estimate is based on the following assumptions:

1. Operation will be continuous from start to finish with no annual shutdowns due to environmental windows.
2. Operation will work on a 24 hour per day seven days per week.
3. Dredging permits can be obtained.
4. Dredging will be allowed within Franks Tract. No dredging permits will be required.
5. No costs are included for containment of sediments as they are placed.
6. No escalation is included in the above estimate.
7. No factor has been included for material losses due to bulking, erosion or other factors.
8. No downtime for weather is included or environmental work window is included.
9. It is assumed that the dredge can get through the peat and excavate good material for pumping the fill.
10. No contingency or engineering costs are included in the above amounts.
11. No weather delays or costs are included in the above amounts.

1.3.6. Projected Schedule

The overall schedule for the above work is approximately 60 months and is summarized below:

Table 1-6: Preliminary ROM Schedule

Item	Description	Quantity	Unit
1000	Mobilization	12	WKS
2000	Repair Levees	4	WKS
3000	Dredge Access & Construct Berm	152	WKS
4000	Dredge, Tow, Pump off Dredge Material	90	WKS
5000	Furnish & Install Rock Groin	4	WKS
	Total	262	WKS

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