Criteria Pollutant and Greenhouse Gas Emissions Estimates

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Model Assumptions Used

Quantities Memo from Moffat and Nichol

MEMORANDUM

To: Mark Cleveland, Sonoma County Regional Parks

From: Brad Porter, PE

Date: October 22, 2012

Subject: Westside and Doran Parks BLF-Project Description Quantities 30% Design-Draft

M&N Job No.: 7852

In order to assist in the analysis of the environmental impacts of the project, this memo describes the estimated quantities of materials, likely construction methods and an estimate of the number of truck trips that will be generated by the project. The quantities of materials listed are those that will be placed below the elevation of high tide as well as the comparable existing material in place. These estimates are based upon the 30% Review drawings dated October 19, 2012.

Westside Park:

Item	Unit	Existing	Proposed
Concrete Ramp	Square feet	4,256	4,775
Boarding Float Dock	Square feet	1,888	1,600
Gangway	Square feet	N/A	250
Rock/Gravel	Square feet	unknown	360
Low Freeboard Dock (hand launch)	Square feet	N/A	320
Piles	each	8	7
Dredging (maintenance)	Cubic Yards		1300
Truck (Semitrailer) Trips Piles (2) Floats (3) Panels (4) Disposal (2)	Round trip		9
Truck- Dump (dredge material)	Round trip		108
Truck- Concrete	Round trip		28

Construction Means and Methods

The means and methods of construction will be determined by the construction contractor who performs the work consistent with permit conditions and best management practices. Based upon similar, recent projects the following methods are anticipated on the Westside and Doran Park BLFs:

Traffic Impacts

It is anticipated that a truck and semitrailer will be used to deliver the piles, gangway, floats and concrete panels from the San Francisco Bay Area through Petaluma to Bodega Bay. A truck and end dump trailer would be used for moving the dredge material to the Cypress day use area likely driving from Westside to Doran Park through the town of Bodega Bay for placement. Concrete will be delivered to the site for the cast in place portion of the ramp by a concrete mixer truck. The parking lot will be resealed with a slurry seal delivered from an asphalt tank truck. The appurtenance features of the project (signs, picnic benches, washdown area valves, etc.) will be delivered to the site in common delivery trucks or pickup trucks. It is not anticipated that oversize truck loads with escort will be required for this project. The construction workers will likely drive to the site each day in 3-4 vehicles.

Ramp Construction

The lower portion of the ramp (below mean low water, approximately) will likely be constructed in water by placing precast concrete planks on top of the existing concrete ramp to reuse the existing panels as a base, minimize in-water earthwork and the volume of material that would otherwise go to landfill. The portion of the ramp beyond the lower portion of the existing ramp (which has a scour hole) will have a gravel base placed using clean gravel upon which the panels will be placed. If during the construction turbidity develops silt curtains would be used to contain it. Rock slope protection will be placed at the bottom of the ramp to protect from scour and undermining of the ramp. This work would be performed with a crane located onshore and a construction crew of 4-6 workers utilizing hand power tools and a generator in addition to the crane.

As an alternative method, the contractor may use a coffer dam around the entire ramp to allow construction in the dry. There are now portable cofferdams made of tubes that are filled with water to form the water retaining dam.

The upper portion of the ramp (above low water) will be cast in place at a low tide with additives to the concrete to provide early set (hardening) that prevents wet concrete being in contact when the tide rises during the tidal cycle. This work would be performed by a similar crew but will not require a crane. The concrete would be trucked in from offsite to cast the ramp.

Pile Driving and Removal

The existing timber piles will likely be removed with a crane and cable that wraps around the pile (choker) and simply pulls it straight out. This is readily accomplished as the piles are tapered and come freely once the initial resistance is overcome and the pile broken free.

The method of installation for the new piles will depend on the pile type, which has not been finalized pending analysis and geotechnical investigation. It is anticipated that the piles will be concrete or steel between 12-18 inches in diameter. Best management practices will be used to install the piles to minimize turbidity and sound levels. If concrete is used, they would be driven with an impact hammer. Due to the smaller size and shallow water, it is not anticipated that sound levels underwater would exceed threshold limits. If the piles are steel, they would be installed with a vibratory hammer to minimize sound levels underwater. The existing piles are embedded approximately 15 feet into the bottom, it is anticipated that the new piles will be driven 15-25 feet into the bottom.

Dredging

The dredging would likely be performed using a small mechanical machine (Aqua Mog) with an environmental bucket—an excavation bucket with a smooth jaw that seals to prevent the dredged material from falling through as the bucket is being raised and therefore minimizing turbidity. The material would be loaded onto a small barge and taken to the near shore, loaded onto a truck with a sealed gate and driven to the day use site for placement in dune restoration.

Docks and Gangway

The docks will be constructed of concrete or fiberglass, are opaque and therefore block light, as the existing docks do. A portion of the footprint now used by the docks will be replaced with a gangway that will be above the water and allows greater light transmission than the floating docks. In addition, the decking of the gangway will utilize open (1/2 inch maximum opening size) grating that allows light transmission through it.

Construction Schedule

The construction schedule is estimated as follows:

In water:		
	Pile Removal and Dock Demolition	1 week
	Concrete Ramp	4 weeks
	Floating Dock Placement	1 week
	Maintenance Dredging	2 weeks
Above water:		
	Concrete Ramp,	3 weeks
	Landside improvements	5 weeks
	Total	16 weeks

Doran Park:

Item	Unit	Existing	Proposed
Concrete Ramp	Square feet	1,976	2,132
Boarding Float Dock	Square feet	456	624
Rock/Gravel	Square feet	160	160
Gangway	Square feet	N/A	250
Low Freeboard Dock (hand launch)	Square feet	N/A	320
Piles	each	4	3
Truck (Semitrailer) Trips Piles (1) Floats (1) Panels (2) Disposal (1)	Round trip		5
Truck- Concrete	Round trip		6

Construction Means and Methods

The means and methods of construction will be as described above for the Westside BLF.

Construction Schedule

The construction schedule is estimated as follows:

In water:		
	Pile Removal and Dock Demolition	1 week
	Concrete Ramp	2 weeks
	Floating Dock Placement	1 week
Above water:		
	Concrete Ramp,	2 weeks
	Landside improvements	4 weeks
	Total	10 weeks

Worker/Day/Truck-Trip Assumptions for Construction Phases

Worker/Day/Truck Assumptions for Construction Phases

Category	Workers	Equipment	Days	Truck Trips to deliver/ remove	Quantity	trip total**
Grading (SY)	2	1 grader	0.5	2	400	2.1
Excavation (CY)	5	1 grader, 1 ripper	10	128	1300	178
Rip Rap (LCY)	1	1 crawler	4.8	2	300	6.83871
Concrete (SF) Cast-in-place	4	1 small pump	25	2	500	102
Concrete Precast (SF)	5	1 mixer, 2 finishers	30	4	6132	0
Plumbing (LF)	2	none	0.1	0	5	0.2
Electrical (lamps)	2	none	0.3	0	3	0.6
Building (SF)	5	none	40	14	12,000*	214
Demolition	6	1 crawler, 2 dump trucks	10	6	10	66

* Used to estimate parking lot resurfacing emission

** Average Truck Distance 4.2 (Excavation trips were only 4 miles to deliver materials from Westside dredging to Doran restoration).

Average Worker Commute 12 miles – assuming pulling mostly from Sebastopol and west.

Calculations of Project Emissions

Model Output for Criteria Pollutants and Greenhouse Gas Emissions (Urbemis 2007)

Emission Source	Con-struction Equipment* (g/gal)	Delivery Trucks** (g/mile)	Private Cars (g/mile)	Con-struction Disturb-ance	Cement Manu-facture****	Demolition	Project Total (g)	Project Emissions	Project Emissions
PM10 EF	8.0	1.1	0.4	51 lbs /acre /day		.00042 lbs/yd3		Tonnes/ Year	Tons/ Year
PM10 from project	53423.2	746.9	3194.4	0.48	neglible	1.91	57367	0.06	0.06
CO EF	511.0	73.0	4.6		neglible				
CO from project	3412404.4	47829.6	33613.6	neglible	neglible	neglible	3493848	3.49	3.85
ROG EF	34.0	4.9	0.4	neglible	neglible	neglible			
ROG from project	227048.4	3177.7	2613.6	neglible	neglible	neglible	232840	0.23	0.26
NOx EF	157.0	22.4	1.0	neglible	neglible	neglible			
Nox from project	1048429.5	14676.5	7042.2	neglible	neglible	neglible	1070148	1.07	1.18
SOx EF	17.0	2.4	0.0	neglible	neglible	neglible			
SOx from project	113524.2	1592.1	217.8	neglible	neglible	neglible	115334	0.12	0.13
CO2 EF	22.4	0.0	0.0	neglible	neglible	neglible			
CO2 from project	149384.5	3.2	12.3	neglible	neglible	neglible	149400	0.15	0.16
CH4 EF	0.6	0.0	0.0	neglible	neglible	neglible			
CH4 from project	3873.2	3.3	72.6	neglible	neglible	neglible	3949	0.00	0.00
N2O EF	0.3	0.0	0.0	neglible	neglible	neglible			
N2O from project	1736.3	31.4	108.9	neglible	neglible	neglible	1877	0.00	0.00
CO2E from project	0.8	0.0	0.0	neglible	36.89	neglible	38	37.70	41.56