Appendix 3.E, Pile Driving Assumptions for the Proposed Action

Table 3.E-1. Physical Location of Pile Driving

Facility/ Structure	Location	Lat/long	On land (distance to water in ft) or in water	River depth (ft)[1]	River width (ft)	Width of in-river construction (ft)	Length of construc-tion along river bank (ft)	Proportion of river available for passage	Straight line distance to river bend (furthest upstream/downstream location) (ft)	Distance to concurrent pile driving sites (ft)[2]
Intake 2										
Intake 2 cofferdam	Sac River (RM 41.1)	38.40541, -121.51452	In water	-14	700	60	2,000	95%	6,500-12,000	2,000
Intake 2 foundation	Sac River (RM 41.1)	38.40541, -121.51452	In cofferdam 40-90 ft from open water	-14	700	NA	1,667	NA	6,500-12,000	2,000
Intake 3										
Intake 3 cofferdam	Sac River (RM 39.4)	38.38209, -121.51991	In water	-25	500	60	1,600	93%	1,500-4,500	1,600
Intake 3 foundation	Sac River (RM 39.4)	38.38209, -121.51991	In cofferdam 40-90 ft from open water	-25	500	NA	1,373	NA	1,500-4,500	1,600
Intake 5										
Intake 5 cofferdam	Sac River (RM 36.8)	38.35057, -121.53302	In water	-14	600	60	2,000	94%	4,500-7,500	2,000
Intake 5 foundation	Sac River (RM 36.8)	38.35057, -121.53302	In cofferdam 40-90 ft from open water	-14	600	NA	1,667	NA	4,500-7,500	2,000
Barge Landings										
Dock piles	IF barge	38.28106, -121.49816	In water	-11	265	50	300	81%	1,400-2,700	300

Facility/ Structure	Location	Lat/long	On land (distance to water in ft) or in water	River depth (ft)[1]	River width (ft)	Width of in-river construction (ft)	Length of construc-tion along river bank (ft)	Proportion of river available for passage	Straight line distance to river bend (furthest upstream/downstream location) (ft)	Distance to concurrent pile driving sites (ft)[2]
	landing									
Dock piles	Bouldin Is. barge landing	38.08762, -121.54505	In water	-11 to -18	980	50	300	95%	1,800-2,900	300
Dock piles	Venice Is. barge landing	38.06630, -121.54130	In water	-19 to -36	1,030	50	300	95%	2,000-4,700	300
Dock piles	Mandeville Is. barge landing	38.04264, -121.53177	In water	-5 to -47	760	50	300	93%	6,500-8,500	300
Dock piles	Bacon Is. barge landing	38.00392, -121.54343	In water	-8 to -28	340	50	300	85%	1,200-1,800	300
Dock piles	Victoria Is. barge landing	37.91087, -121.56185	In water	-7	433	50	300	88%	2,200-3,200	300
Dock piles	CCPP barge landing	37.85505, -121.56435	In water	-4 to -10	285	50	300	82%	705-720	300
Clifton Court Forebay										
Embankment cofferdams	CCF	37.83204, -121.57494	In water	-3	10,500 (width of CCF)	25	20,800	NA	NA	Unknown

Facility/ Structure	Location	Lat/long	On land (distance to water in ft) or in water	River depth (ft)[1]	River width (ft)	Width of in-river construction (ft)	Length of construc-tion along river bank (ft)	Proportion of river available for passage	Straight line distance to river bend (furthest upstream/downstream location) (ft)	Distance to concurrent pile driving sites (ft)[2]
Divider wall	CCF	37.83961, -121.57514	In water	-3	10,500 (width of CCF)	<5% of total surface area of CCF	9,800	NA	NA	Unknown
NCCF siphon	CCF	37.83257, -121.59218	In cofferdam 20-30 feet from open water	-17	600 (width of entrance channel)	300	150	50%	NA	300
HOR Gate										
HOR gate cofferdams	Old River 400 ft from SJR junction	37.80798, -121.32912	In water	-6	150	75	50-100	50%	700-1,500	100
HOR gate foundation	Old River 400 ft from SJR junction	37.80798, -121.32912	In cofferdam 20-30 feet from open water	-6	150	NA	30-80	NA	700-1,500	80

Notes

NA = Not applicable

[1] Depths at sites other than barge landings represent channel bottom elevation based on NAVD 88, from design drawings in Appendix 3.C. Depths at barge landings are based on NOAA charts 18661 and 18662 which show feet at mean lower low water, based on WGS84.

[2] Pile drivers may operate concurrently within this range.

Table 3.E-2. Pile Driving Details

Structure	Pile Type/Sizes	Total Piles per site	# of concurrent pile drivers per site	Piles per day	Strikes per pile (impact driving only)	Total strikes per day	Sound Attenuation Devices	Expected acoustic dampening in dB
Intake 2								
Intake 2 cofferdam	Sheet piles	2,500	4	60	210[1]	12,600	None	NA
Intake 2 foundation	42-inch steel piles	1,120	4	60	1,500	90,000	Dewatering or bubble curtains, if feasible/practicable	5 dB
Intake 3								
Intake 3 cofferdam	Sheet piles	2,500	4	60	210[1]	12,600	None	NA
Intake 3 foundation	42-inch steel piles	850	4	60	1,500	90,000	Dewatering or bubble curtains, if feasible/practicable	5 dB
Intake 5								
Intake 5 cofferdam	Sheet piles	2,500	4	60	210[1]	12,600	None	NA
Intake 5 foundation	42-inch steel piles	1,120	4	60	1,500	90,000	Dewatering or bubble curtains, if feasible/practicable	5 dB
Barge Landings								
Dock piles	24-inch steel piles	107	4	60	315[1]	18,900	None	NA
Clifton Court Forebay								
Embankment cofferdams	Sheet piles (AZ-28-700)	5,125	4	60	210[1]	12,600	None	NA
Divider wall	Sheet piles (AZ-28-700)	5,169	4	60	210[1]	12,600	None	NA
NCCF siphon	14-inch concrete or steel piles	2,160	2	30	1,050	31,500	Dewatering or bubble curtains, if feasible/practicable	5 dB

Structure	Pile Type/Sizes	Total Piles per site	# of concurrent pile drivers per site	Piles per day	Strikes per pile (impact driving only)	Total strikes per day	Sound Attenuation Devices	Expected acoustic dampening in dB
HOR Gate								
HOR gate cofferdams	Sheet piles (AZ-28-700)	550	1	15	210[1]	3,150	None	NA
HOR gate foundation	14-inch steel pipe or H-piles	100	1	15	1,050	15,750	None	NA

Notes

[1] Assumes 70% of pile can be driven using vibratory driving followed by impact driving to drive the remainder of the pile.

General: All assumptions will be refined as part of next engineering phase when site-specific geotechnical data are collected.

Table 3.E-3. Pile Driving Acoustics.

Structure (one pile driver only)	Distance to 206 dB SPL Injury Threshold (feet)	Distance to Cumulative 187 dB SEL Injury Threshold or Effective Quiet (feet)[1]	Distance to 150 dB RMS Behavioral Threshold (feet)	Number and Timing of Construction Seasons	Timing of Pile Driving	Duration of Pile Driving (days)	Preferred period within that work window[2]
Intake 2							
Intake 2 cofferdam	30	2,814	13,058	Year 8	Jun-Oct	42	Aug-Sep
Intake 2 foundation (no attenuation)	46	3,280	32,800	Year 9	Jun-Oct	19	Aug-Sep
Intake 2 foundation (with attenuation)	20	1,522	15,226	Year 9	Jun-Oct	19	Aug-Sep
Intake 3							
Intake 3 cofferdam	30	2,814	13,058	Year 7	Jun-Oct	42	Aug-Sep
Intake 3 foundation (no attenuation)	46	3,280	32,800	Year 8	Jun-Oct	14	Aug-Sep
Intake 3 foundation (with attenuation)	20	1,522	15,226	Year 8	Jun-Oct	14	Aug-Sep
Intake 5							
Intake 5 cofferdam	30	2,814	13,058	Year 5	Jun-Oct	42	Aug-Sep
Intake 5 foundation (no attenuation)	46	3,280	32,800	Year 6	Jun-Oct	19	Aug-Sep
Intake 5 foundation (with attenuation)	20	1,522	15,226	Year 6	Jun-Oct	19	Aug-Sep
Barge Landings							
Dock piles	46	1,774	9,607	1 (Year 1 or 2)	Aug-Oct	2	Aug-Sep

Structure (one pile driver only)	Distance to 206 dB SPL Injury Threshold (feet)	Distance to Cumulative 187 dB SEL Injury Threshold or Effective Quiet (feet)[1]	Distance to 150 dB RMS Behavioral Threshold (feet)	Number and Timing of Construction Seasons	Timing of Pile Driving	Duration of Pile Driving (days)	Preferred period within that work window[2]
Clifton Court Forebay							
Embankment cofferdams	30	2,814	13,058	1 (Year 5)	Jul-Nov	85	Aug-Oct
Divider wall	30	2,814	13,058	1 (Year 4)	Jul-Nov	86	Aug-Oct
NCCF siphon (no attenuation)	46	1,774	9,607	2 (Years 2 and 3)	Jul-Nov	72	Aug-Oct
NCCF siphon (with attenuation)	20	823	4,458	2 (Years 2 and 3)	Jul-Nov	72	Aug-Oct
HOR Gate							
HOR gate cofferdams	30	2,063	13,058	2 years	Aug-Nov	19	Aug-Oct
HOR gate foundation (no attenuation)	46	1,774	9,607	2 years	Aug-Nov	4	Aug-Oct
HOR gate foundation (with attenuation)	20	823	4,458	2 years	Aug-Nov	4	Aug-Oct

Notes

[1] Calculated injury distance is governed by the distance to effective quiet (150 SEL). Calculation assumes that single strike SELs <150 dB do not accumulate to cause injury. Accordingly, once the distance to the cumulative injury threshold exceeds the distance to effective quiet, increasing the number of strikes does not increase the presumed injury distance.

[2] To the extent feasible, pile driving will occur within this timeframe. In all circumstances, pile driving will be limited to the period specified in column 6.