TABLE 1
ALTERNATIVE 1
COST ESTIMATE

Item	Description	Quantity	Units	Unit Cost	Item Cost[1]	Subtotal
1.0	Mobilization and Demobilization	1	LS	$ 50,000.00	$ 50,000	$ 50,000
2.0	Marina Beach Park (Channel and Habitat Features)					
2.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
2.2	Demolition and Removal (existing tide gate and water main)	1	LS	$ 50,000.00	$ 50,000	
2.3	Dewatering	1	LS	$ 100,000.00	$ 100,000	
2.4	Channel Excavation	8,000	CY	$ 10.00	$ 80,000	
2.4.1	Haul and Dispose Excavated Material (uncontaminated)	3,900	CY	$ 10.00	$ 39,000	
2.4.2	Haul and Dispose Excavated Material (50 percent contaminated)	3,900	CY	$ 95.35	$ 371,865	
2.5	Vegetated Reinforced Soil Slope	1,000	VSF	$ 81.50	$ 81,500	
2.6	Channel and Shoreline Habitat Features	1	LS	$ 50,000.00	$ 50,000	
2.7	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 873,000
3.0	Daylight Channel Construction					
3.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
3.2	Dewatering	1	LS	$ 250,000.00	$ 250,000	
3.3	Dewatering (Contaminated GW Treatment)	1	LS	$ 50,000.00	$ 50,000	
3.4	Channel Excavation	16,900	CY	$ 7.00	$ 118,300	
3.5.1	Haul and Dispose Excavated Material (uncontaminated)	13,520	CY	$ 10.00	$ 135,200	
3.5.2	Haul and Dispose Excavated Material (50 percent contaminated)	13,520	CY	$ 95.35	$ 1,289,132	
3.6	Demolition, Protection, Modification of Stormwater Structures	1	LS	$ 250,000.00	$ 250,000	
3.7	HDPE Channel Liner for Contaminant Protection	84,600	SF	$ 2.50	$ 211,500	
3.8	Self-regulating Tide gate	1	LS	$ 400,000.00	$ 400,000	
3.9	Import Clean Liner Backfill	9,400	CY	$ 16.20	$ 152,280	
3.10	Utility Relocations	1	LS	$ 25,000.00	$ 25,000	
3.11	BNSF Railroad ROW Work					
3.11.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
3.11.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
3.11.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
3.11.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
3.11.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
3.14	Soldier Pile Wall	150	LF	$ 2,500.00	$ 375,000	
3.15	MSE Wall Facing	750	SF	$ 50.00	$ 37,500	
3.16	Daylight Channel Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 3,649,000
4.0	Marsh Improvements					
4.1	Clearing and Grubbing (remove cattails)	1.4	AC	$ 10,000.00	$ 14,000	
4.2	Channel Excavation/Dredging	970	CY	$ 50.00	$ 48,500	
4.3	Haul and Dispose Excavated Material (uncontaminated)	485	CY	$ 10.00	$ 4,850	
4.4	Haul and Dispose Excavated Material (contaminated)	485	CY	$ 95.35	$ 46,245	
4.5	Marsh Habitat Features	1	LS	$ 25,000.00	$ 25,000	
4.6	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 189,000
				Equipment, Labor, and Material Costs	$ 4,759,872	$ 4,761,000
				Escalation Adjustment (10.0%)	$ 475,987	
				Taxes (10.3%)	$ 490,267	
				Bonding & Insurance (5%)	$ 237,994	
				Contingency (25%)	$ 1,189,968	
				Construction Cost	$ 7,154,087	$ 7,155,000
				Real Estate Agreements, Easements, Real Property (TBD)	$ -	
				Engineering, Permits (15% of Construction)	$ 1,073,113	
				Construction Administration (10% of Construction)	$ 715,409	
				Project Costs	$ 8,942,609	$ 8,943,000

Notes:

[1] Costs are rounded to nearest thousand.

% = percent

AC = asphalt concrete; CY = cubic yards; EA = each; GW = groundwater; LS = lump sum; TBD= to be determined; VSF = volume scattering function

TABLE 2
ALTERNATIVE 4
COST ESTIMATE

Item	Description	Quantity	Units	Unit Cost	Item Cost[1]	Subtotal
1.0	Mobilization and Demobilization	1	LS	$ 50,000.00	$ 50,000	$ 50,000
2.0	Marina Beach Park (Channel and Habitat Features)					
2.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
2.2	Demolition and Removal (existing tide gate and water main)	1	LS	$ 50,000.00	$ 50,000	
2.3	Dewatering	1	LS	$ 100,000.00	$ 100,000	
2.4	Channel Excavation	12,200	CY	$ 10.00	$ 122,000	
2.4.1	Haul and Dispose Excavated Material (uncontaminated)	6,100	CY	$ 10.00	$ 61,000	
2.4.2	Haul and Dispose Excavated Material (50 percent contaminated)	6,100	CY	$ 95.35	$ 581,635	
2.5	Vegetated Reinforced Soil Slope	1,000	VSF	$ 81.50	$ 81,500	
2.6	Channel and Shoreline Habitat Features	1	LS	$ 50,000.00	$ 50,000	
2.7	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,147,000
3.0	Daylight Channel Construction					
3.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
3.2	Dewatering	1	LS	$ 250,000.00	$ 250,000	
3.3	Dewatering (Contaminated GW Treatment)	1	LS	$ 50,000.00	$ 50,000	
3.4	Channel Excavation	17,400	CY	$ 7.00	$ 121,800	
3.5.1	Haul and Dispose Excavated Material (uncontaminated)	8,700	CY	$ 10.00	$ 87,000	
3.5.2	Haul and Dispose Excavated Material (50 percent contaminated)	8,700	CY	$ 95.35	$ 829,545	
3.6	Demolition, Protection, Modification of Stormwater Structures	1	LS	$ 250,000.00	$ 250,000	
3.7	HDPE Channel Liner for Contaminant Protection	90,000	SF	$ 2.50	$ 225,000	
3.8	Self-regulating Tide gate	1	LS	$ 400,000.00	$ 400,000	
3.9	Import Clean Liner Backfill	10,000	CY	$ 16.20	$ 162,000	
3.10	Utility Relocations	1	LS	$ 25,000.00	$ 25,000	
3.11	BNSF Railroad ROW Work					
3.11.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
3.11.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
3.11.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
3.11.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
3.11.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
3.14	Soldier Pile Wall	150	LF	$ 2,500.00	$ 375,000	
3.15	MSE Wall Facing	750	SF	$ 50.00	$ 37,500	
3.16	Daylight Channel Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 3,168,000
4.0	Marsh Improvements					
4.1	Clearing and Grubbing (remove cattails)	1.4	AC	$ 10,000.00	$ 13,659	
4.2	Channel Excavation/Dredging	9,028	CY	$ 50.00	$ 451,400	
4.3	Haul and Dispose Excavated Material (uncontaminated)	2,853	CY	$ 10.00	$ 28,530	
4.4	Haul and Dispose Excavated Material (contaminated)	6,175	CY	$ 95.35	$ 588,786	
4.5	Marsh Habitat Features	1	LS	$ 25,000.00	$ 25,000	
4.6	Demo and Dispose of Pond Pump Station	1	LS	$ 50,000.00	$ 50,000	
4.7	Decommission wells	5	EA	$ 5,000.00	$ 25,000	
4.8	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,233,000
				Equipment, Labor, and Material Costs	$ 5,596,356	$ 5,598,000
				Escalation Adjustment (10.0%)	$ 559,636	
				Taxes (10.3%)	$ 576,425	
				Bonding & Insurance (5%)	$ 279,818	
				Contingency (25%)	$ 1,399,089	
				Construction Cost	$ 8,411,322	$ 8,412,000
				Real Estate Agreements, Easements, Real Property (TBD)	$ -	
				Engineering, Permits (15% of Construction)	$ 1,261,698	
				Construction Administration (10% of Construction)	$ 841,132	
				Project Costs	$ 10,514,153	$ 10,515,000

Notes:

[1] Costs are rounded to nearest thousand.

% = percent

AC = asphalt concrete; CY = cubic yards; EA = each; GW = groundwater; LS = lump sum; TBD= to be determined; VSF = volume scattering function

Liner and contaminated sediment depth inside existing treatment pond assumed to total 1 ft.

TABLE 3A
ALTERNATIVE 6A
DAYLIGHT WITH FLOOD BERMS
COST ESTIMATE

Item	Description	Quantity	Units	Unit Cost	Item Cost[1]	Subtotal
1.0	Mobilization and Demobilization	1	LS	$ 50,000.00	$ 50,000	$ 50,000
2.0	Marina Beach Park (Channel and Habitat Features)					
2.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
2.2	Demolition and Removal (existing tidegate and water main)	1	LS	$ 50,000.00	$ 50,000	
2.3	Dewatering	1	LS	$ 100,000.00	$ 100,000	
2.4	Channel Excavation	12,200	CY	$ 10.00	$ 122,000	
2.4.1	Haul and Dispose Excavated Material (uncontaminated)	6,100	CY	$ 10.00	$ 61,000	
2.4.2	Haul and Dispose Excavated Material (50 percent contaminated)	6,100	CY	$ 95.35	$ 582,000	
2.5	Vegetated Reinforced Soil Slope	1,000	VSF	$ 81.50	$ 82,000	
2.6	Channel and Shoreline Habitat Features	1	LS	$ 50,000.00	$ 50,000	
2.7	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,147,000
3.0	Daylight Channel Construction					
3.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
3.2	Dewatering	1	LS	$ 250,000.00	$ 250,000	
3.3	Dewatering (Contaminated GW Treatment)	1	LS	$ 50,000.00	$ 50,000	
3.4	Channel Excavation	21,100	CY	$ 7.00	$ 148,000	
3.5.1	Excavated Material (uncontaminated) for use in Parking Area Fill	10,600	CY	$ 10.00	$ 106,000	
3.5.2	Haul and Dispose Excavated Material (50 percent contaminated)	10,600	CY	$ 95.35	$ 1,011,000	
3.6	Demolition, Protection, Modification of Stormwater Structures	1	LS	$ 250,000.00	$ 250,000	
3.7	HDPE Channel Liner for Contaminant Protection	107,700	SF	$ 2.50	$ 269,000	
3.9	Import Clean Liner Backfill	10,000	CY	$ 16.20	$ 162,000	
3.10	Utility Relocations	1	LS	$ 25,000.00	$ 25,000	
3.11	BNSF Railroad ROW Work					
3.11.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
3.11.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
3.11.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
3.11.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
3.11.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
3.14	Soldier Pile Wall	150	LF	$ 2,500.00	$ 375,000	
3.15	MSE Wall Facing	750	SF	$ 50.00	$ 38,000	
3.2	Side Slope Revegetation Topsoil Type B	2,500	CY	$ 5.00	$ 12,500	
3.2	Side Slope Revegetation Seeding and Mulching	2	AC	$ 3,600.00	$ 5,616	
3.2	Bench Plug Planting (Sedges, Hairgrass, Blurus)	20,000	EA	$ 2.00	$ 40,000	
3.2	Large Woody Debris	200	EA	$ 1,000.00	$ 200,000	$ 3,248,000
4.0	Marsh Improvements					
4.1	Clearing and Grubbing (remove cattails)	1.4	AC	$ 10,000.00	$ 14,000	
4.2	Channel Excavation/Dredging	9,028	CY	$ 50.00	$ 451,000	
4.3	Haul and Dispose Excavated Material (uncontaminated)	2,853	CY	$ 10.00	$ 29,000	
4.4	Haul and Dispose Excavated Material (contaminated)	6,175	CY	$ 95.35	$ 589,000	
4.5	Marsh Habitat Features	1	LS	$ 25,000.00	$ 25,000	
4.6	Demo and Dispose of Pond Pump Station	1	LS	$ 50,000.00	$ 50,000	
4.7	Decomission wells	5	EA	$ 5,000.00	$ 25,000	
4.8	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,233,000
5.0	Railroad Levee and Sheet Pile Floodwall					
5.1	BNSF Railroad ROW Work					
5.1.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
5.1.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
5.1.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
5.1.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
5.1.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
5.2	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
5.3	Levee Select Fill	9,500	CY	$ 25.00	$ 237,500	
5.4	Embankment Compaction	9,500	CY	$ 2.50	$ 23,750.00	
5.5	Side Slope Revegetation Seeding and Mulching	1	AC	$ 3,600.00	$ 3,600.00	
5.6	Side Slope Revegetation Topsoil Type B	1,600.0	CY	$ 5.00	$ 8,000	
5.7	Gravel Borrow incl Haul (9" thickness)	900	TON	$ 14.00	$ 12,600	
5.8	Wetland Mitigation from Levee Fill	1	AC	$ 750,000.00	$ 747,245	$ 1,338,000
6.0	Harbor Square / SR-104 Levee					

TABLE 3A
ALTERNATIVE 6A
DAYLIGHT WITH FLOOD BERMS
COST ESTIMATE

6.1 Temporary Erosion Control and Sediment Control	1.0	LS	$	5,000.00	$	5,000		
6.2 Levee Select Fill	100	CY	$	13.83	$	1,383		
6.3 Embankment Compaction	100	CY	$	2.50	$	250		
6.4 Side Slope Revegetation Seeding and Mulching	0	AC	$	3,600.00	$	36		
6.5 Side Slope Revegetation Topsoil Type B	30	CY	$	5.00	$	150		
6.6 Signage Setup/Tear Down/Maintenance	1	LS	$	10,000.00	$	10,000		
6.7 Flagging - 2-person crew	20	DAY	$	576.00	$	11,520		
6.8 Gravel Borrow incl Haul (9" thickness)	30	TON	$	14.00	$	420	$	29,000
7.0 SR-104 Stellas/Marsh Flood Protection Barrier								
7.1 Sheet Pile Wall - Furnishing and Driving Steel Pile	550.0	LF	$	115.00	$	63,250		
7.3 Sheet Pile Wall - Concrete Cap Installed	41	CY	$	120.00	$	4,920		
7.4 Signage Setup/Tear Down/Maintenance	1	LS	$	2,000.00	$	2,000		
7.5 Flagging - 2-person crew	5	DAY	$	576.00	$	2,880	$	74,000
8.0 Miscellaneous								
8.1 Parking Area Fill (Salvaged from Daylight Channel and Wetland Berm)	10,800.0	CY	$	10.00	$	108,000	$	108,000
				Equipment, Labor, and Material Costs	$	7,224,620	$	7,227,000
				Escalation Adjustement (10.0%)	$	722,462		
				Taxes (10.3%)	$	744,136		
				Bonding & Insurance (5%)	$	361,231		
				Contingency (25%)	$	1,806,155		
				Construction Cost	$	10,858,604	$	10,859,000
				Real Estate Agreements, Easements, Real Property (TBD)	$	-		
				Engineering, Permits (15% of Construction)	$	1,628,791		
				Construction Administration (10% of Construction)	$	1,085,860		
				Project Costs	$	13,573,255	$	13,574,000

Notes:

[1] Costs are rounded to nearest thousand.

% = percent

AC = asphalt concrete; CY = cubic yards; EA = each; GW = groundwater; LS = lump sum; TBD= to be determined; VSF = volume scattering function

Liner and contaminated sediment depth inside existing treatment pond assumed to total 1 ft.

TABLE 3B
ALTERNATIVE 6B
DAYLIGHT WITH FLOODWALL
COST ESTIMATE

Item	Description	Quantity	Units	Unit Cost	Item Cost[1]	Subtotal
1.0	Mobilization and Demobilization	1	LS	$ 50,000.00	$ 50,000	$ 50,000
2.0	Marina Beach Park (Channel and Habitat Features)					
2.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
2.2	Demolition and Removal (existing tidegate and water main)	1	LS	$ 50,000.00	$ 50,000	
2.3	Dewatering	1	LS	$ 100,000.00	$ 100,000	
2.4	Channel Excavation	12,200	CY	$ 10.00	$ 122,000	
2.4.1	Haul and Dispose Excavated Material (uncontaminated)	6,100	CY	$ 10.00	$ 61,000	
2.4.2	Haul and Dispose Excavated Material (50 percent contaminated)	6,100	CY	$ 95.35	$ 581,635	
2.5	Vegetated Reinforced Soil Slope	1,000	VSF	$ 81.50	$ 81,500	
2.6	Channel and Shoreline Habitat Features	1	LS	$ 50,000.00	$ 50,000	
2.7	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,147,000
3.0	Daylight Channel Construction					
3.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
3.2	Dewatering	1	LS	$ 250,000.00	$ 250,000	
3.3	Dewatering (Contaminated GW Treatment)	1	LS	$ 50,000.00	$ 50,000	
3.4	Channel Excavation	21,100	CY	$ 7.00	$ 147,700	
3.5.1	Excavated Material (uncontaminated) for use in Parking Area Fill	10,600	CY	$ -	$ -	
3.5.2	Haul and Dispose Excavated Material (50 percent contaminated)	10,600	CY	$ 95.35	$ 1,010,710	
3.6	Demolition, Protection, Modification of Stormwater Structures	1	LS	$ 250,000.00	$ 250,000	
3.7	HDPE Channel Liner for Contaminant Protection	107,700	SF	$ 2.50	$ 269,250	
3.8	Self-regulating Tidegate	1	LS	$ 400,000.00	$ 400,000	
3.9	Import Clean Liner Backfill	10,000	CY	$ 16.20	$ 162,000	
3.10	Utility Relocations	1	LS	$ 25,000.00	$ 25,000	
3.11	BNSF Railroad ROW Work					
3.11.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
3.11.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
3.11.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
3.11.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
3.11.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
3.14	Soldier Pile Wall	150	LF	$ 2,500.00	$ 375,000	
3.15	MSE Wall Facing	750	SF	$ 50.00	$ 37,500	
3.2	Side Slope Revegetation Topsoil Type B	2,500	CY	$ 5.00	$ 12,500	
3.2	Side Slope Revegetation Seeding and Mulching	2	AC	$ 3,600.00	$ 5,616	
3.2	Bench Plug Planting (Sedges, Hairgrass, Blurus)	20,000	EA	$ 2.00	$ 40,000	
3.2	Large Woody Debris	200	EA	$ 1,000.00	$ 200,000	$ 3,541,000
4.0	Marsh Improvements					
4.1	Clearing and Grubbing (remove cattails)	1	AC	$ 10,000.00	$ 13,659	
4.2	Channel Excavation/Dredging	9,028	CY	$ 50.00	$ 451,400	
4.3	Haul and Dispose Excavated Material (uncontaminated)	2,853	CY	$ 10.00	$ 28,530	
4.4	Haul and Dispose Excavated Material (contaminated)	6,175	CY	$ 95.35	$ 588,786	
4.5	Marsh Habitat Features	1	LS	$ 25,000.00	$ 25,000	
4.6	Demo and Dispose of Pond Pump Station	1	LS	$ 50,000.00	$ 50,000	
4.7	Decomission wells	5	EA	$ 5,000.00	$ 25,000	
4.8	Revegetation	1	LS	$ 50,000.00	$ 50,000.00	$ 1,233,000
5.0	Railroad Levee and Sheet Pile Floodwall					
5.1	BNSF Railroad ROW Work					
5.1.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
5.1.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
5.1.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
5.2	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
5.3	Backfill Soil	9,500	CY	$ 13.83	$ 131,385	
5.5	Side Slope Revegetation Seeding and Mulching	1	AC	$ 3,600.00	$ 3,600	
5.6	Side Slope Revegetation Topsoil Type B	1,600	CY	$ 5.00	$ 8,000.00	
5.9	Sheet Pile Wall - Furnishing and Driving Steel Pile	43,400	SF	$ 50.00	$ 2,170,000.00	
6.0	Sheet Pile Wall - Concrete Cap Installed	161.0	CY	$ 120.00	$ 19,320	$ 2,593,000
6.0	Harbor Square / SR-104 Flood Wall					
6.1	Temporary Erosion Control and Sediment Control	1	LS	$ 5,000.00	$ 5,000	
6.2	Sheet Pile Wall - Furnishing and Driving Steel Pile	700	SF	$ 50.00	$ 35,000	

TABLE 3B
ALTERNATIVE 6B
DAYLIGHT WITH FLOODWALL
COST ESTIMATE

6.6 Signage Setup/Tear Down/Maintenance	1.0	LS	$	2,000.00	$	2,000		
6.7 Flagging - 2-person crew	5	DAY	$	576.00	$	2,880		
6.8 Sheet Pile Wall - Concrete Cap Installed	6	CY	$	120.00	$	720	$	46,000
7.0 SR-104 Stellas/Marsh Flood Protection Barrier								
7.1 Sheet Pile Wall - Furnishing and Driving Steel Pile	2,750	SF	$	50.00	$	137,500		
7.3 Sheet Pile Wall - Concrete Cap Installed	41	CY	$	120.00	$	4,920		
7.4 Signage Setup/Tear Down/Maintenance	1	LS	$	2,000.00	$	2,000		
7.5 Flagging - 2-person crew	5	DAY	$	576.00	$	2,880.00	$	148,000
8.0 Miscellaneous								
8.1 Parking Area Fill (Salvaged from Daylight Channel and Wetland Berm)	10,800	CY	$	10.00	$	108,000	$	108,000
Equipment, Labor, and Material Costs					$	8,861,992	$	8,866,000
Escalation Adjustement (10.0%)					$	886,199		
Taxes (10.3%)					$	912,785		
Bonding & Insurance (5%)					$	443,100		
Contingency (25%)					$	2,215,498		
				Construction Cost	$	13,319,573	$	13,320,000
				Real Estate Agreements, Easements, Real Property (TBD)	$	-		
				Engineering, Permits (15% of Construction)	$	1,997,936		
				Construction Administration (10% of Construction)	$	1,331,957		
				Project Costs	$	16,649,467	$	16,650,000

Notes:

[1] Costs are rounded to nearest thousand.

% = percent

AC = asphalt concrete; CY = cubic yards; EA = each; GW = groundwater; LS = lump sum; TBD= to be determined; VSF = volume scattering function

Liner and contaminated sediment depth inside existing treatment pond assumed to total 1 ft.

TABLE 4
ALTERNATIVE 7
DAYLIGHT WITH TIDEGATE FLOOD BERMS AT SR-104
COST ESTIMATE

Item	Description	Quantity	Units	Unit Cost	Item Cost[1]	Subtotal
1.0	Mobilization and Demobilization	1	LS	$ 50,000.00	$ 50,000	$ 50,000
2.0	Marina Beach Park (Channel and Habitat Features)					
2.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
2.2	Demolition and Removal (existing tidegate and water main)	1	LS	$ 50,000.00	$ 50,000	
2.3	Dewatering	1	LS	$ 100,000.00	$ 100,000	
2.4	Channel Excavation	12,200	CY	$ 10.00	$ 122,000	
2.4.1	Haul and Dispose Excavated Material (uncontaminated)	6,100	CY	$ 10.00	$ 61,000	
2.4.2	Haul and Dispose Excavated Material (50 percent contaminated)	6,100	CY	$ 95.35	$ 582,000	
2.5	Vegetated Reinforced Soil Slope	1,000	VSF	$ 81.50	$ 82,000	
2.6	Channel and Shoreline Habitat Features	1	LS	$ 50,000.00	$ 50,000	
2.7	Revegetation	1	LS	$ 50,000.00	$ 50,000	$ 1,147,000
3.0	Daylight Channel Construction					
3.1	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
3.2	Dewatering	1	LS	$ 250,000.00	$ 250,000	
3.3	Dewatering (Contaminated GW Treatment)	1	LS	$ 50,000.00	$ 50,000	
3.4	Channel Excavation	19,900	CY	$ 7.00	$ 139,000	
3.5.1	Excavated Material (uncontaminated) for use in Parking Area & UNOCAL Fill	9,300	CY	$ -	$ -	
3.5.2	Haul and Dispose Excavated Material (50 percent contaminated)	10,600	CY	$ 95.35	$ 1,011,000	
3.6	Demolition, Protection, Modification of Stormwater Structures	1	LS	$ 250,000.00	$ 250,000	
3.7	HDPE Channel Liner for Contaminant Protection	107,700	SF	$ 2.50	$ 269,000	
3.8	Self-regulating Tidegate	1	LS	$ 400,000.00	$ 400,000	
3.9	Import Clean Liner Backfill	10,000	CY	$ 16.20	$ 162,000	
3.10	Utility Relocations	1	LS	$ 25,000.00	$ 25,000	
3.11	BNSF Railroad ROW Work					
3.11.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
3.11.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
3.11.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
3.11.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
3.11.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
3.14	Soldier Pile Wall	150	LF	$ 2,500.00	$ 375,000	
3.15	MSE Wall Facing	750	SF	$ 50.00	$ 38,000	
3.2	Side Slope Revegetation Topsoil Type B	2,600	CY	$ 5.00	$ 13,000	
3.2	Side Slope Revegetation Seeding and Mulching	2	AC	$ 3,600.00	$ 5,868	
3.2	Bench Plug Planting (Sedges, Hairgrass, Blurus)	20,000	EA	$ 2.00	$ 40,000	
3.2	Large Woody Debris	200	EA	$ 1,000.00	$ 200,000	$ 3,533,000
4.0	Marsh Improvements					
4.1	Clearing and Grubbing (remove cattails)	1	AC	$ 10,000.00	$ 14,000	
4.2	Channel Excavation/Dredging	9,028	CY	$ 50.00	$ 451,000	
4.3	Haul and Dispose Excavated Material (uncontaminated)	2,853	CY	$ 10.00	$ 29,000	
4.4	Haul and Dispose Excavated Material (contaminated)	6,175	CY	$ 95.35	$ 589,000	
4.5	Marsh Habitat Features	1	LS	$ 25,000.00	$ 25,000	
4.6	Demo and Dispose of Pond Pump Station	1	LS	$ 50,000.00	$ 50,000	
4.7	Decomission wells	5	EA	$ 5,000.00	$ 25,000	
4.8	Revegetation	1	LS	$ 50,000.00	$ 50,000.00	$ 1,233,000
5.0	Tide Gate and Flood Wall					
5.1	BNSF Railroad ROW Work					
5.1.1	BNSF Permits and Construction Maintenance Agreement	1	LS	$ 50,000.00	$ 50,000	
5.1.2	BNSF Railroad Crossing Special Insurance	1	LS	$ 100,000.00	$ 100,000	
5.1.3	BNSF Railroad Flagger	30	EA	$ 2,000.00	$ 60,000	
5.1.4	Erosion Protection Rock Bedding Material	250	CY	$ 60.00	$ 15,000	
5.1.5	Erosion Protection Rock (12-inch Riprap)	500	CY	$ 60.00	$ 30,000	
5.2	Temporary Erosion and Sediment Control	1	LS	$ 50,000.00	$ 50,000	
5.3	Tide Gates	2	LS	$ 100,000.00	$ 200,000.00	
5.4	Tide Gate Walkway	1	LS	$ 50,000.00	$ 50,000.00	
5.5	Sheet Pile Wall - Furnishing and Driving Steel Pile	120	LF	$ 115.00	$ 13,800.00	
5.6	Sheet Pile Wall - Concrete Cap Installed	240	CY	$ 120.00	$ 28,800	
5.7	Tide Gate Headwall	1	LS	$ 100,000.00	$ 100,000.00	$ 698,000
8.0	Miscellaneous					
8.1	UNOCAL Area Fill (Salvaged from Daylight Channel)	150.0	CY	$ 10.00	$ 1,500	
8.2	Parking Area Fill (Salvaged from Daylight Channel)	9,100	CY	$ 10.00	$ 91,000.00	$ 93,000

TABLE 4
ALTERNATIVE 7
DAYLIGHT WITH TIDEGATE FLOOD BERMS AT SR-104
COST ESTIMATE

Equipment, Labor, and Material Costs	$	6,753,000	$	6,754,000
Escalation Adjustement (10.0%)	$	675,300		
Taxes (10.3%)	$	695,559		
Bonding & Insurance (5%)	$	337,650		
Contingency (25%)	$	1,688,250		
Construction Cost	$	10,149,759.00	$	10,150,000
Real Estate Agreements, Easements, Real Property (TBD)	$	-		
Engineering, Permits (15% of Construction)	$	1,522,464		
Construction Administration (10% of Construction)	$	1,014,976		
Project Costs	$	12,687,199	$	12,688,000

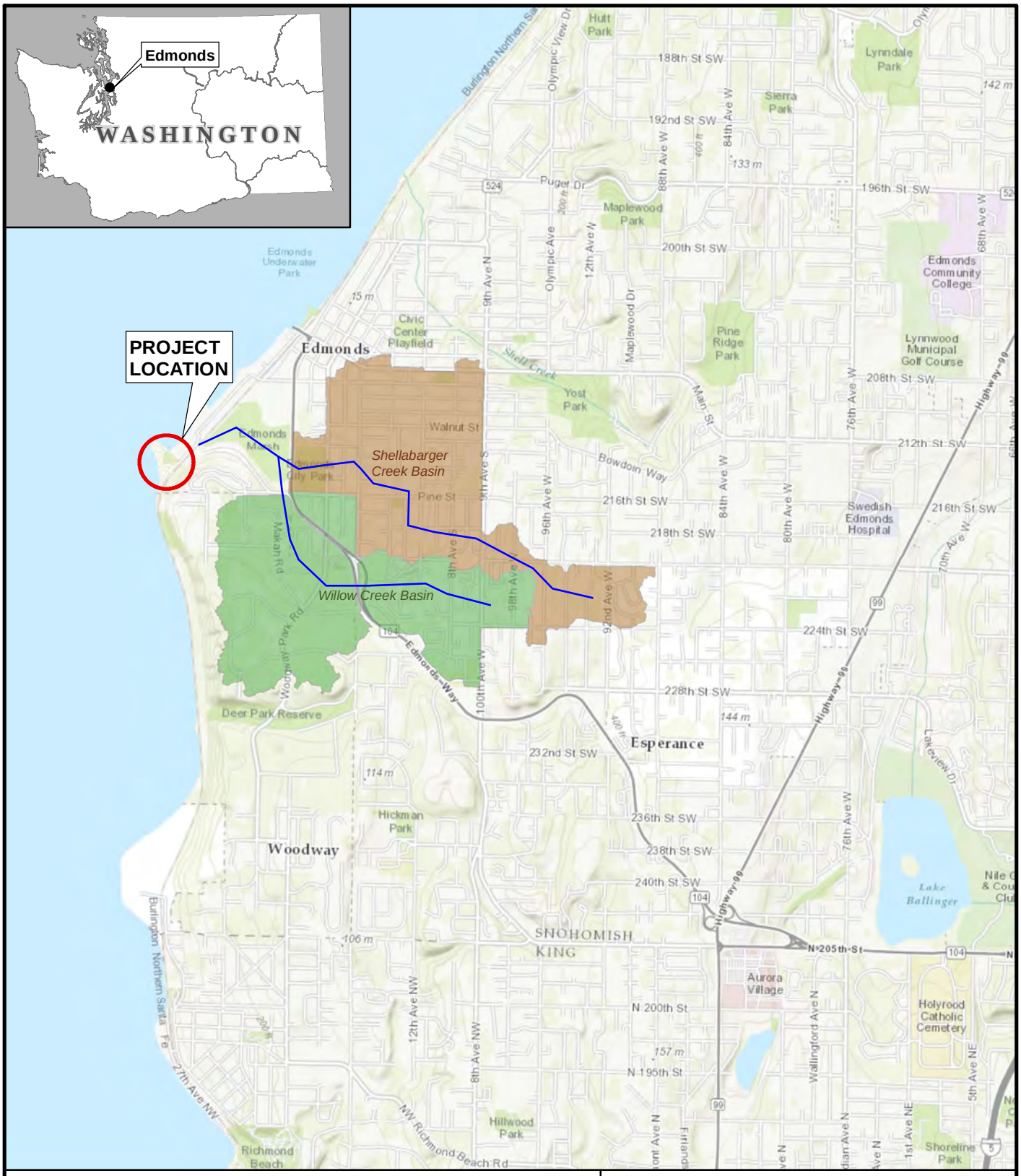
Notes:

[1] Costs are rounded to nearest thousand.

% = percent

AC = asphalt concrete; CY = cubic yards; EA = each; GW = groundwater; LS = lump sum; TBD= to be determined; VSF = volume scattering function

Liner and contaminated sediment depth inside existing treatment pond assumed to total 1 ft.



0 ½ 1

Scale in Miles

N W E S

Willow Creek Daylight Project
Expanded Marsh Concept Design and Hydraulic Modeling
Edmonds, Washington

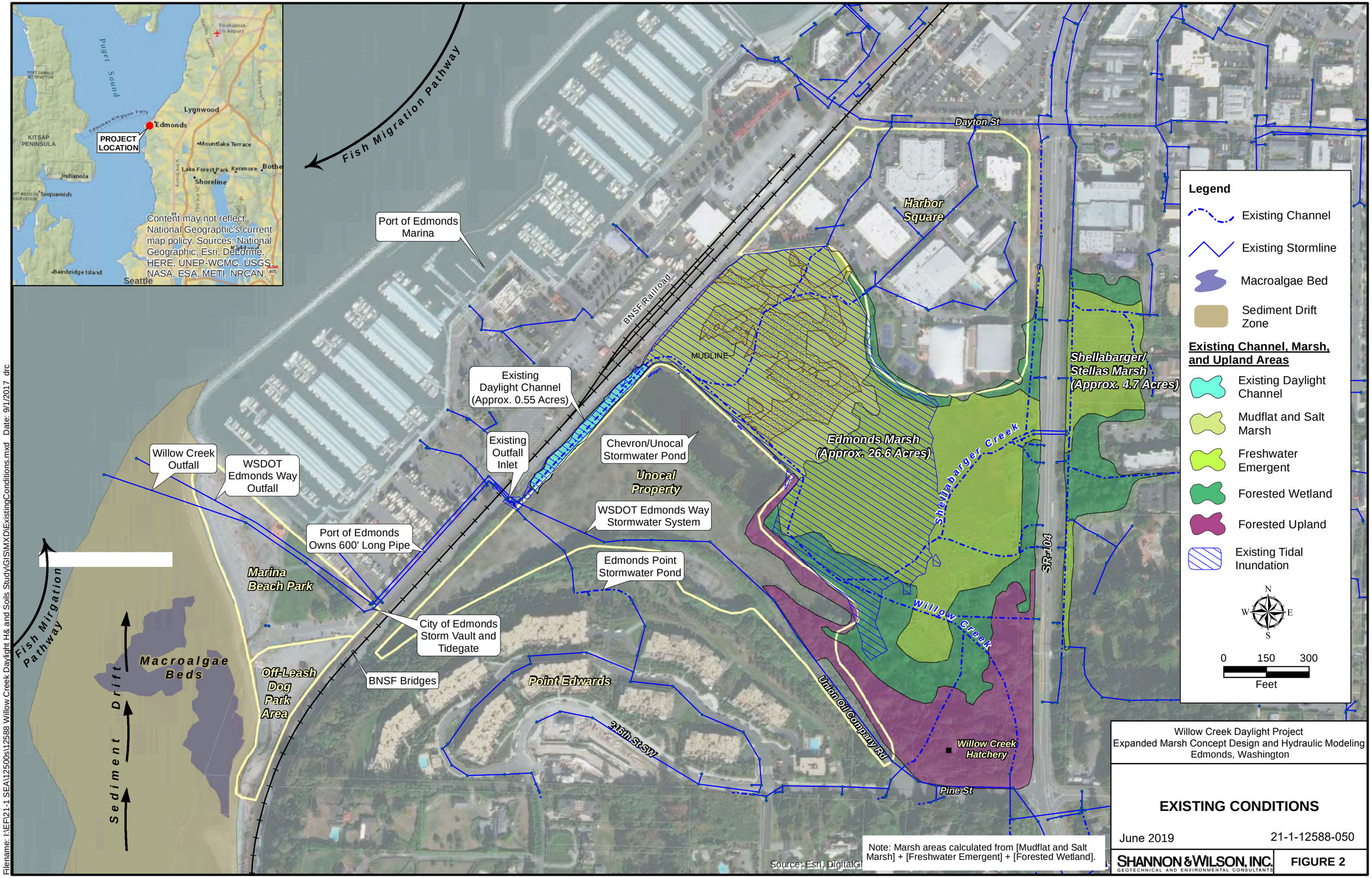
VICINITY MAP

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: I:\WIP\21-1\12393 Willow Creek Daylight\406. GEOTECH\Report\Figures\old\VicinityMap.mxd Date: 9/28/2015 beo



Willow Creek Daylight Project
Expanded Marsh Concept Design and Hydraulic Modeling
Edmonds, Washington

EXISTING CONDITIONS

June 2019

21-1-12588-050

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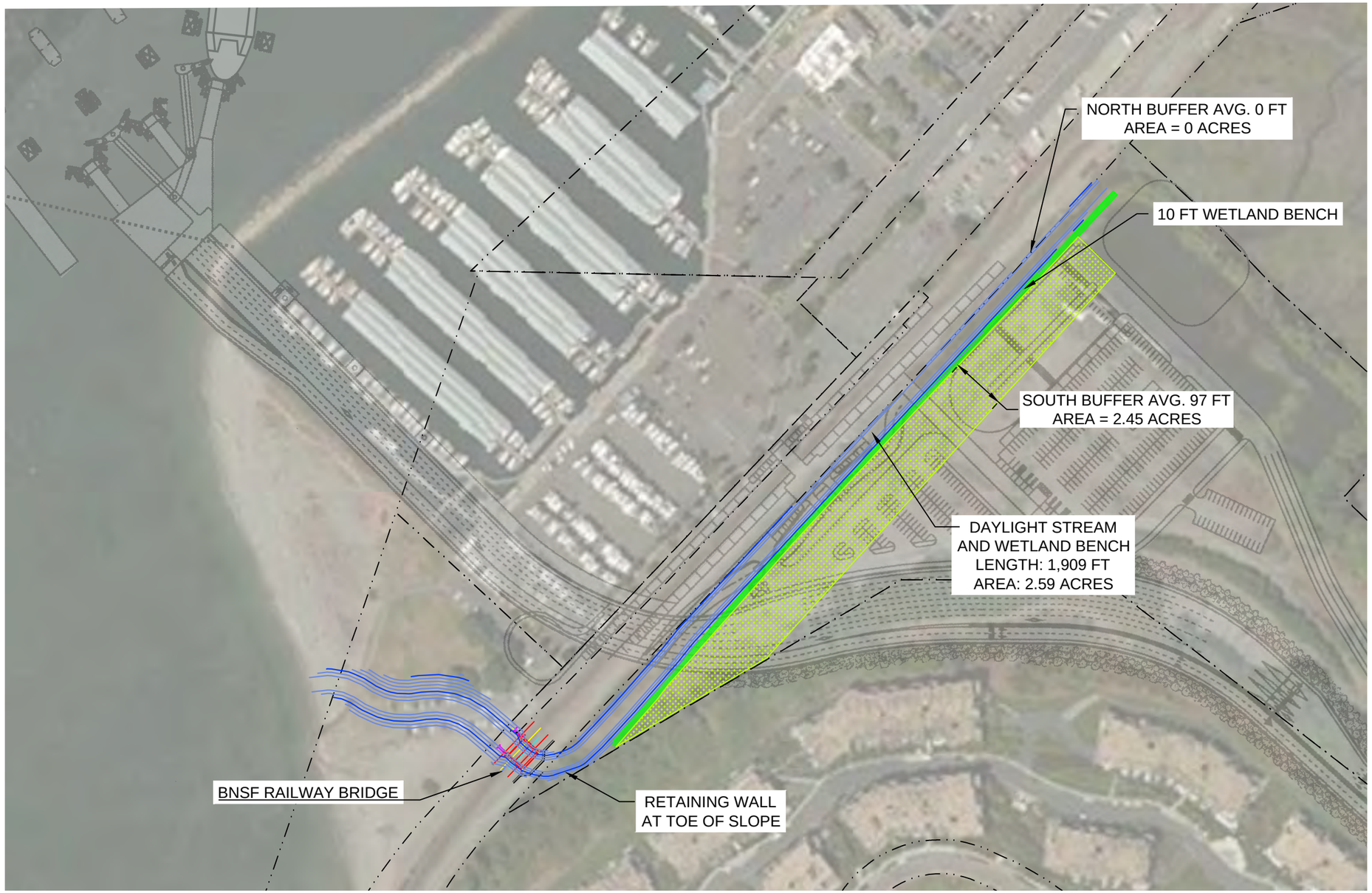
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIGURE 2

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\GIS\MXD\ExistingConditions.mxd Date: 9/1/2017 drc



N

LEGEND

- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

WSDOT Ferry preferred alternative location is approximate.

0 200 400

Scale in Feet
Contour Interval = 1 Foot

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

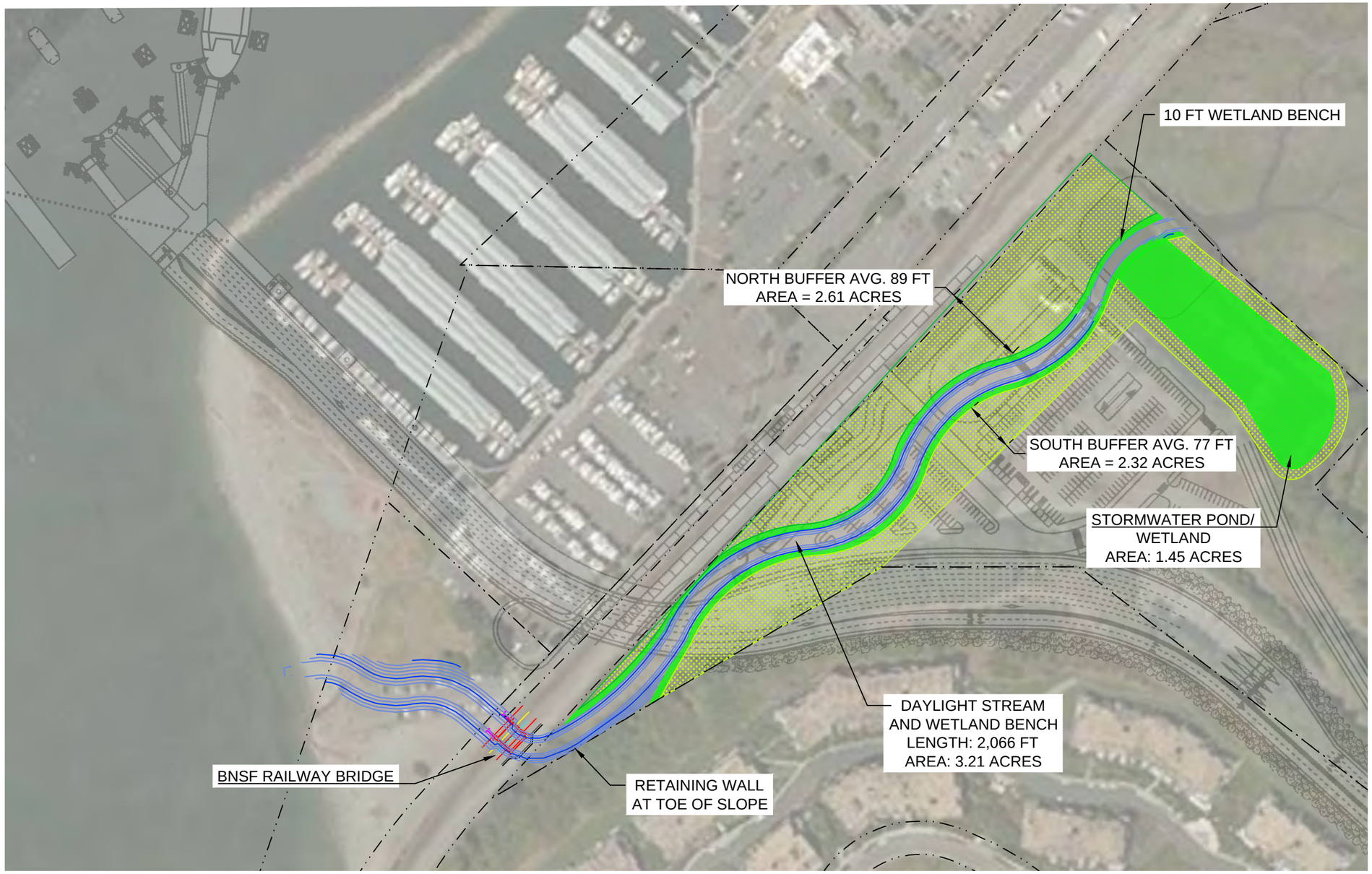
ALTERNATIVE 1
ALIGNMENT AND BUFFERS

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

Filename: \\SEA-FS1\Vol1\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\211-12588 Buffer Options - 2018.dwg Date: 03-08-2019 Login: CCB



N

LEGEND

- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

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0 200 400

Scale in Feet
Contour Interval = 1 Foot

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

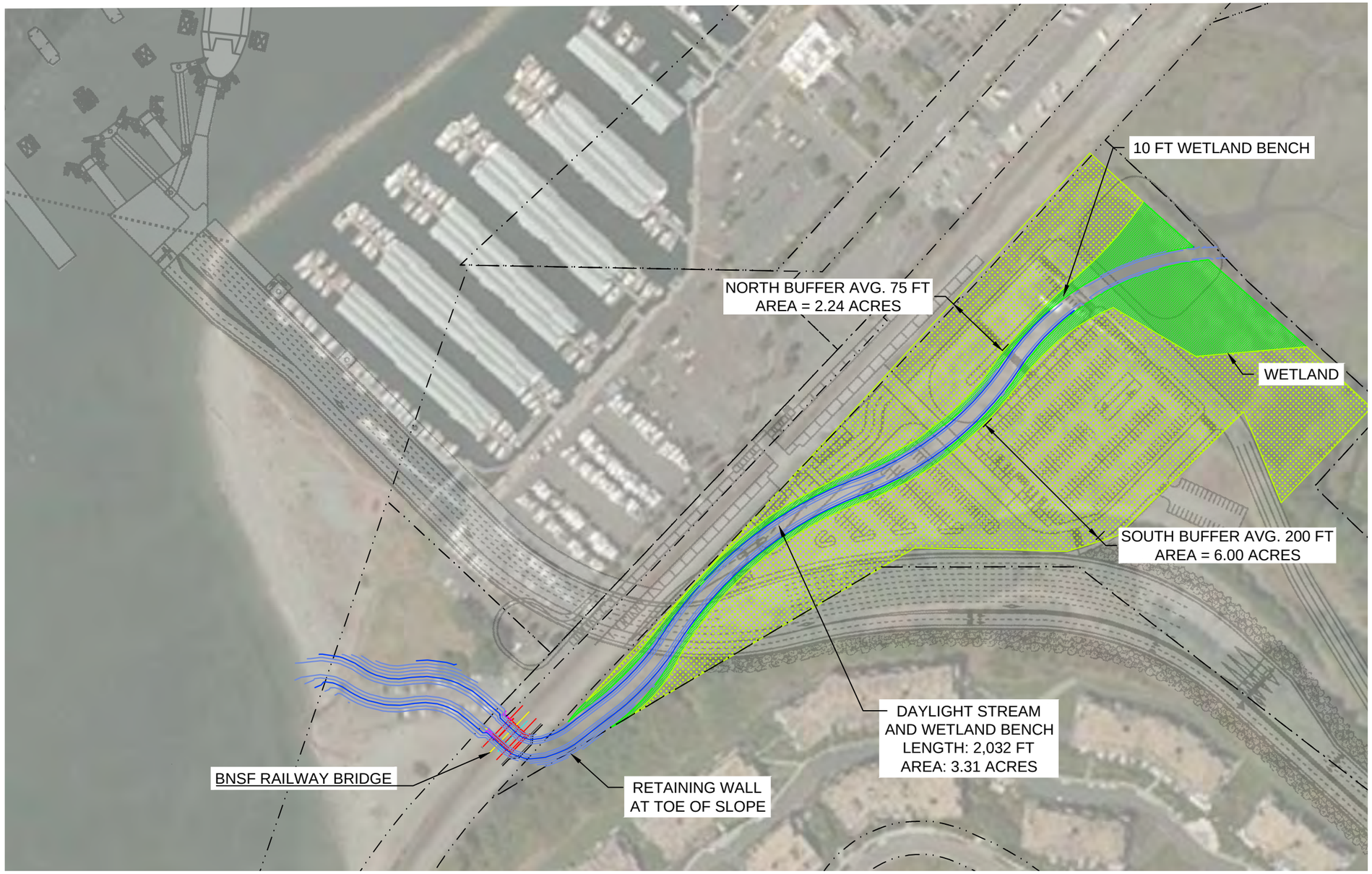
ALTERNATIVE 2
ALIGNMENT AND BUFFERS

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 4

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\211-12588 Buffer Options - 2018.dwg Date: 03-09-2019 Login: CCB



N

LEGEND

- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

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WSDOT Ferry preferred alternative location is approximate.

0 200 400

Scale in Feet
Contour Interval = 1 Foot

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

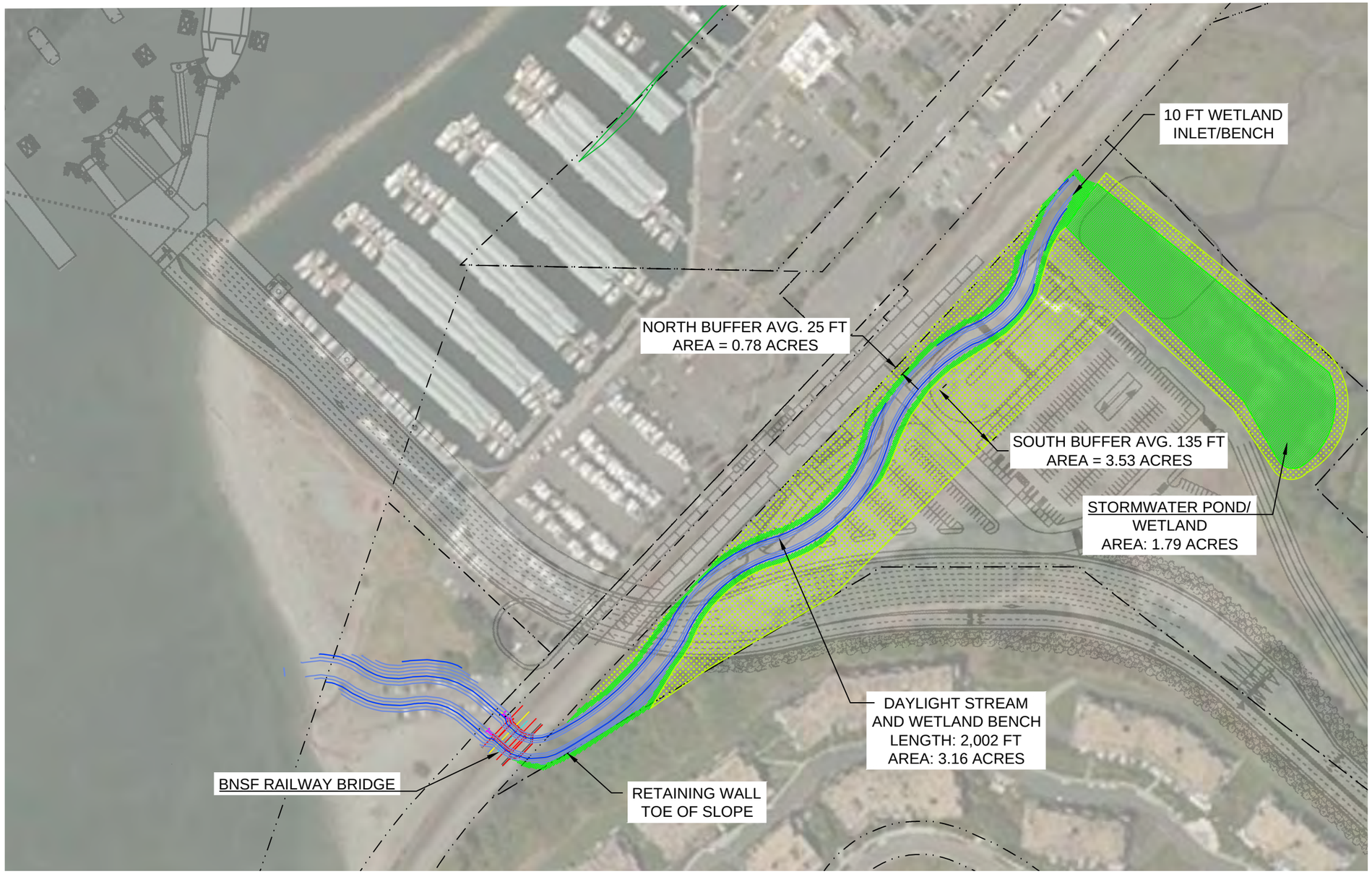
ALTERNATIVE 3
ALIGNMENT AND BUFFERS

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 5

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\211-12588 Buffer Options - 2018.dwg Date: 03-09-2019 Login: CCB



N

LEGEND

- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

WSDOT Ferry preferred alternative location is approximate.

0 200 400

Scale in Feet
Contour Interval = 1 Foot

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

ALTERNATIVE 4
ALIGNMENT AND BUFFERS

June 2019 21-1-12588-050

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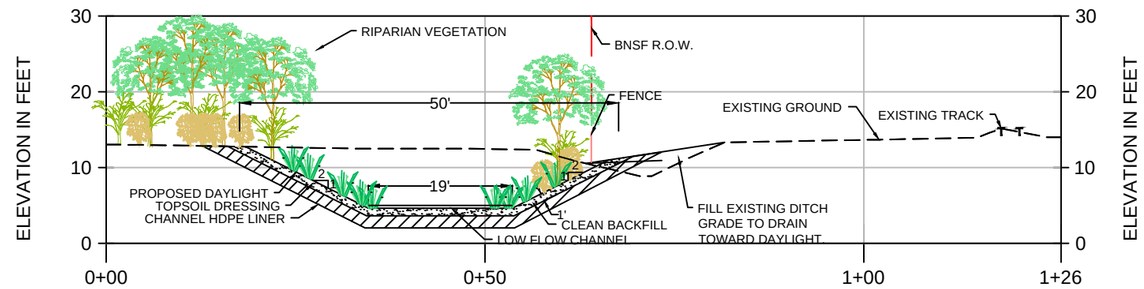
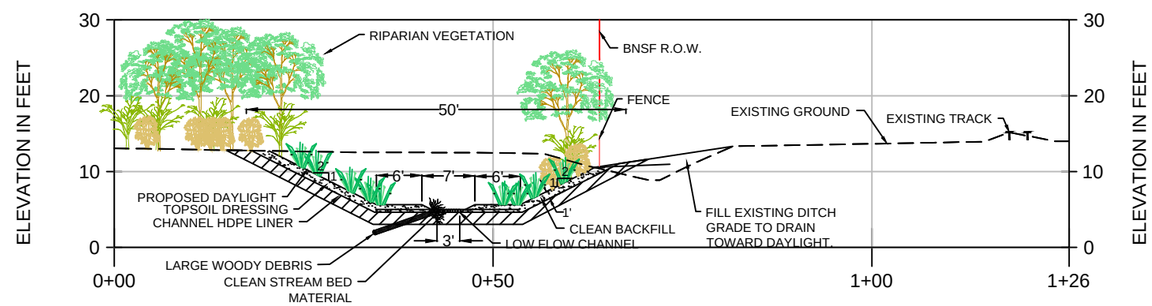
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 6

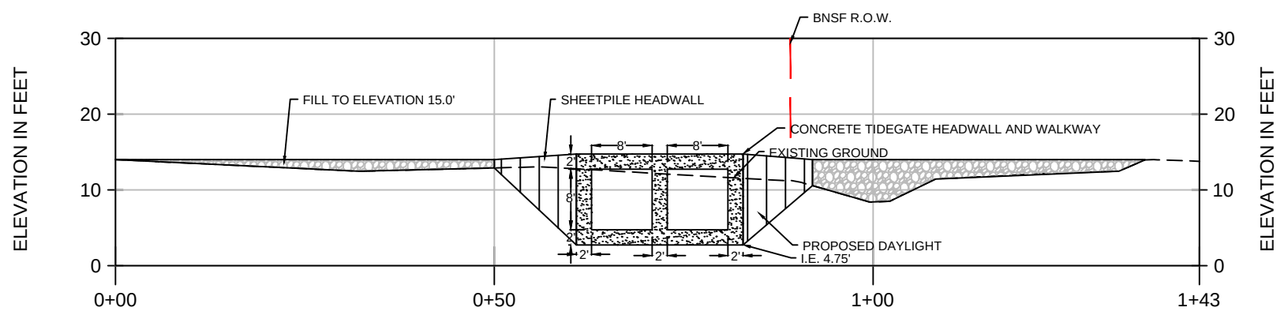
Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\211-12588 Buffer Options - 2018.dwg Date: 03-09-2019 Login: CCB



TYPICAL DAYLIGHT CHANNEL SECTION - WITHOUT HABITAT BENCHES



TYPICAL DAYLIGHT CHANNEL SECTION - WITH HABITAT
BENCHES AND LARGE WOODY DERIS



TIDEGATE SECTION - (2) 8 'X 8' TIDEGATES

0 20 40

Scale in Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

TYPICAL SECTIONS

June 2019 21-1-12588-050

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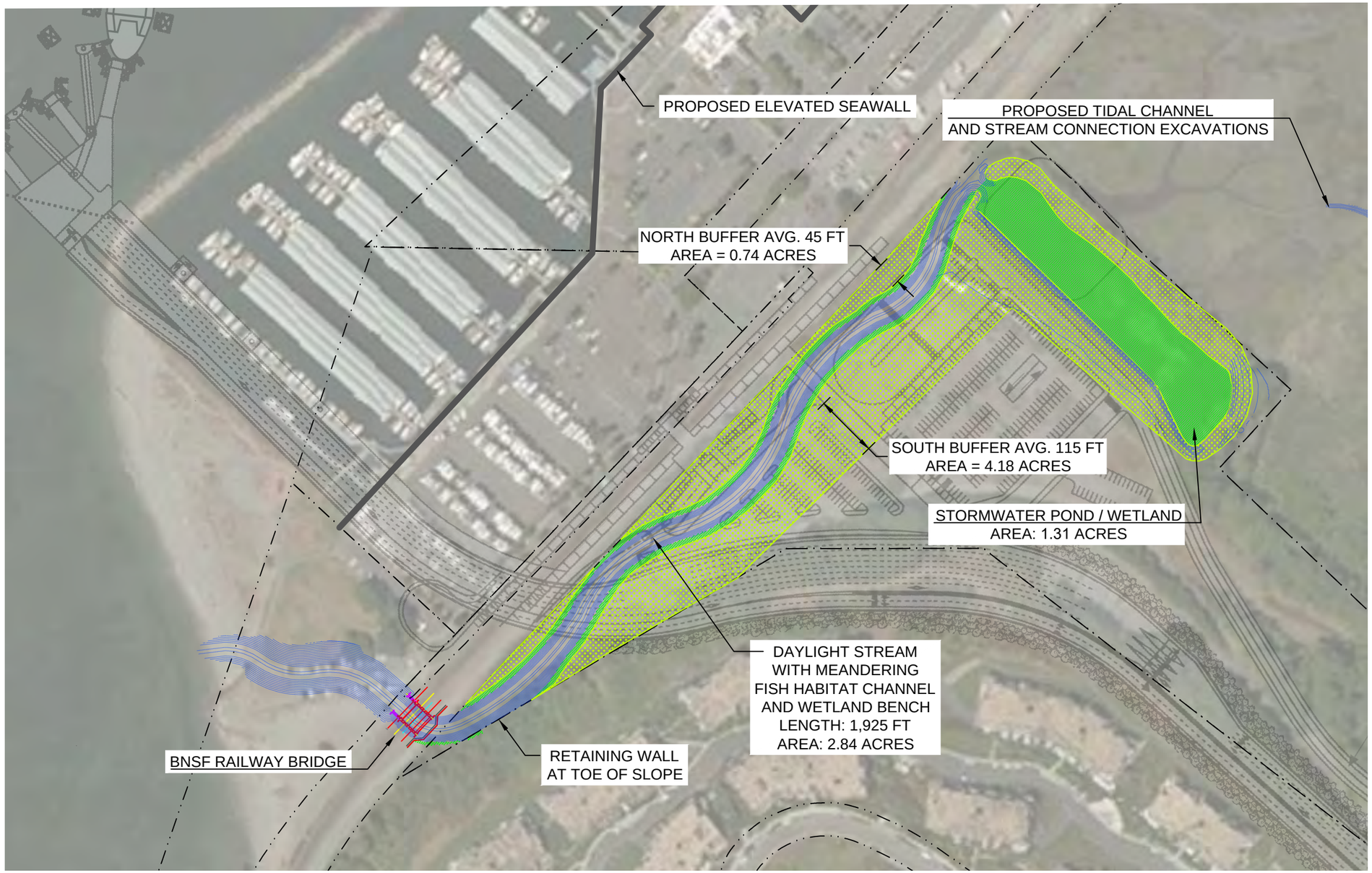
FIG. 7

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\21-1-12588-050_Fig 1_Typical Sections_09MAR2019.dwg Date: 03-09-2019 Login: CCB



N

LEGEND

- PROPOSED FLOOD PROTECTION STRUCTURE
- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

WSDOT Ferry preferred alternative location is approximate.

0 200 400

Scale in Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

ALTERNATIVE 5 ALIGNMENT

June 2019 21-1-12588-050

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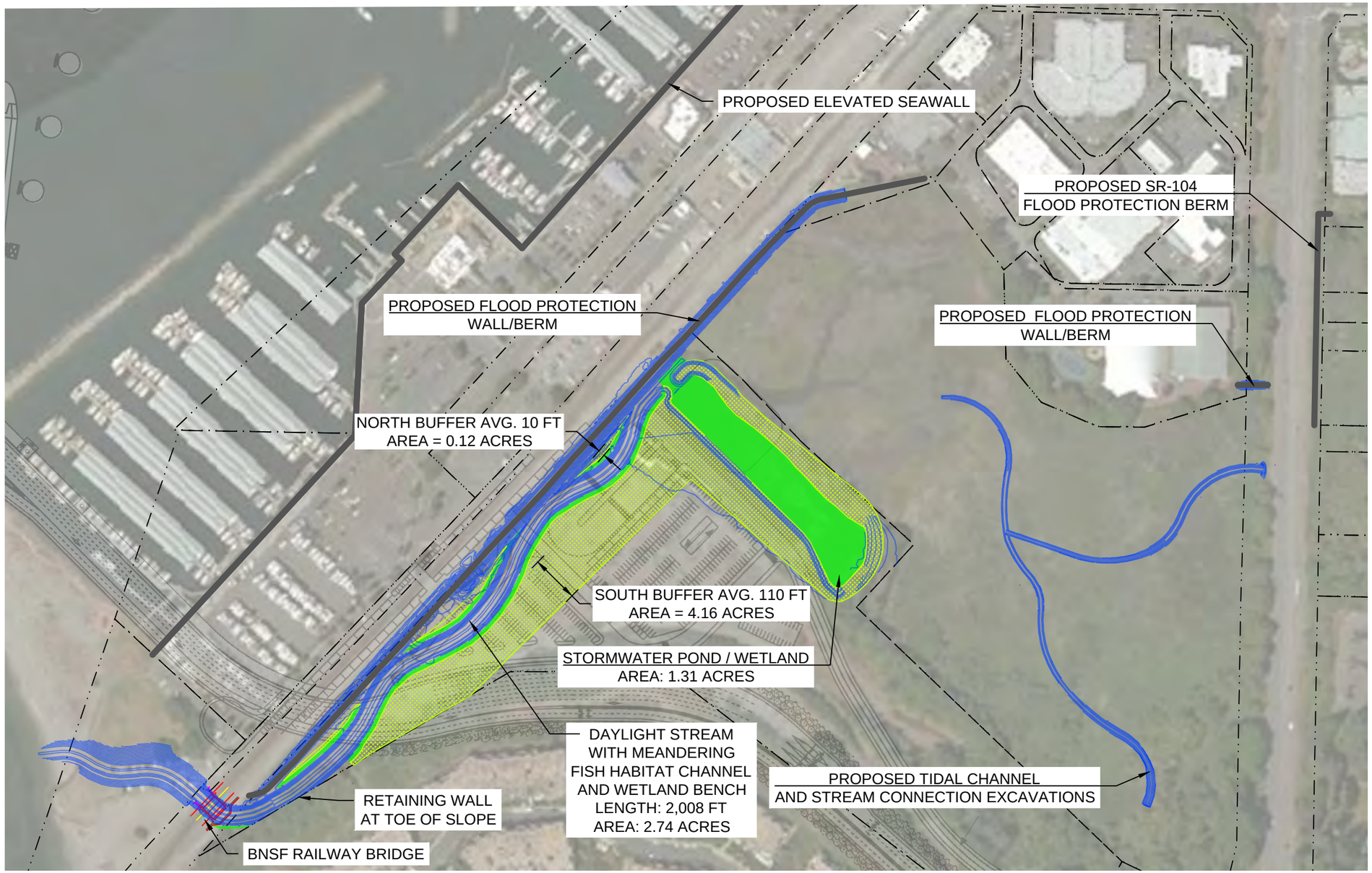
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 8

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\GradingFigures_28FEB2018\CADD\211-12588 Buffer Options - 2018 - Copy.dwg Date: 03-09-2019 Login: CCB



LEGEND

- PROPOSED FLOOD PROTECTION STRUCTURE
- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

WSDOT Ferry preferred alternative location is approximate.

0 250 500

Scale in Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

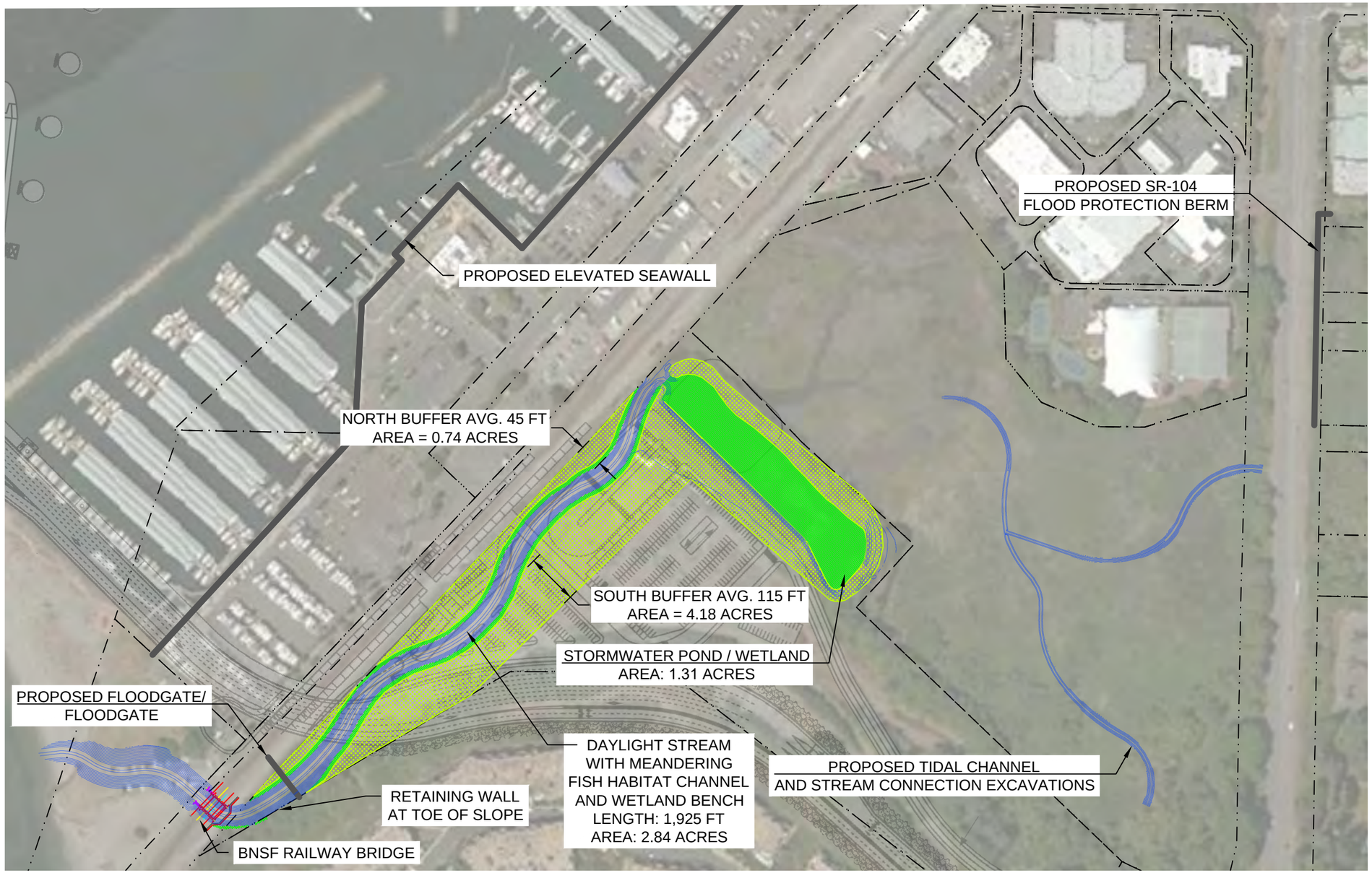
ALTERNATIVE 6 ALIGNMENT

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 9

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\GradingFigures_28FEB2018\CADD\211-12588 Buffer Options - 2018 - Copy.dwg Date: 03-09-2019 Login: CCB



LEGEND

- PROPOSED FLOOD PROTECTION STRUCTURE
- PROPOSED DAYLIGHT CONTOUR
- WETLAND RESTORATION
- RIPARIAN BUFFER
- SNOHOMISH COUNTY GIS PARCELS

NOTE

Figure adapted from electronic files, *2004_Willow_Cr_Survey.dwg*, 2008_Marsh_Survey.dwg, *20120049 TOPO.dwg* and Basemap.dwg received 08-04-2014. Also aerial.jpg received 08-11-2014.

WSDOT Ferry preferred alternative location is approximate.

0 250 500

Scale in Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

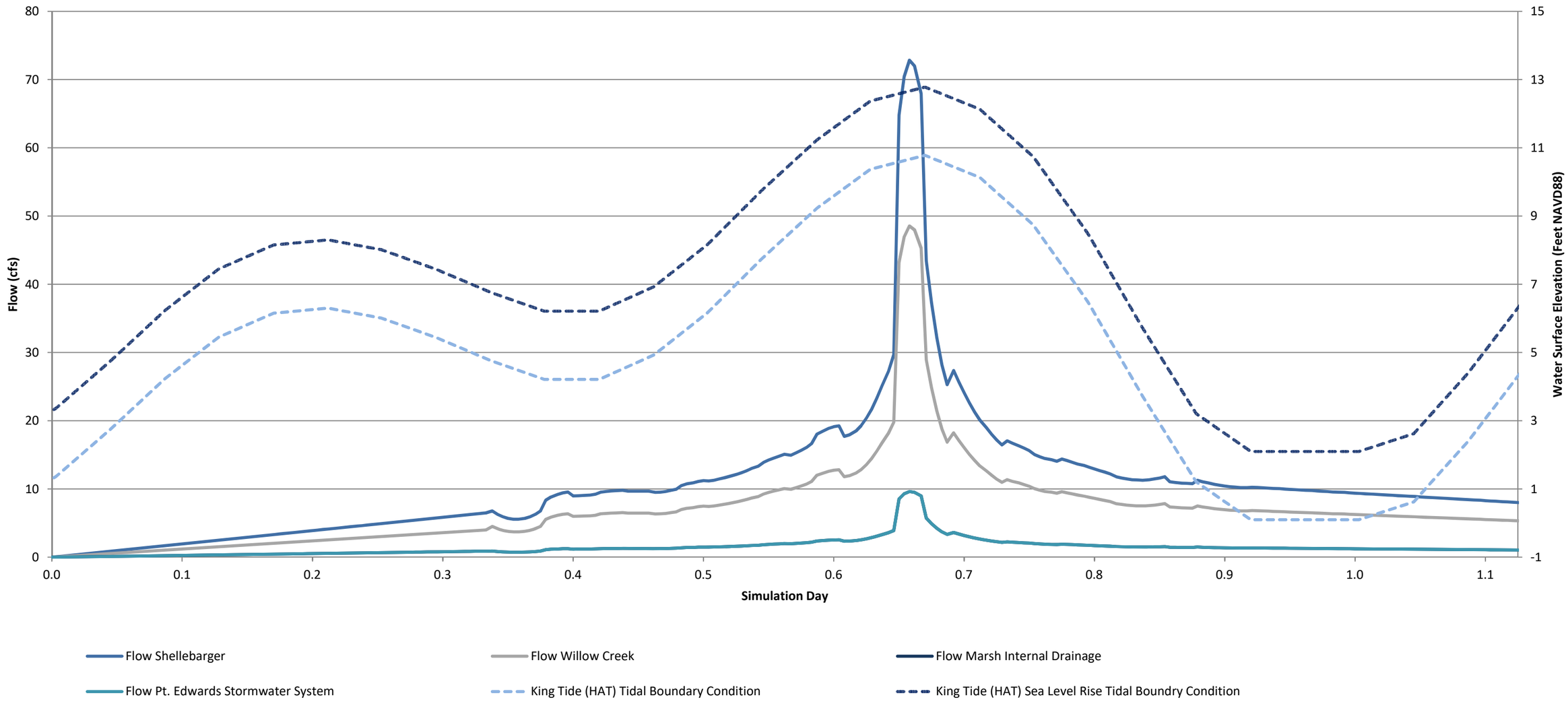
ALTERNATIVE 7 ALIGNMENT

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 10

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\GradingFigures_28FEB2018\CADD\211-12588 Buffer Options - 2018 - Copy.dwg Date: 03-09-2019 Login: CCB



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

1% (100-YR) AEP SAIC STREAM FLOOD HYDROGRAPHS AND KING TIDE/KING TIDE WITH SEA LEVEL RISE TIDAL BOUNDARY CONDITIONS

June 2019 21-1-12588-050

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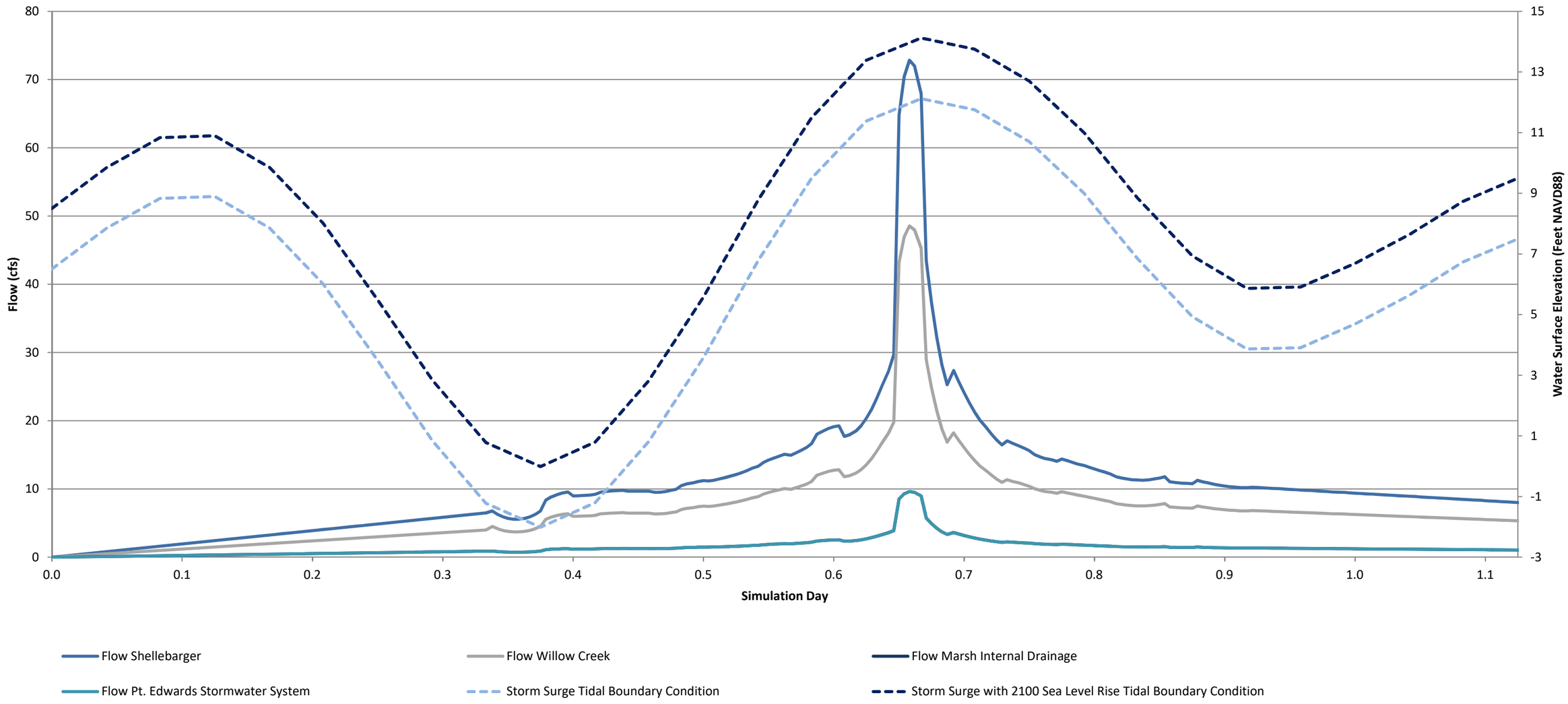
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 11A

Printed: 3-10-19 17:38 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Tables\[Figures.xlsx]Fig12A_Hydrographs-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

1% (100-YR) AEP SAIC STREAM FLOOD HYDROGRAPHS AND STORM SURGE/STORM SURGE WITH SEA LEVEL RISE TIDAL BOUNDARY CONDITIONS

June 2019 | 21-1-12588-050

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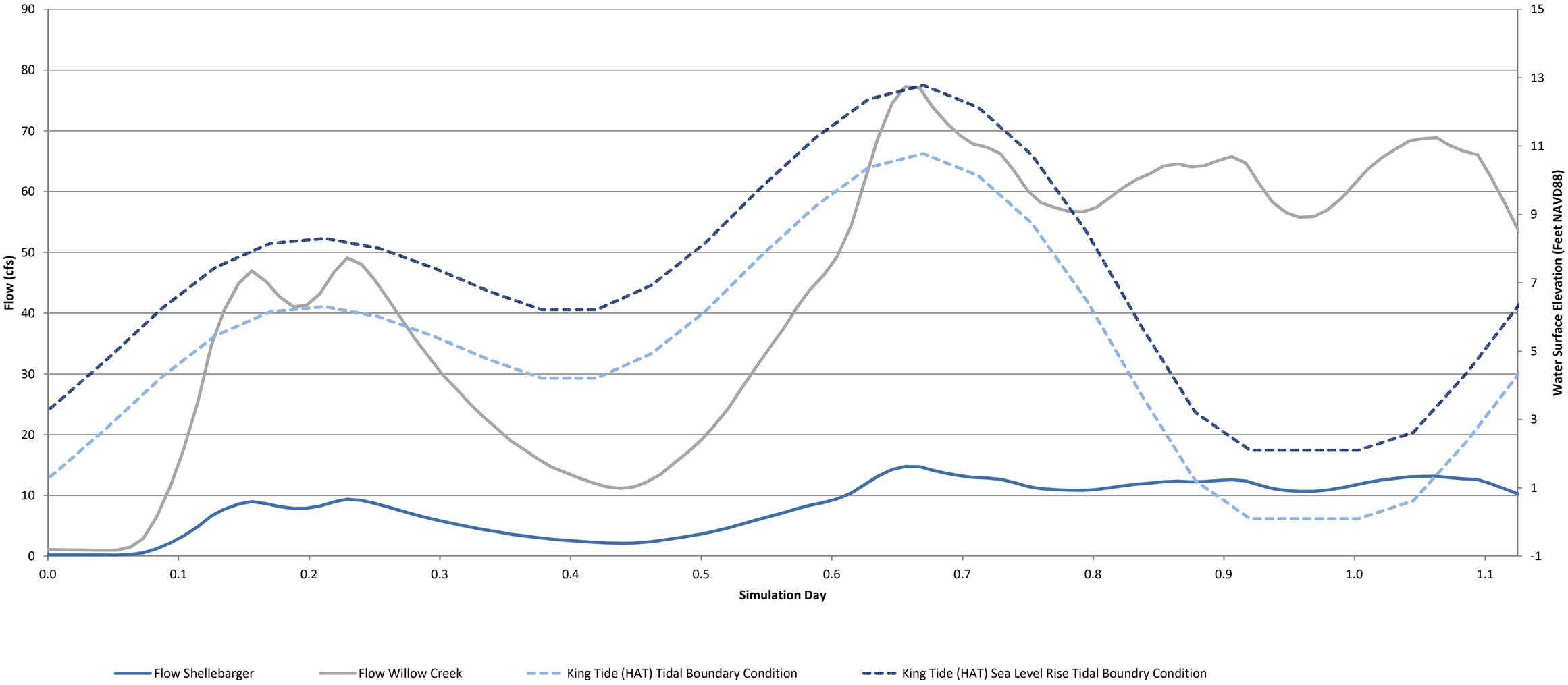
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 11B

Printed: 3-10-19 17:39 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Tables\[Figures.xlsx]Fig12B_Hydrographs-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

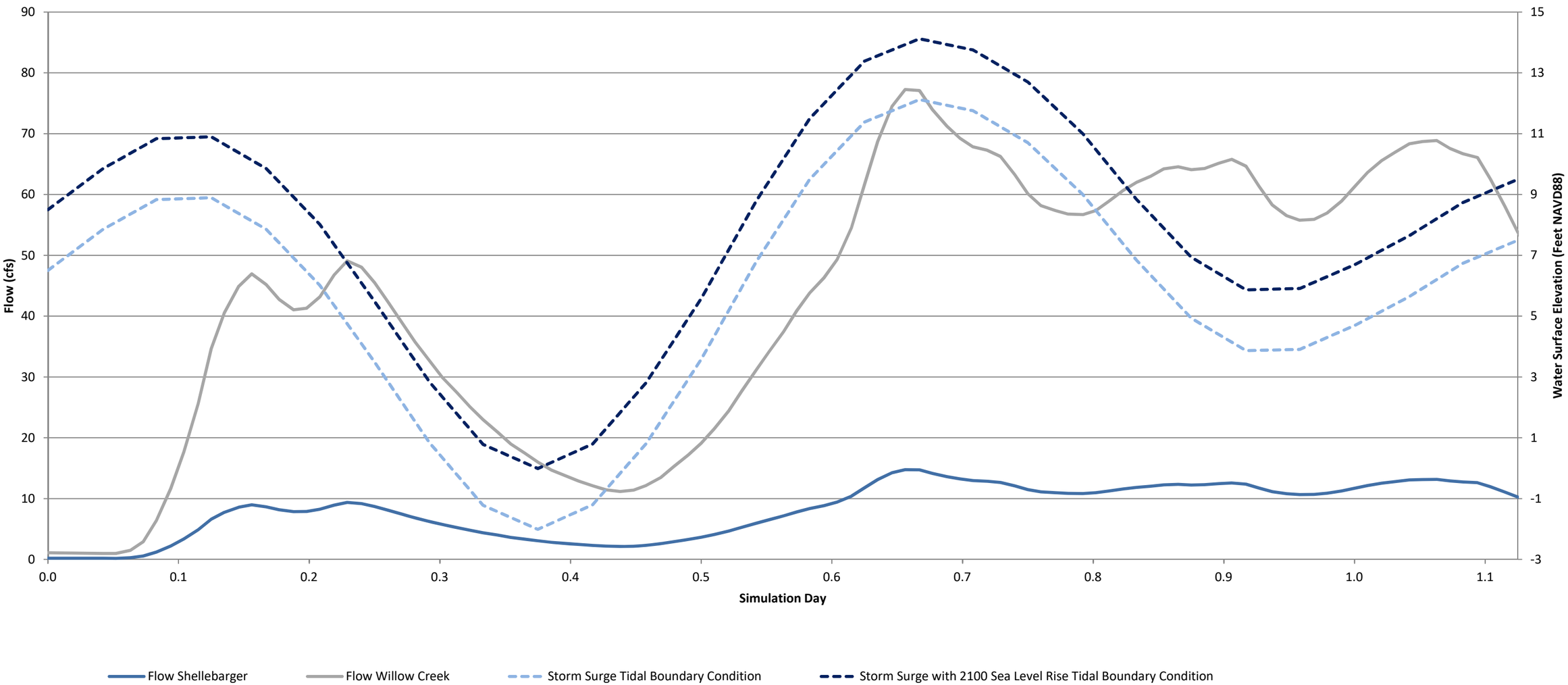
1% (100-YR) ANCHOR-QEA STREAM FLOOD HYDROGRAPHS AND KING TIDE/KING TIDE WITH SEA LEVEL RISE TIDAL BOUNDARY CONDITIONS

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 12A

Printed: 3-10-19 17:21 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Tables\[Figures.xlsx]Fig11A_Hydrographs-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

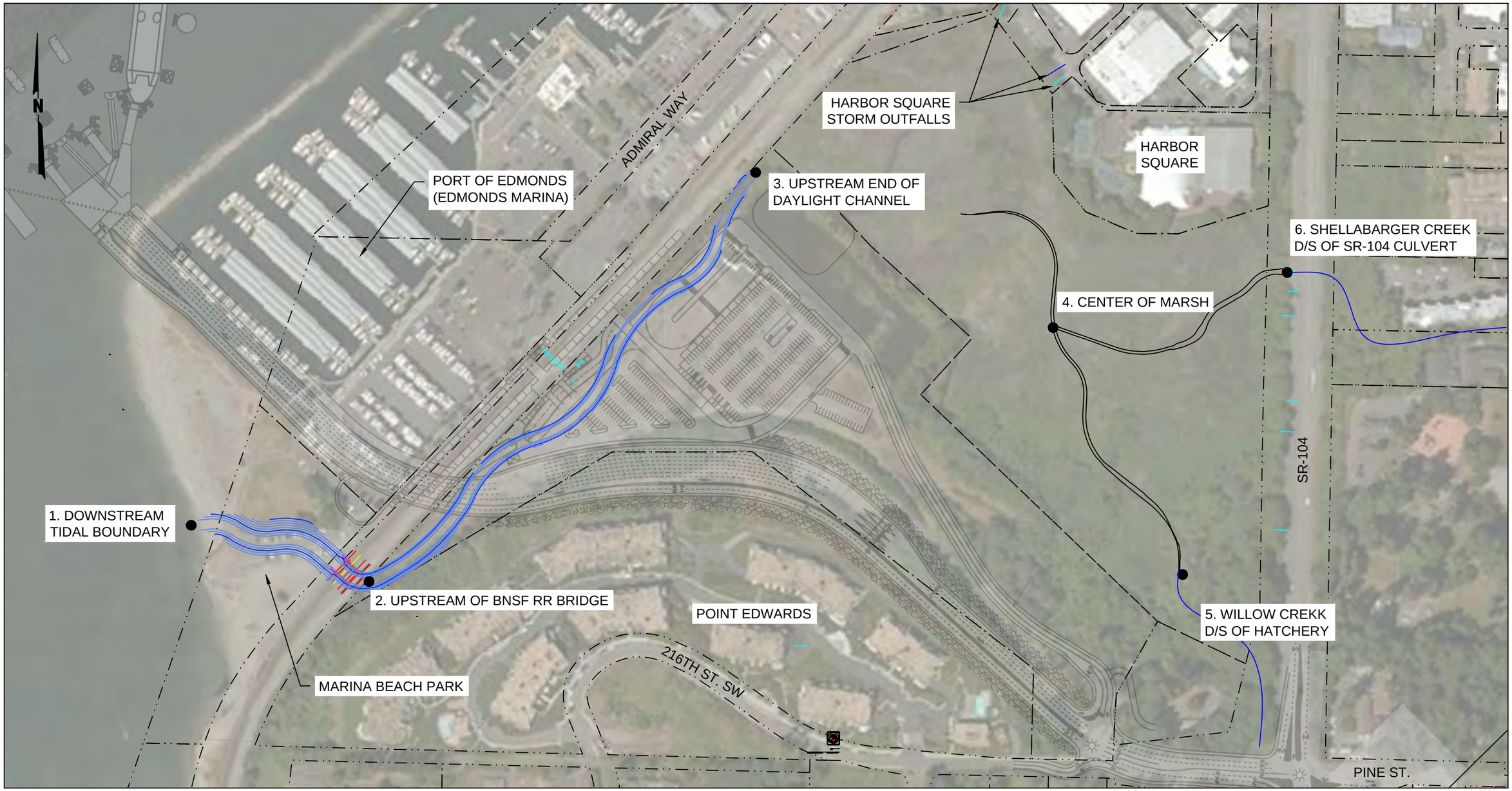
1% (100-YR) ANCHOR-QEA STREAM FLOOD HYDROGRAPHS AND STORM SURGE TIDE/STORM SURGE WITH SEA LEVEL RISE TIDAL BOUNDARY CONDITIONS

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 12B

Printed: 3-10-19 17:25 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Tables\[Figures.xlsx]Fig11B_Hydrographs-



LEGEND

PROPOSED DAYLIGHT CONTOUR

SNOHOMISH COUNTY GIS PARCELS

MODELING NODE

0 250 500

Scale in Feet
Contour Interval = 1 Foot

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN
AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

MODELING NODES

June 2019 21-1-12588-050

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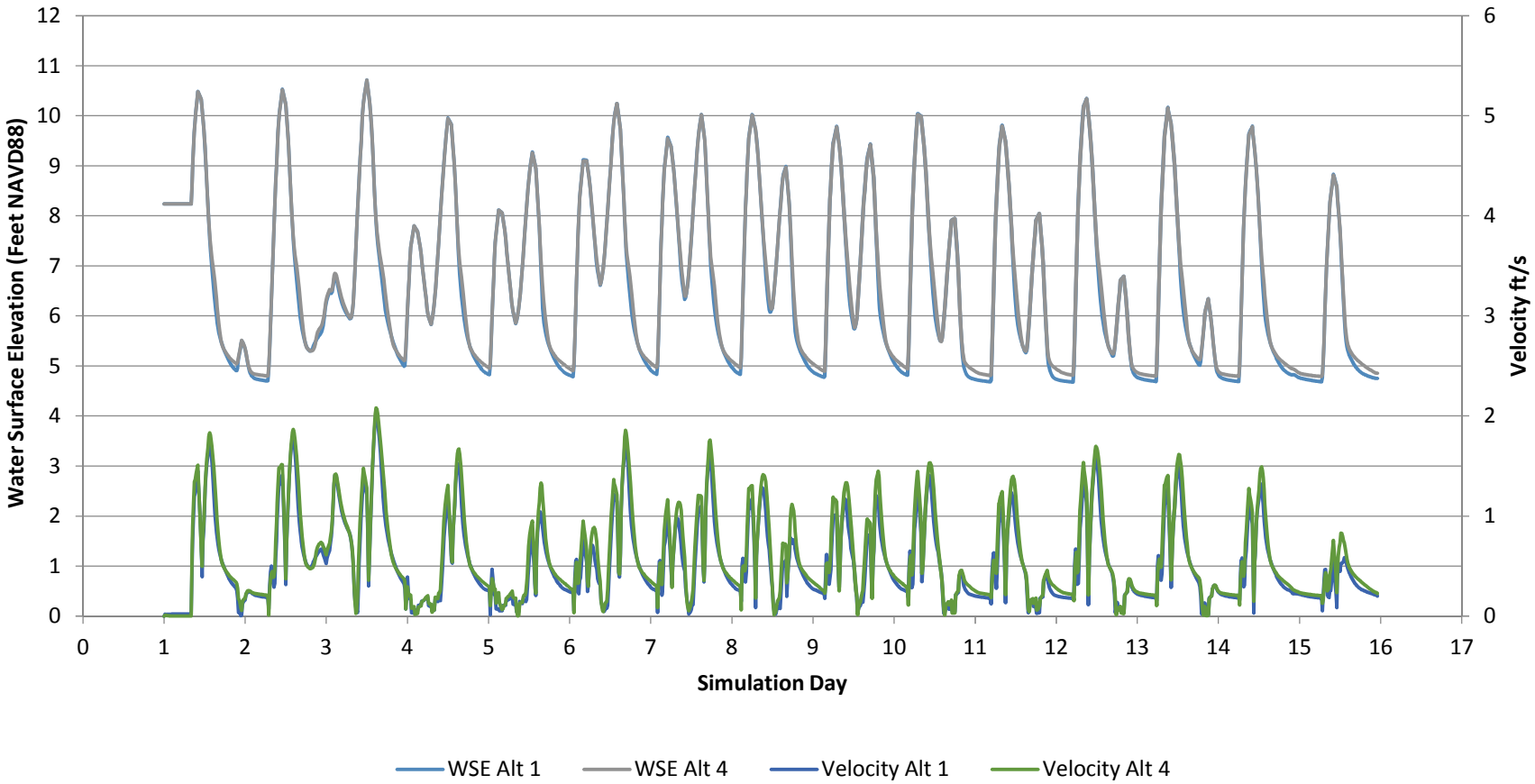
FIG. 13

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\CAD\Figure\211-12588 Buffer Options - 2018.dwg Date: 03-08-2019 Login: CCB



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

100 Year Flood Water Surface Elevation and Velocity
Node 2 - Upstream of BNSF Bridge

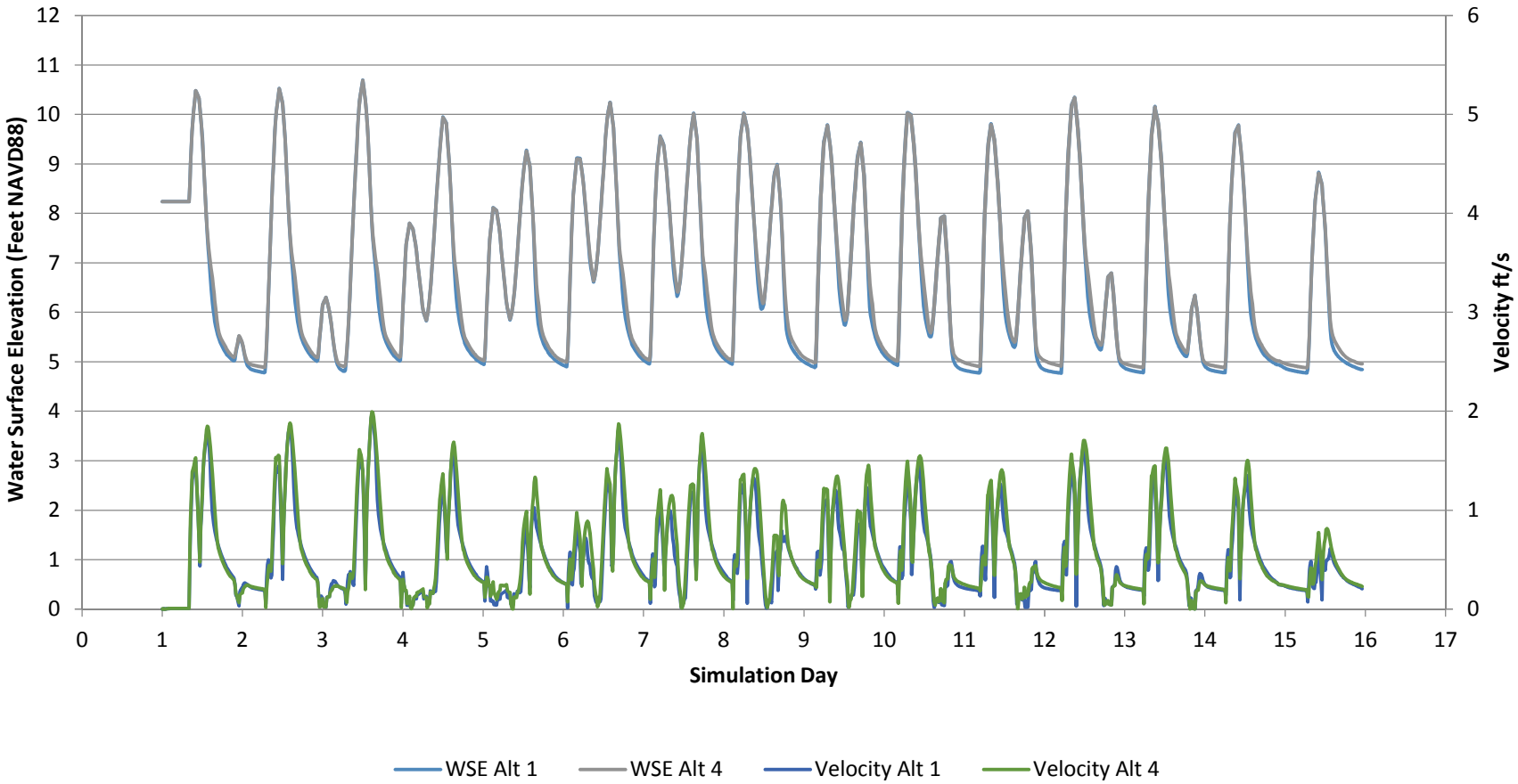
June 2019 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 14

FIG. 14

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 2 100 Year>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

Late Spring Fish Habitat Water Surface Elevation and Velocity Node 2 - Upstream of BNSF Bridge

June 2019 | 21-1-12588-050

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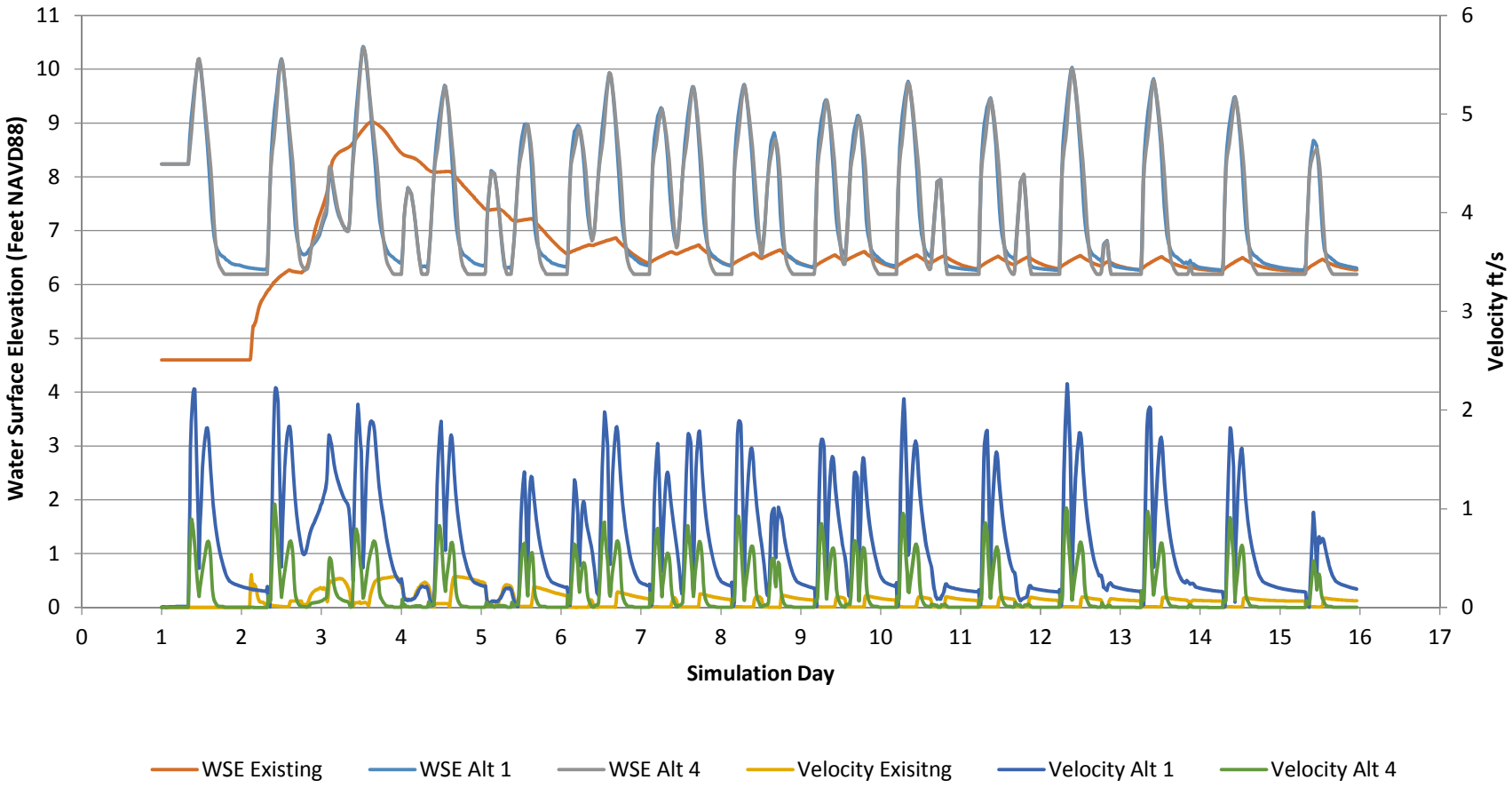
FIG. 15

FIG. 15

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 2 Low Flow>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

100 Year Flood Water Surface Elevation and Velocity
Node 3 - Upstream of Daylight Channel

June 2019 21-1-12588-050

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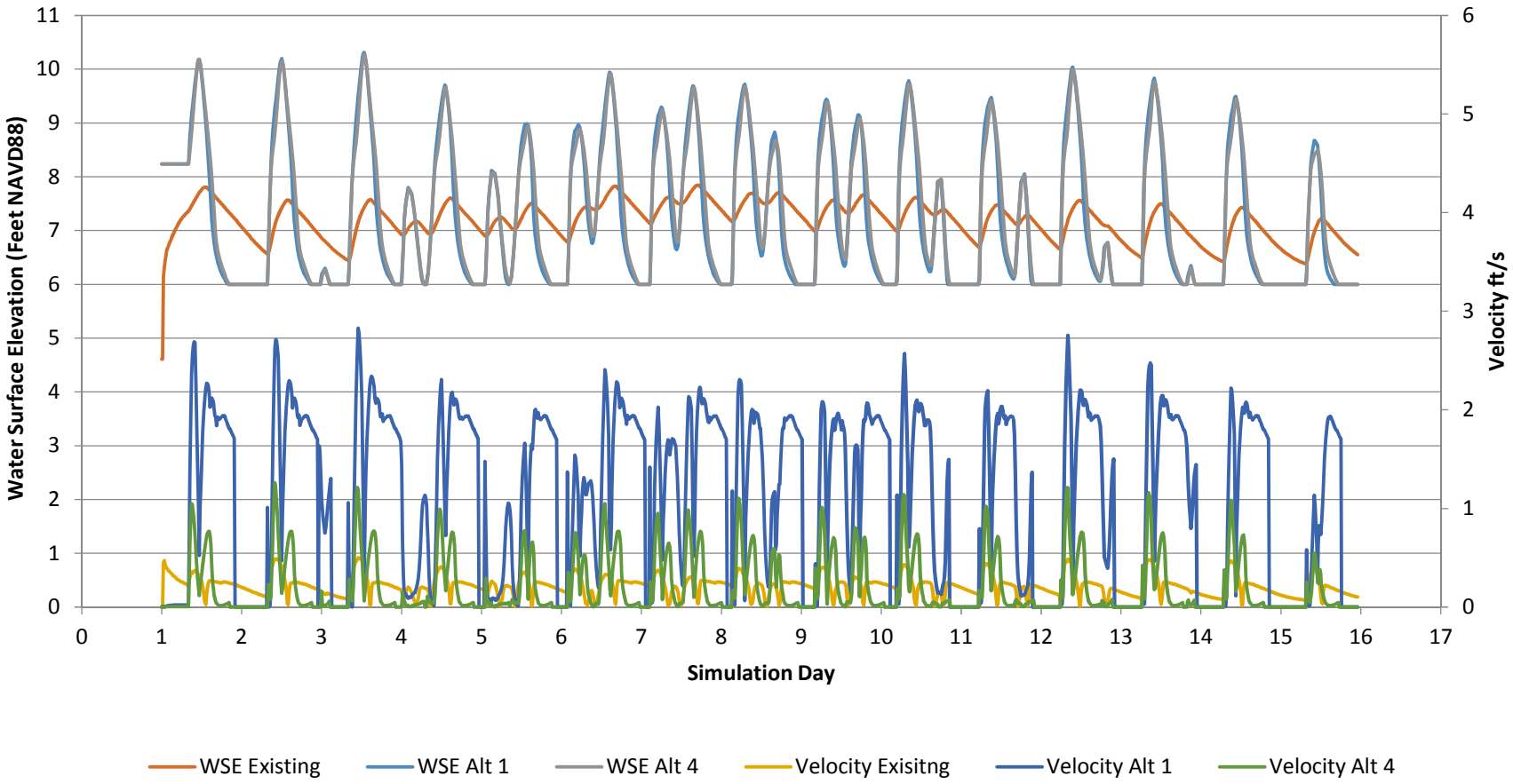
FIG. 16

FIG. 16

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 3 100 Year >



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

Late Spring Habitat Water Surface Elevation and Velocity
Node 3 - Upstream of Daylight Channel

June 2019 21-1-12588-050

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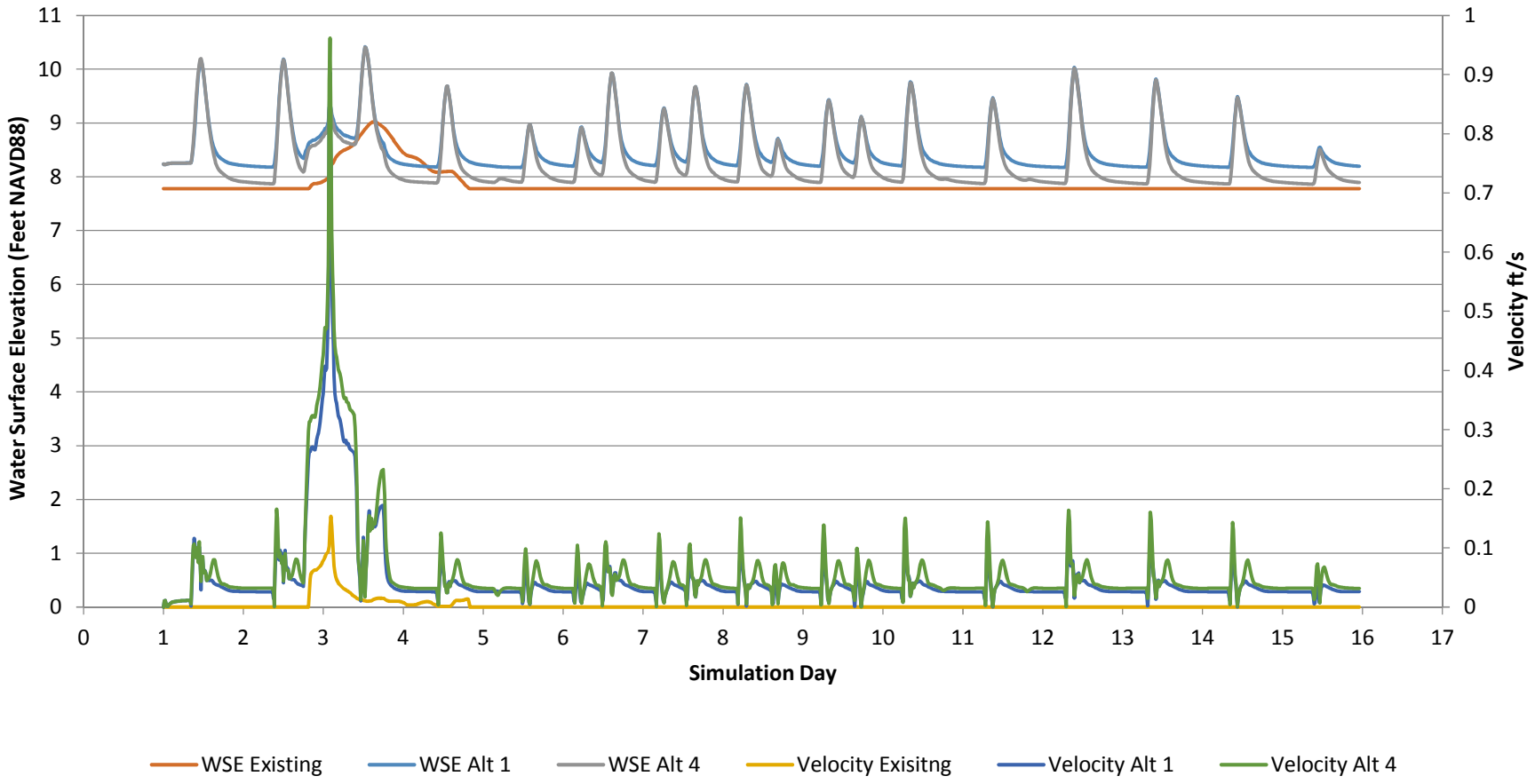
FIG. 17

FIG. 17

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 3 Low Flow>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

100 Year Flood Water Surface Elevation and Velocity
Node 4 - Center of Marsh

June 2019 | 21-1-12588-050

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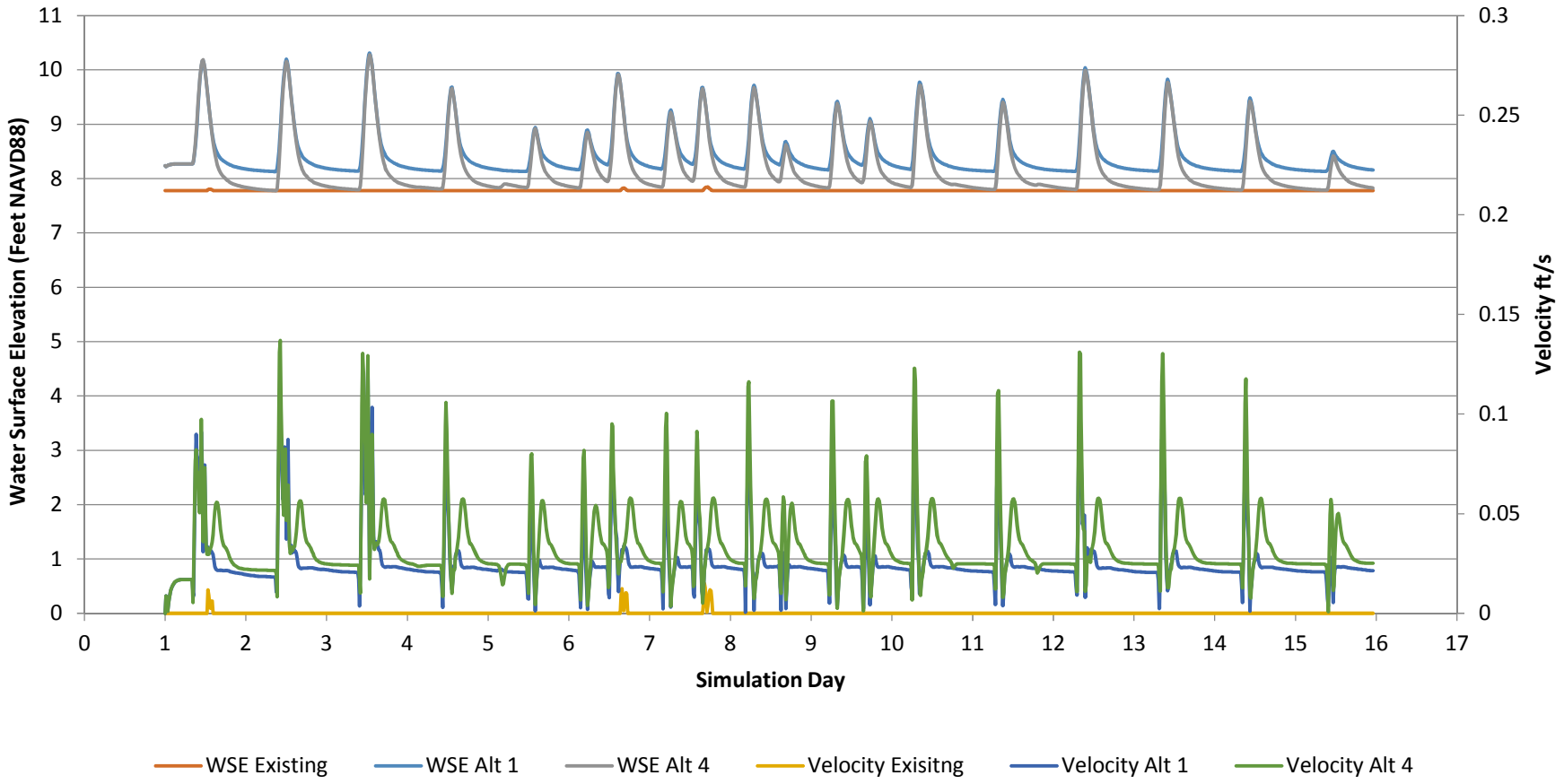
FIG. 18

FIG. 18

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 4 100 Year>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

Late Spring Fish Habitat Water Surface Elevation and Velocity Node 4 - Center of Marsh

June 2019 21-1-12588-050

SHANNON & WILSON, INC.
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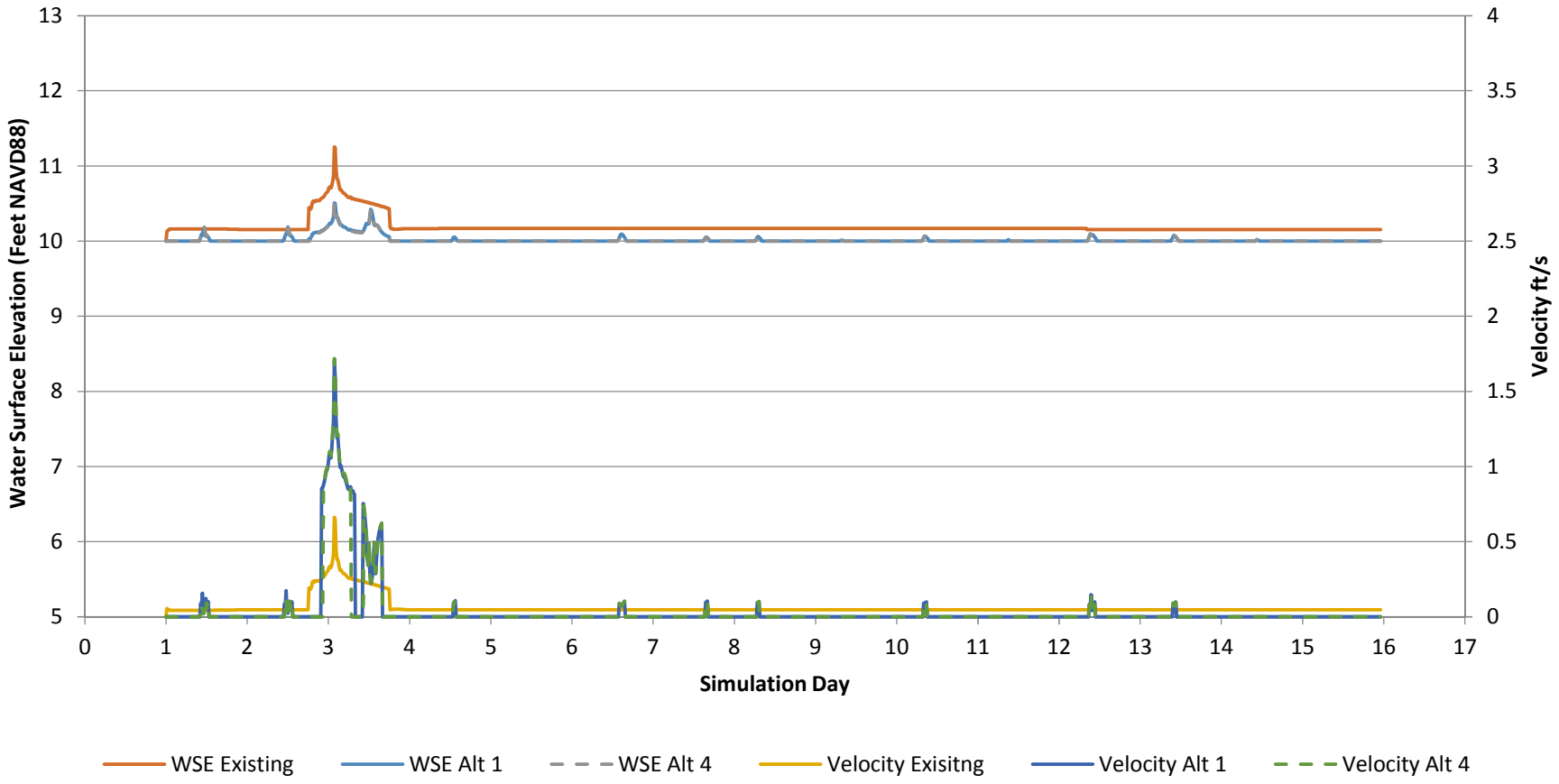
FIG. 19

FIG. 19

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 4 Low Flow>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

100 Year Flood Water Surface Elevation and Velocity
Node 5 - Willow Creek Downstream of Hatchery

June 2019 21-1-12588-050

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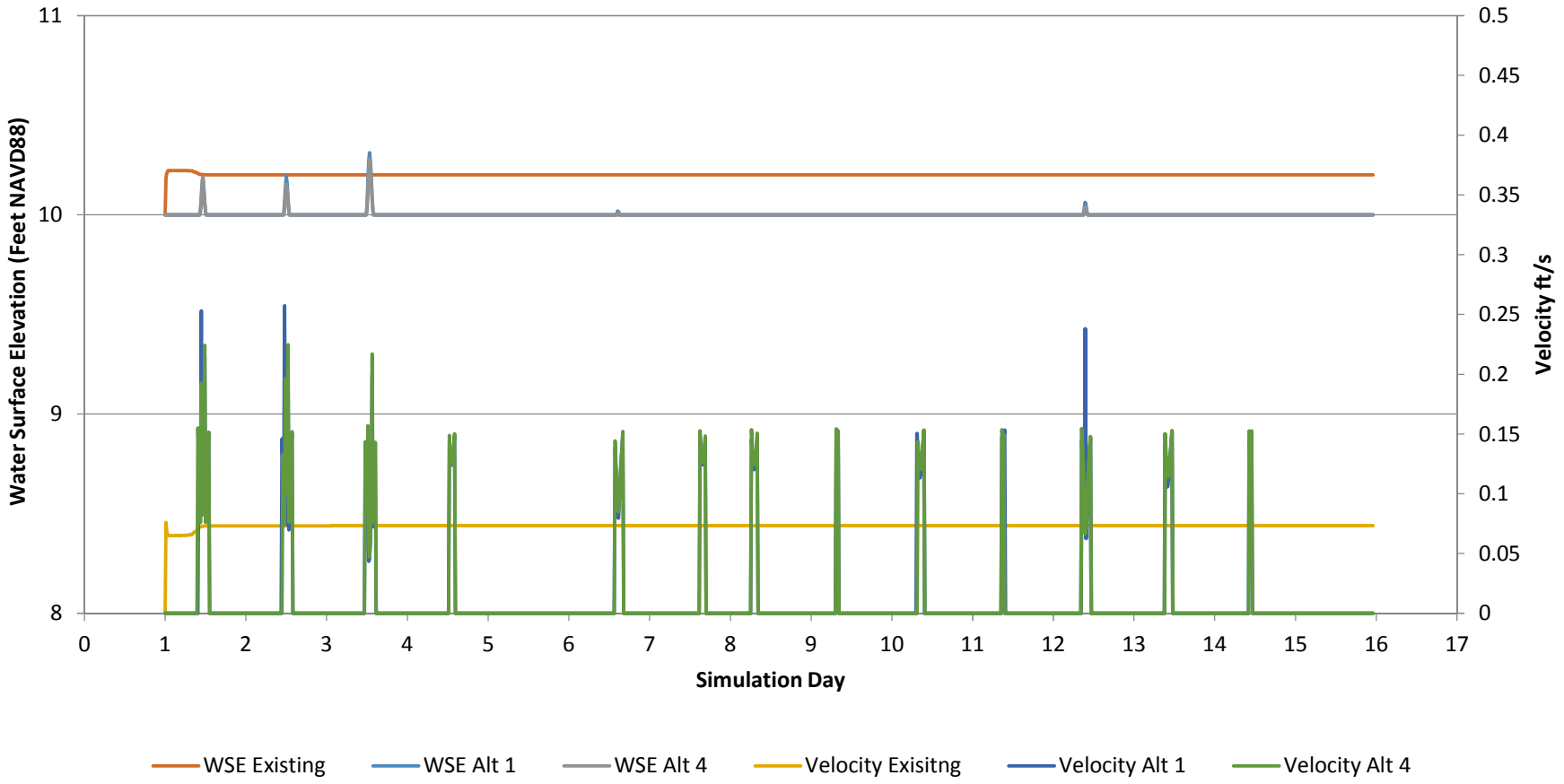
FIG. 20

FIG. 20

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 5 100 Year>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

Late Spring Fish Habitat Water Surface Elevation and Velocity
Node 5 - Willow Creek Downstream of Hatchery

June 2019 21-1-12588-050

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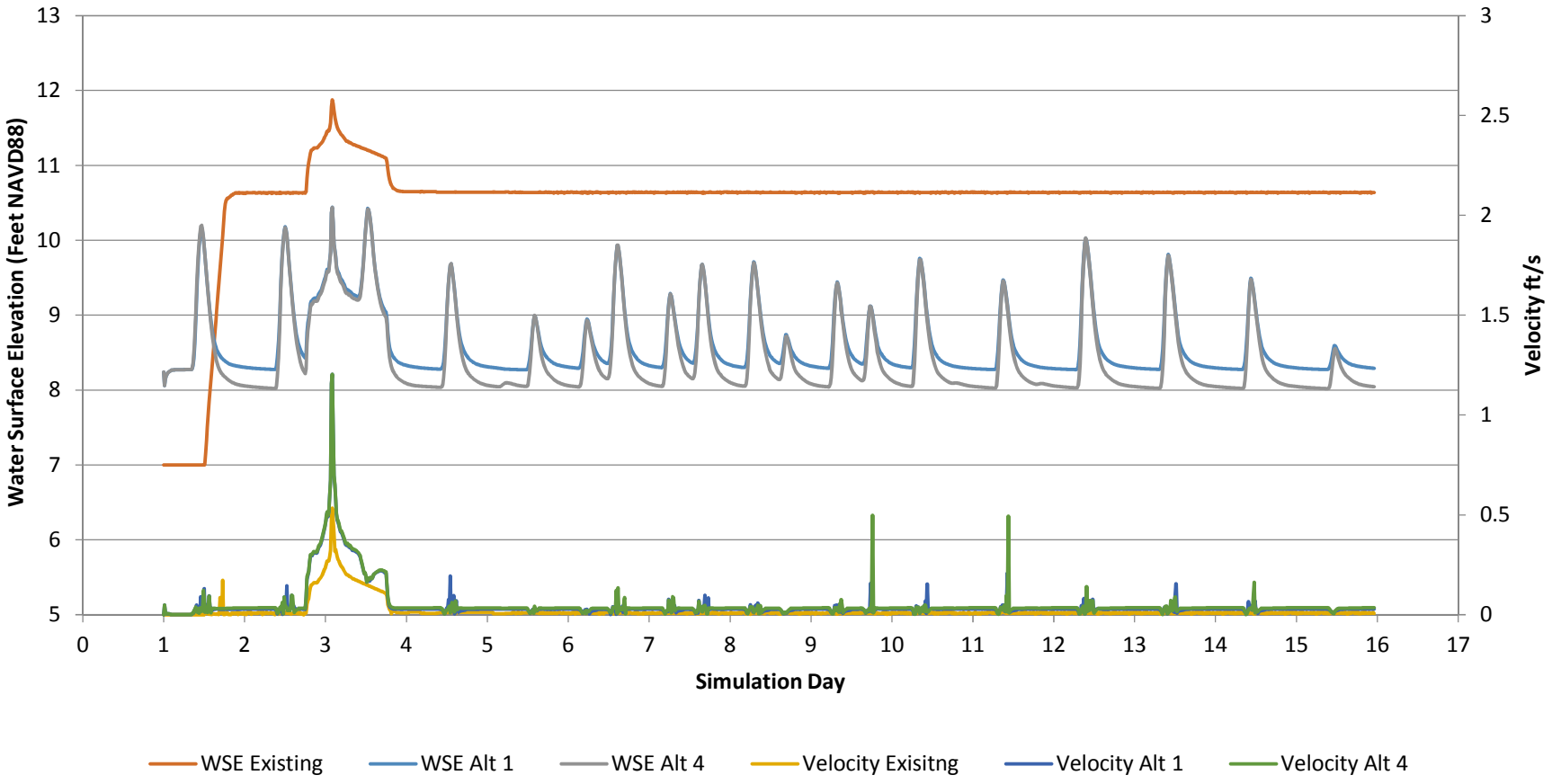
FIG. 21

FIG. 21

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 5 Low Flow>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

100 Year Flood Water Surface Elevation and Velocity
Node 6 - Shellabarger Creek Downstream of SR 104

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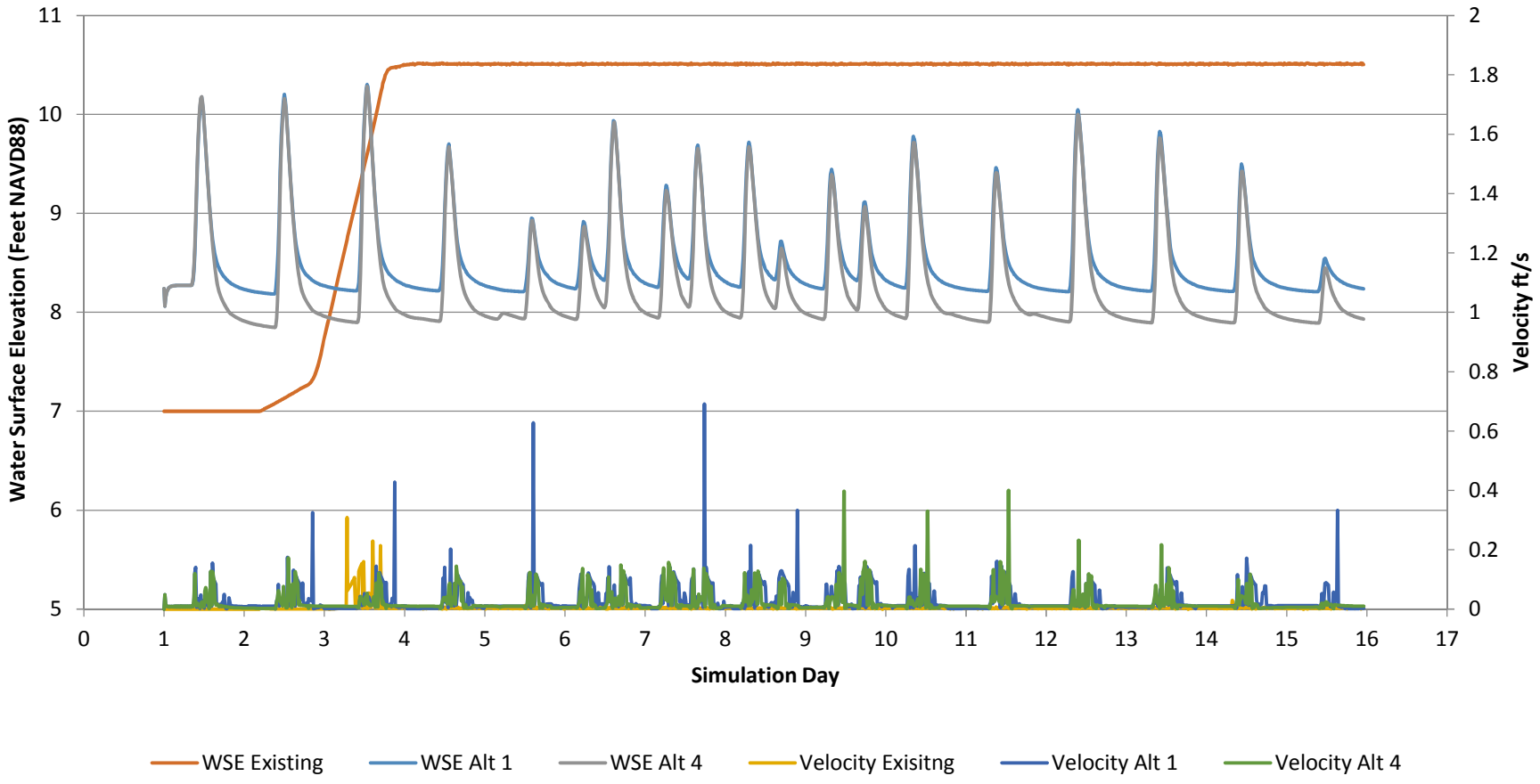
FIG. 22

FIG. 22

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 6 100 Year>



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING
EDMONDS, WASHINGTON

Late Spring Habitat Water Surface Elevation and Velocity
Node 6 - Shellabarger Creek Downstream of SR 104

June 2019 21-1-12588-050

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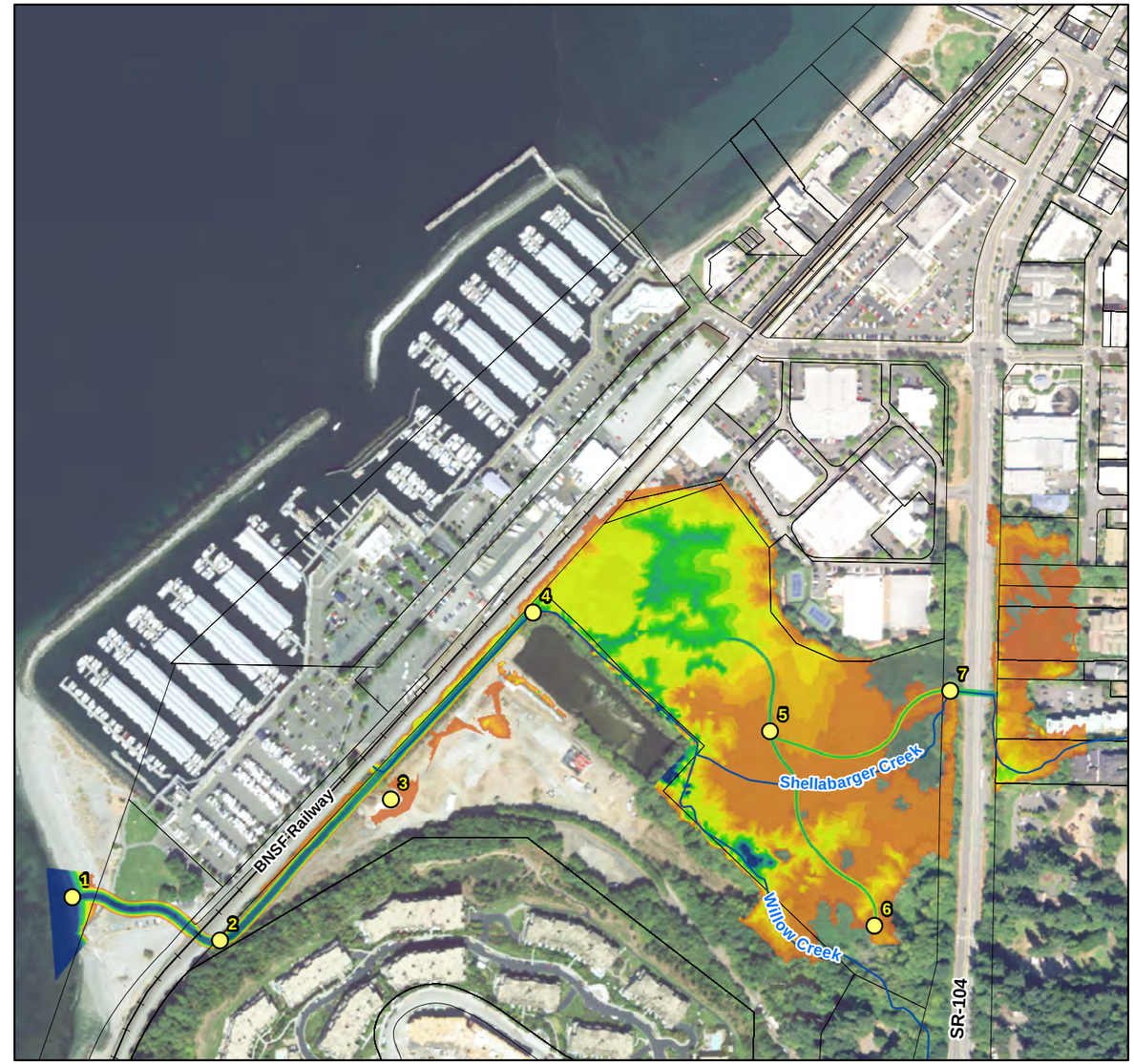
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 23

FIG. 23

I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\020 H&H ALTS\Report\21-1-12588-020_Tables_ Figures 7-18.xlsx <Node 6 Low Flow>

EXISTING CONDITIONS



ALTERNATIVE 1
LINEAR DAYLIGHT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 1
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

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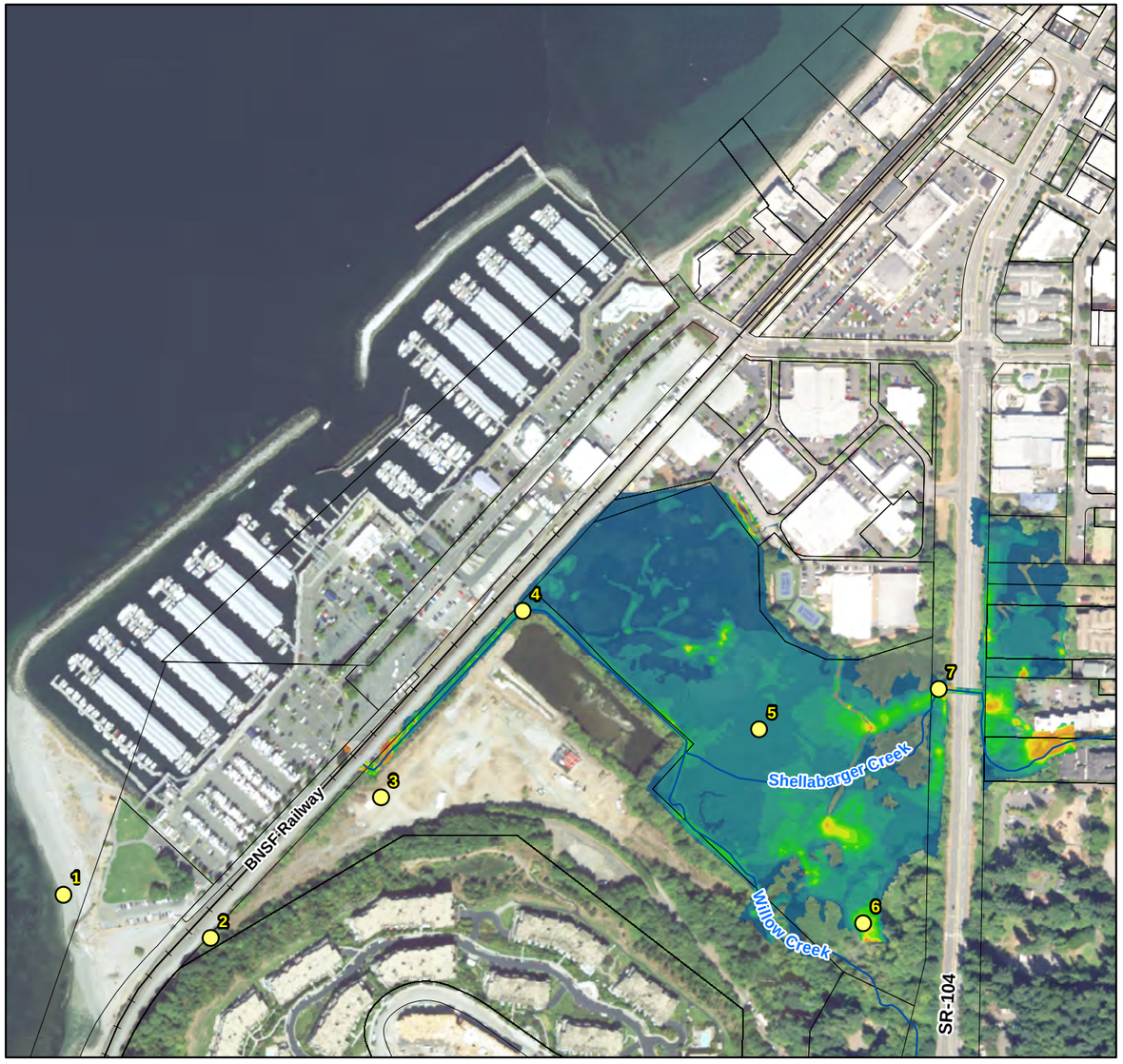
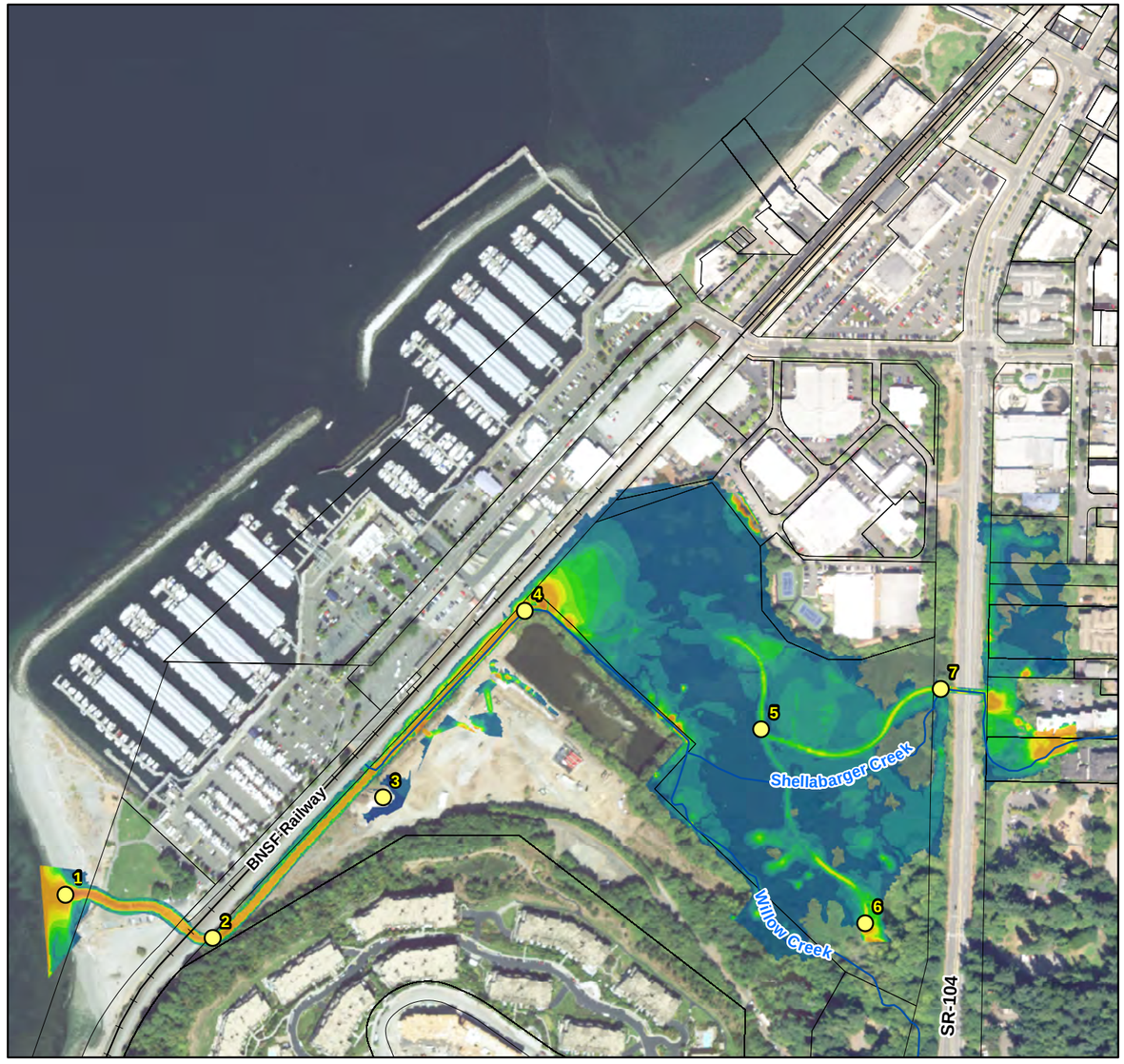
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 24A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure24A_Existing_Alternative1_KingTide_SAIC_Depth.mxd Date: 3/10/2019 CCB



EXISTING CONDITIONS



ALTERNATIVE 1
LINEAR DAYLIGHT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 1
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

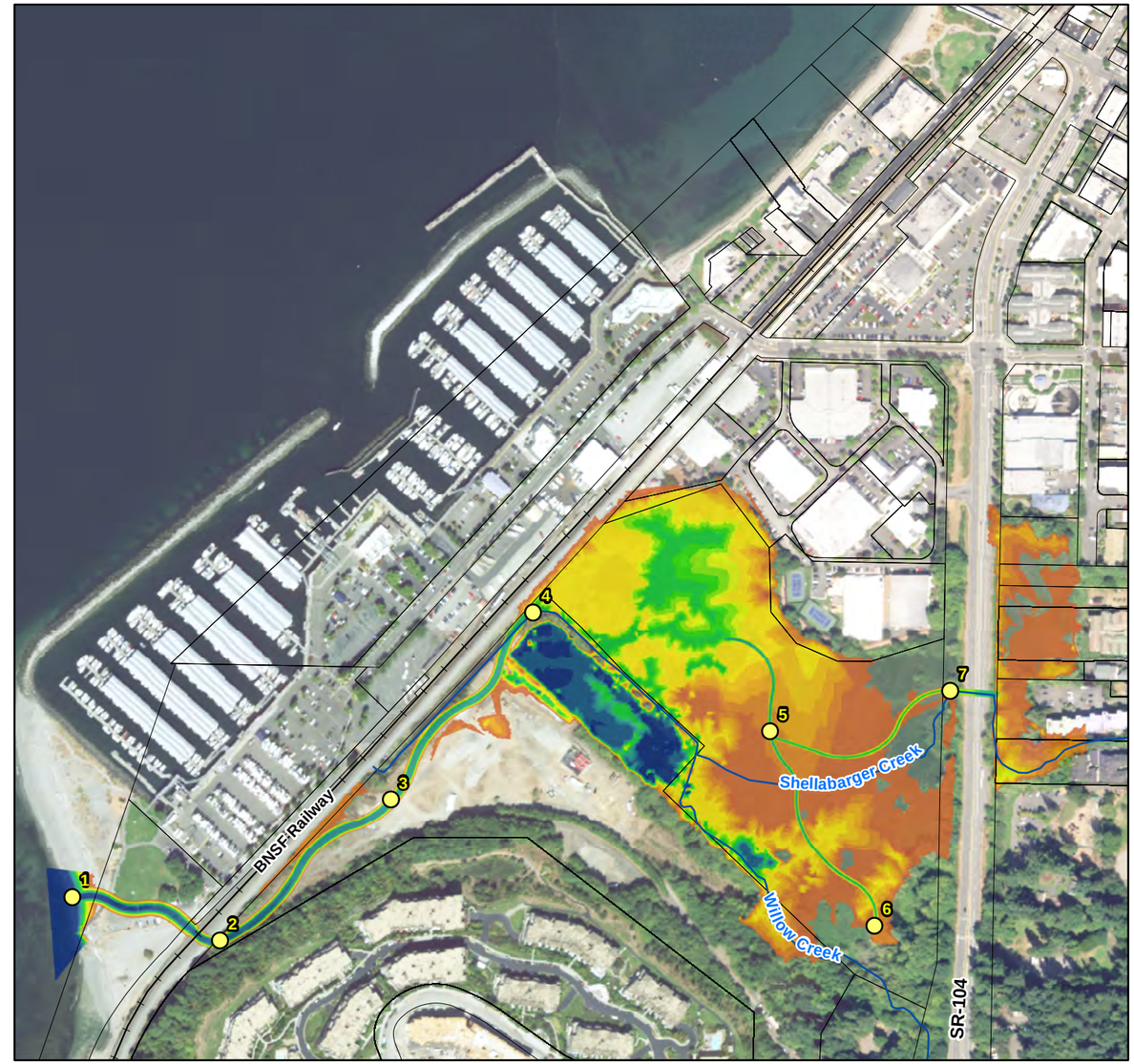
June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 24B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure24B_Existing_Alternative1_KingTide_SAIC_Velocities.mxd Date: 3/10/2019 CCB

EXISTING CONDITIONS



ALTERNATIVE 4
SINUOUS DAYLIGHT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 4
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

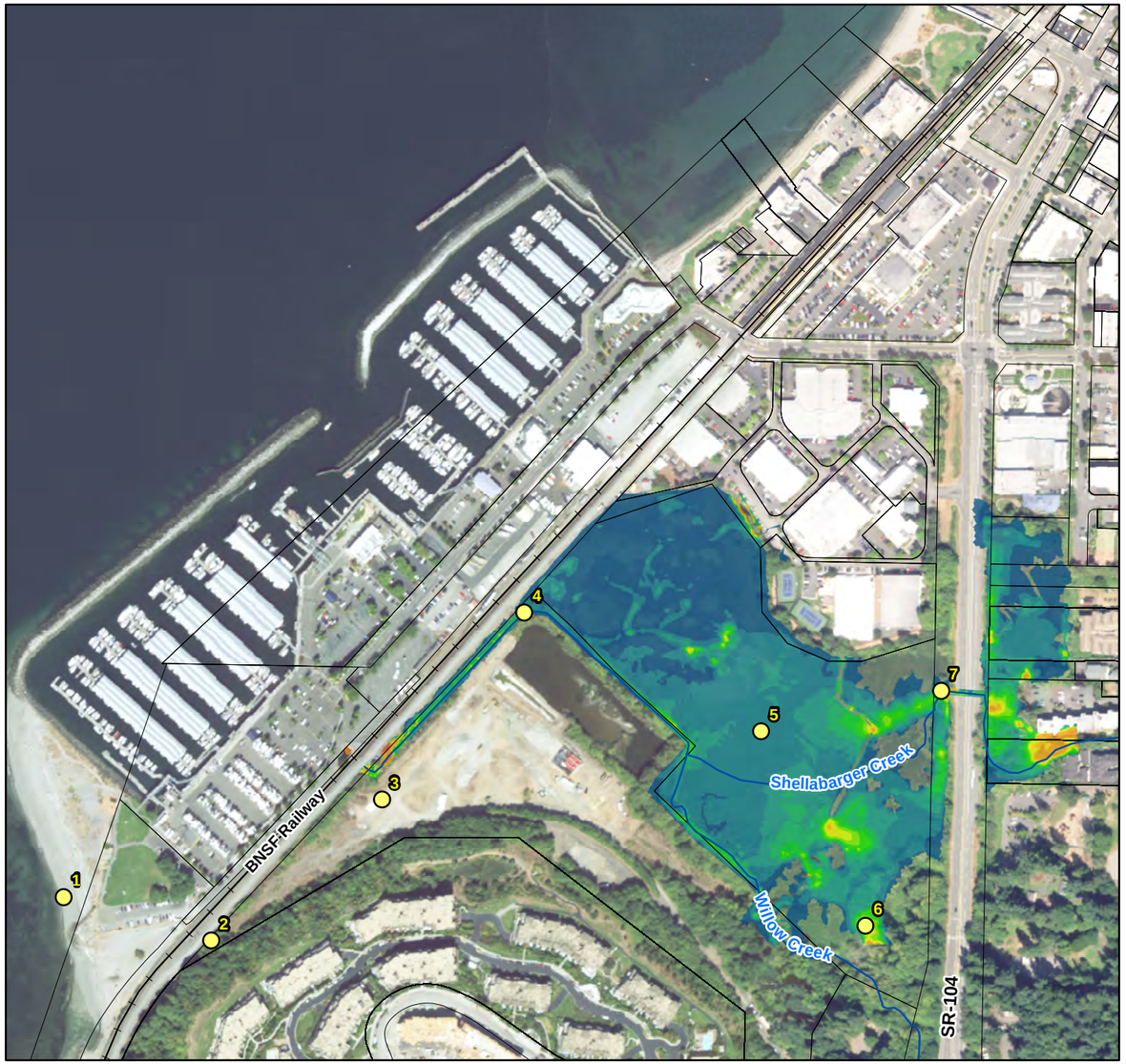
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

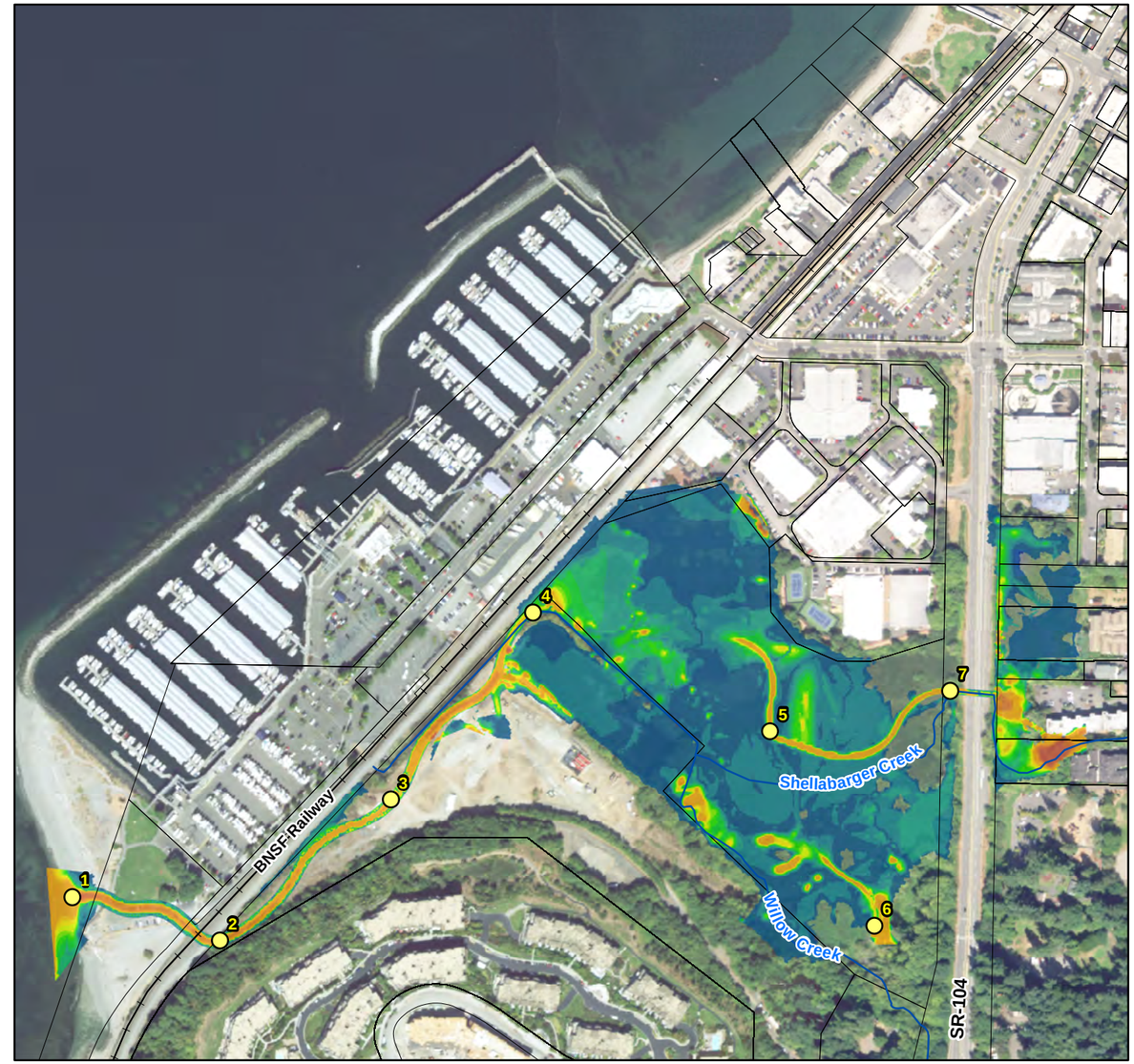
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 25A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure25A_Existing_Alternative4_KingTide_SAIC_Depth.mxd Date: 3/10/2019 CCB



EXISTING CONDITIONS



ALTERNATIVE 4
SINUOUS DAYLIGHT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 4
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 25B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure25B_Existing_Alternative4_KingTide_SAIC_Velocities.mxd Date: 3/10/2019 CCB

EXISTING CONDITIONS

ALTERNATIVE 1
LINEAR DAYLIGHT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 1
KING TIDE WITH LATE SPRING HABITAT
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

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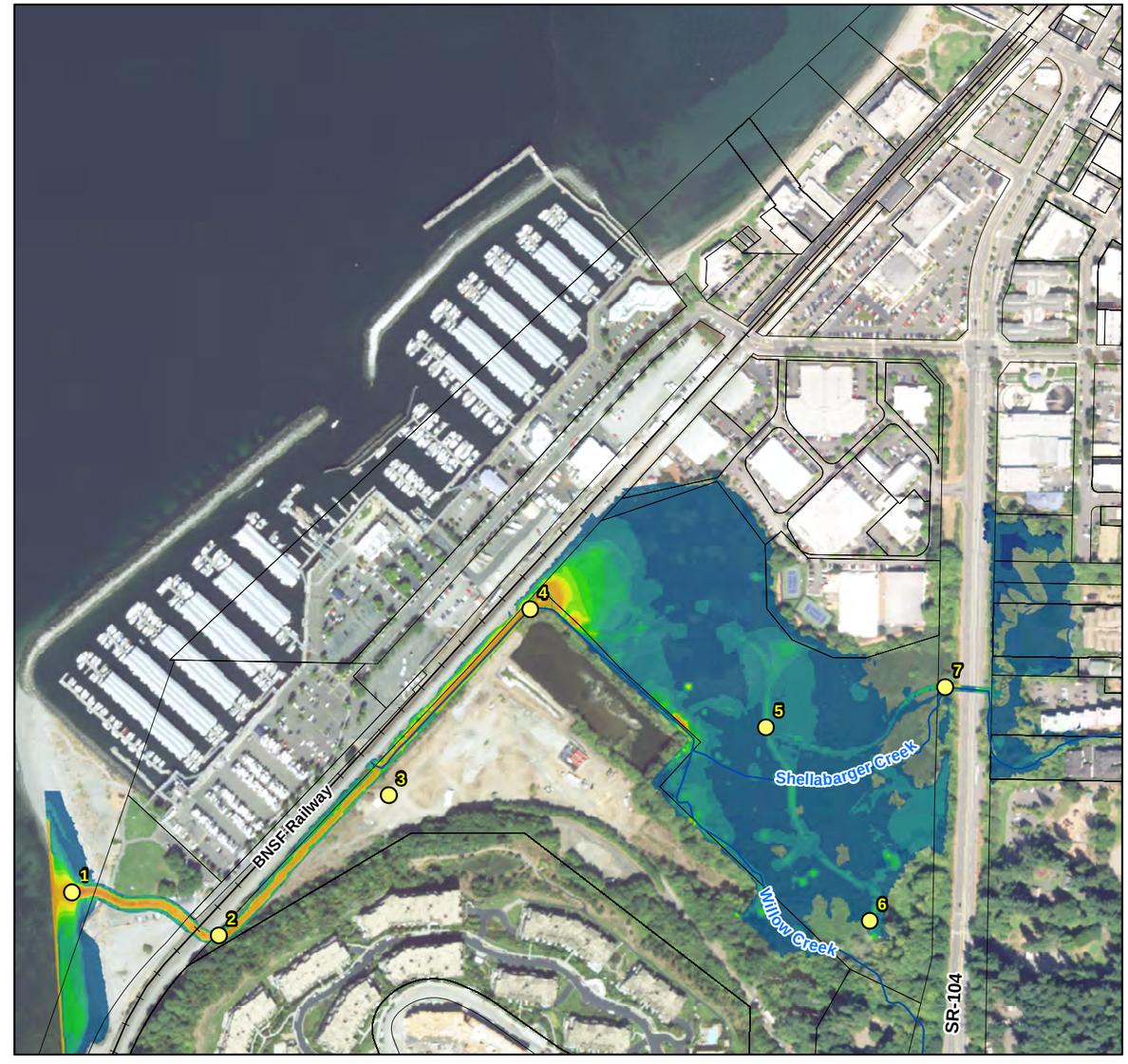
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 26A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure26A_Existing_Alternative1_KingTide_Habitat_Depth.mxd Date: 3/10/2019 CCB

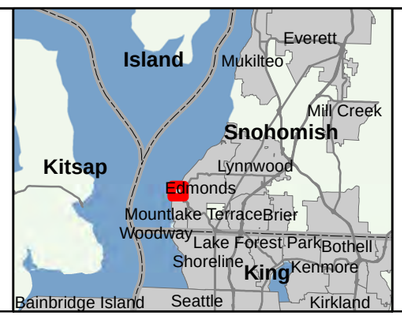
EXISTING CONDITIONS



ALTERNATIVE 1
LINEAR DAYLIGHT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S



EXISTING AND ALTERNATIVE 1
KING TIDE WITH LATE SPRING HABITAT
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

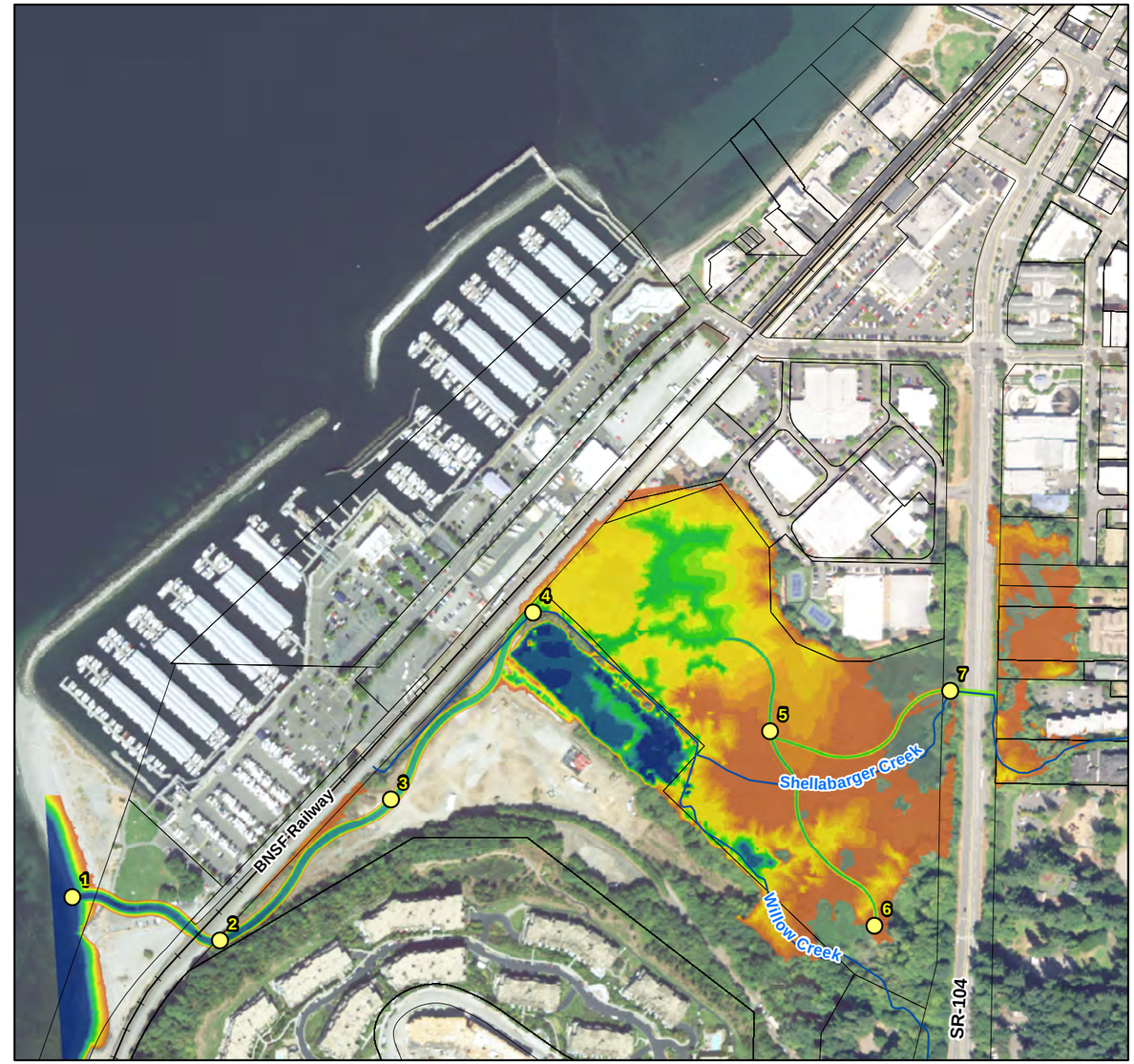
June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 26B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure26B_Existing_Alternative1_KingTide_Habitat_Velocities.mxd Date: 3/10/2019 CCB

EXISTING CONDITIONS



ALTERNATIVE 4
SINUOUS DAYLIGHT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 4
KING TIDE WITH LATE SPRING HABITAT
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

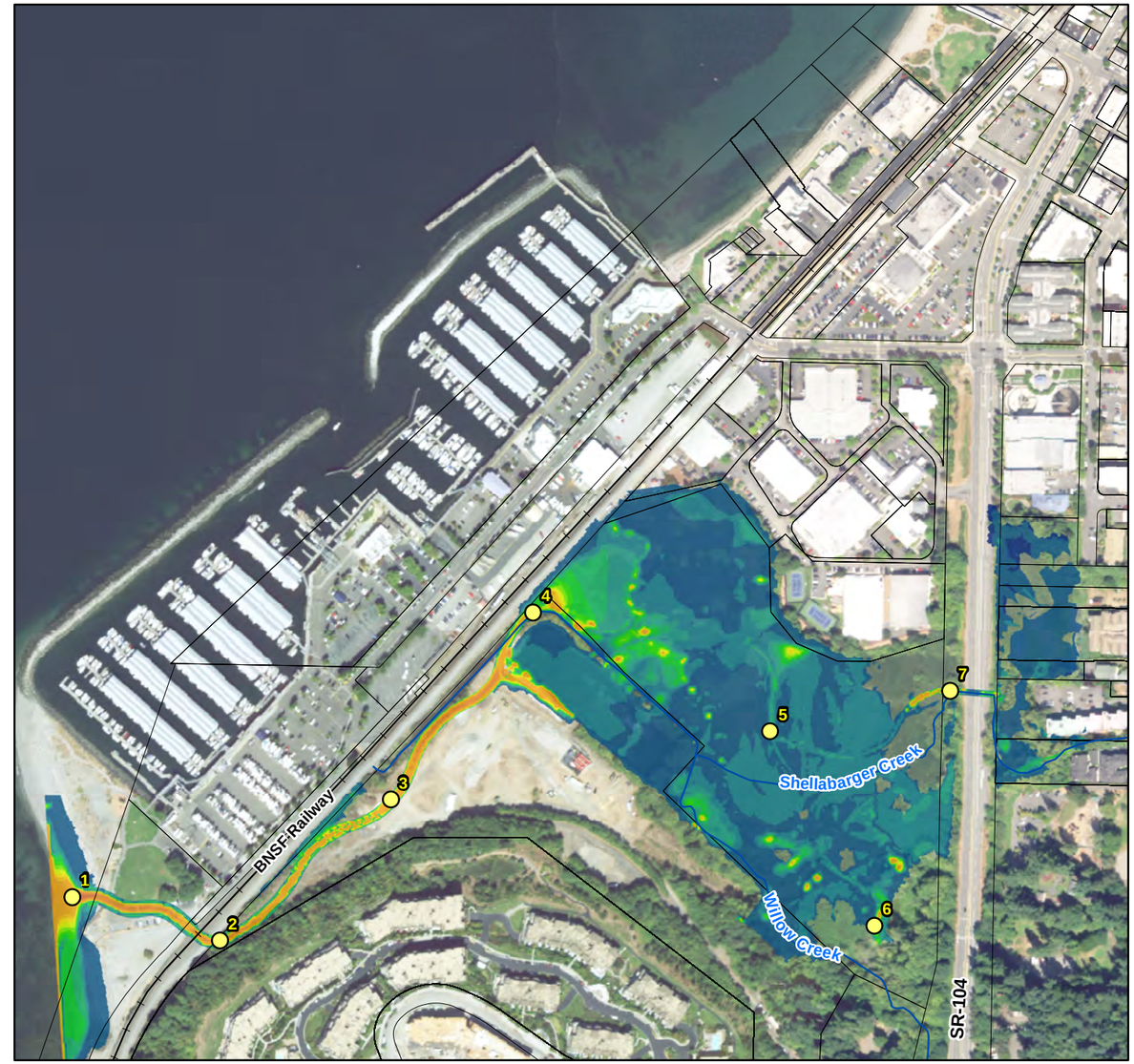
June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 27A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure27A_Existing_Alternative4_KingTide_Habitat_Depth.mxd Date: 3/10/2019 CCB

EXISTING CONDITIONS



ALTERNATIVE 4
SINUOUS DAYLIGHT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 4
KING TIDE WITH LATE SPRING HABITAT
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

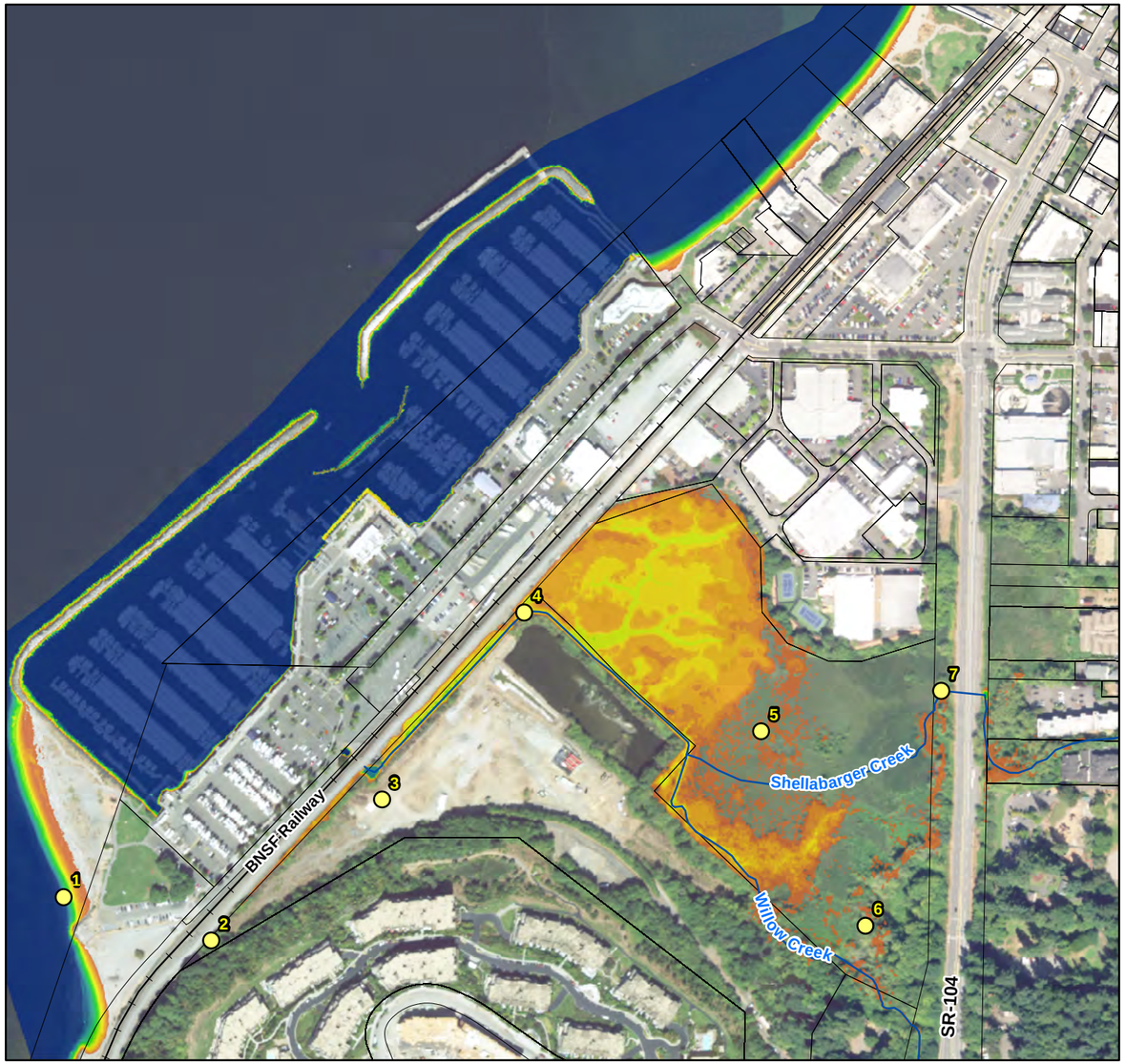
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

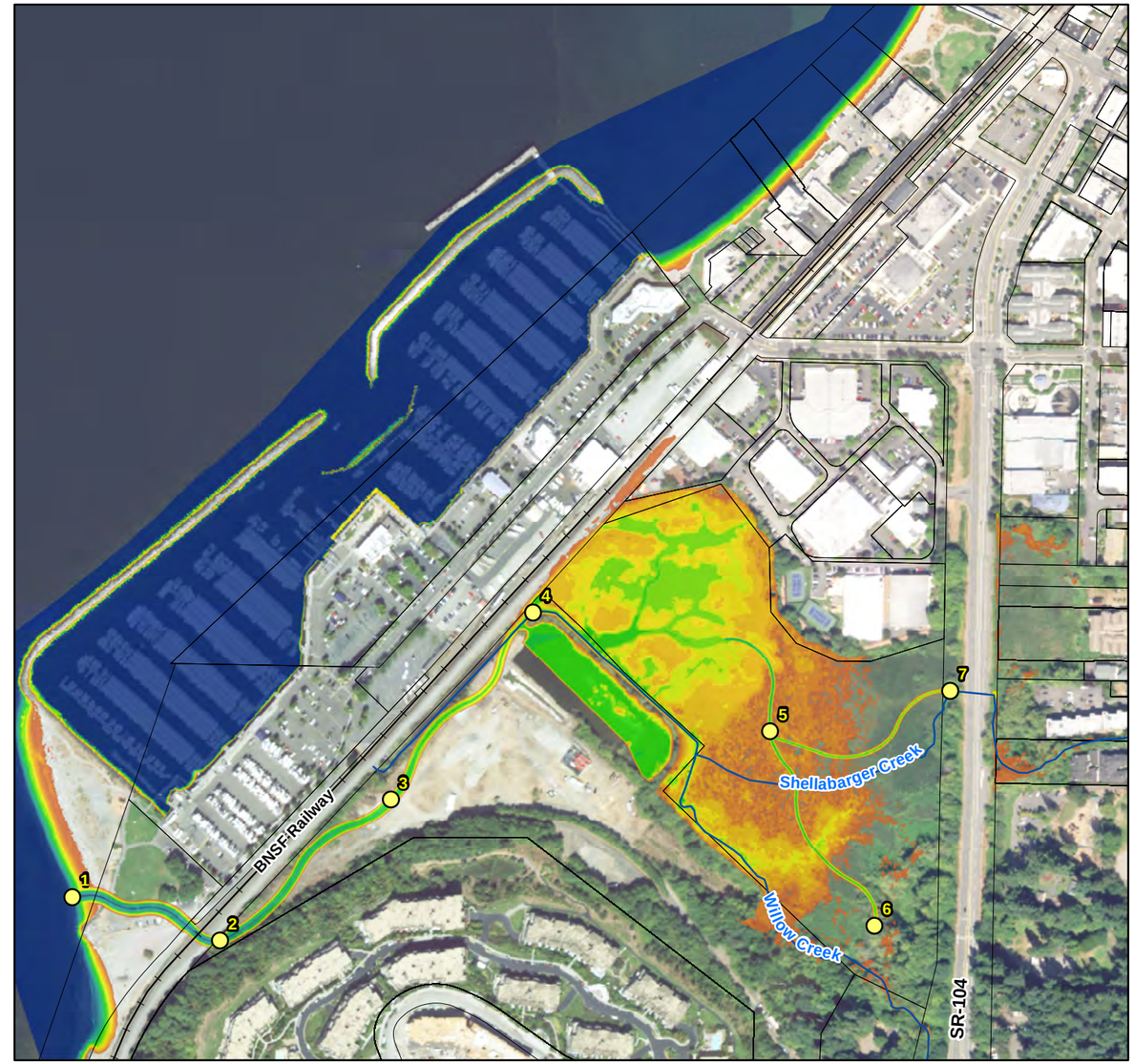
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 27B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\PreviousStudy\Figure27B_Existing_Alternative4_KingTide_Habitat_Velocities.mxd Date: 3/10/2019 CCB



EXISTING CONDITIONS



ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 28A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure16A_Existing_Alternative5_KingTide_Habitat_Depth.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

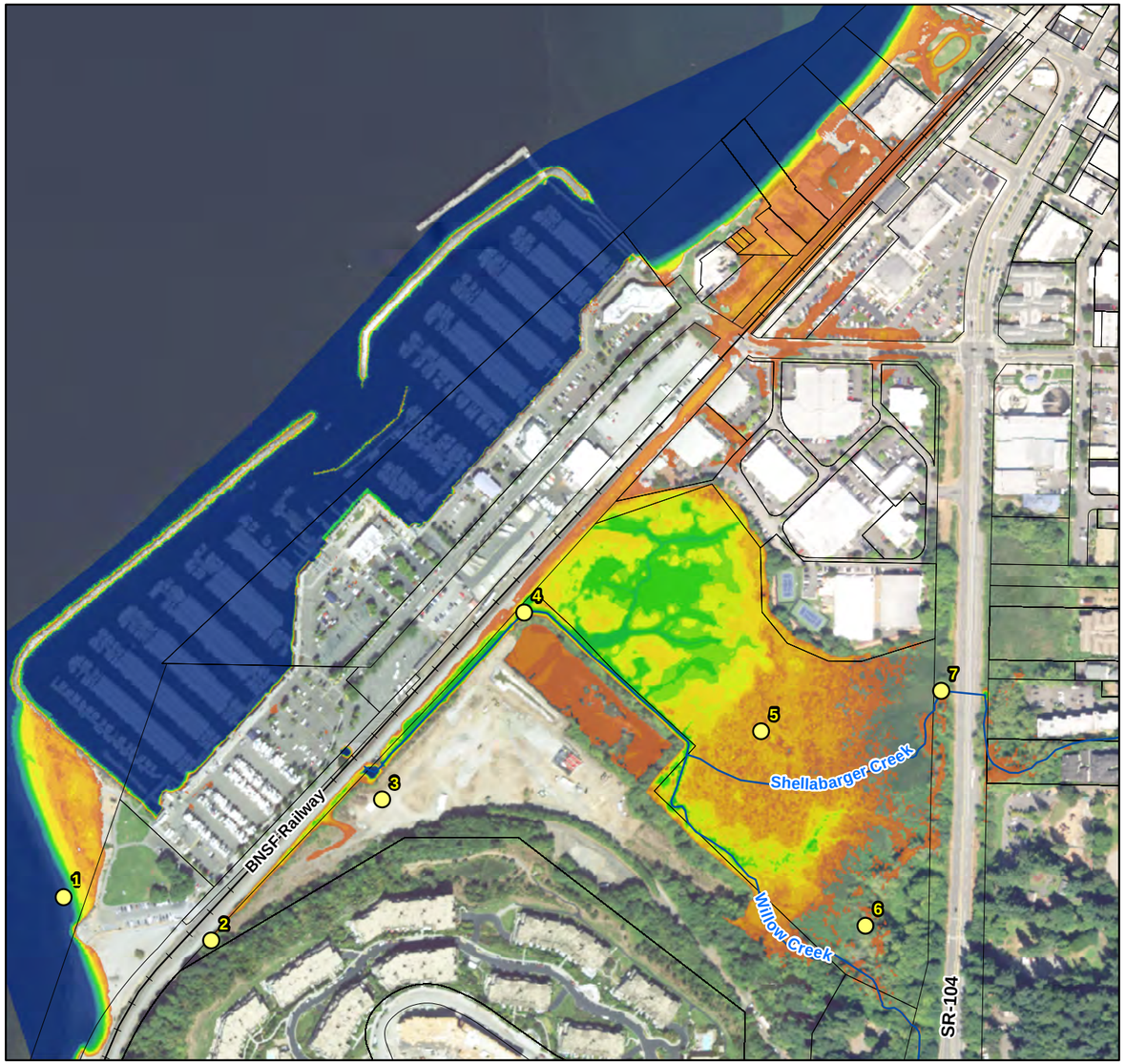
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 28B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure16B_Existing_Alternative5_KingTide_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5 KING TIDE WITH SLR 2100 AND LATE SPRING FISH HABITAT INFLOW HYDROGRAPHS MAXIMUM INUNDATION DEPTHS (FT)

N W E S

0 450 900
Feet

CITY OF EDMONDS Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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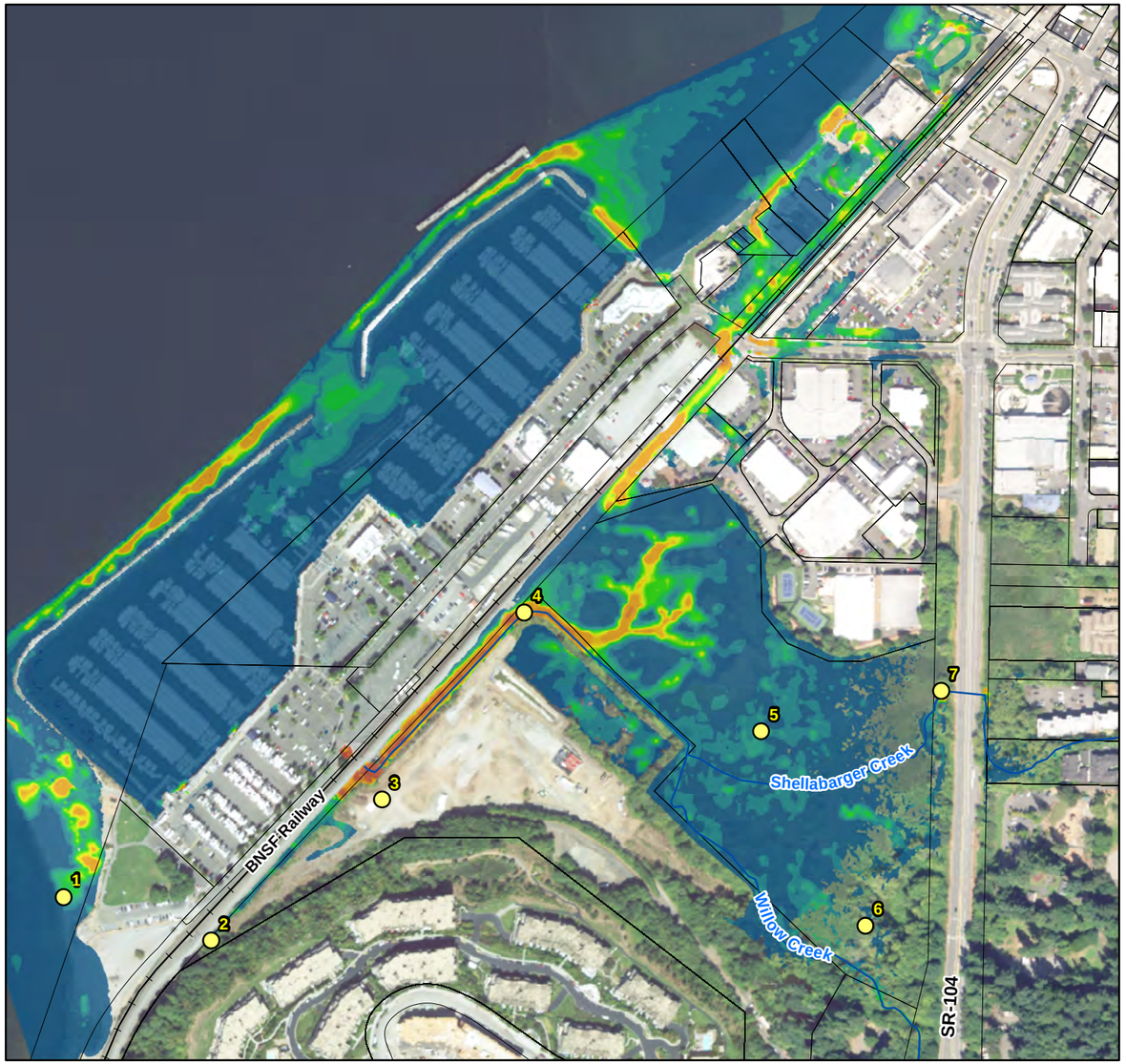
FIG. 29A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure17A_Existing_Alternative5_KingTideSLR2100_Habitat_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5 KING TIDE WITH SLR-2100 AND LATE SPRING FISH HABITAT INFLOW HYDROGRAPHS MAXIMUM VELOCITIES (FT/S)

N W E S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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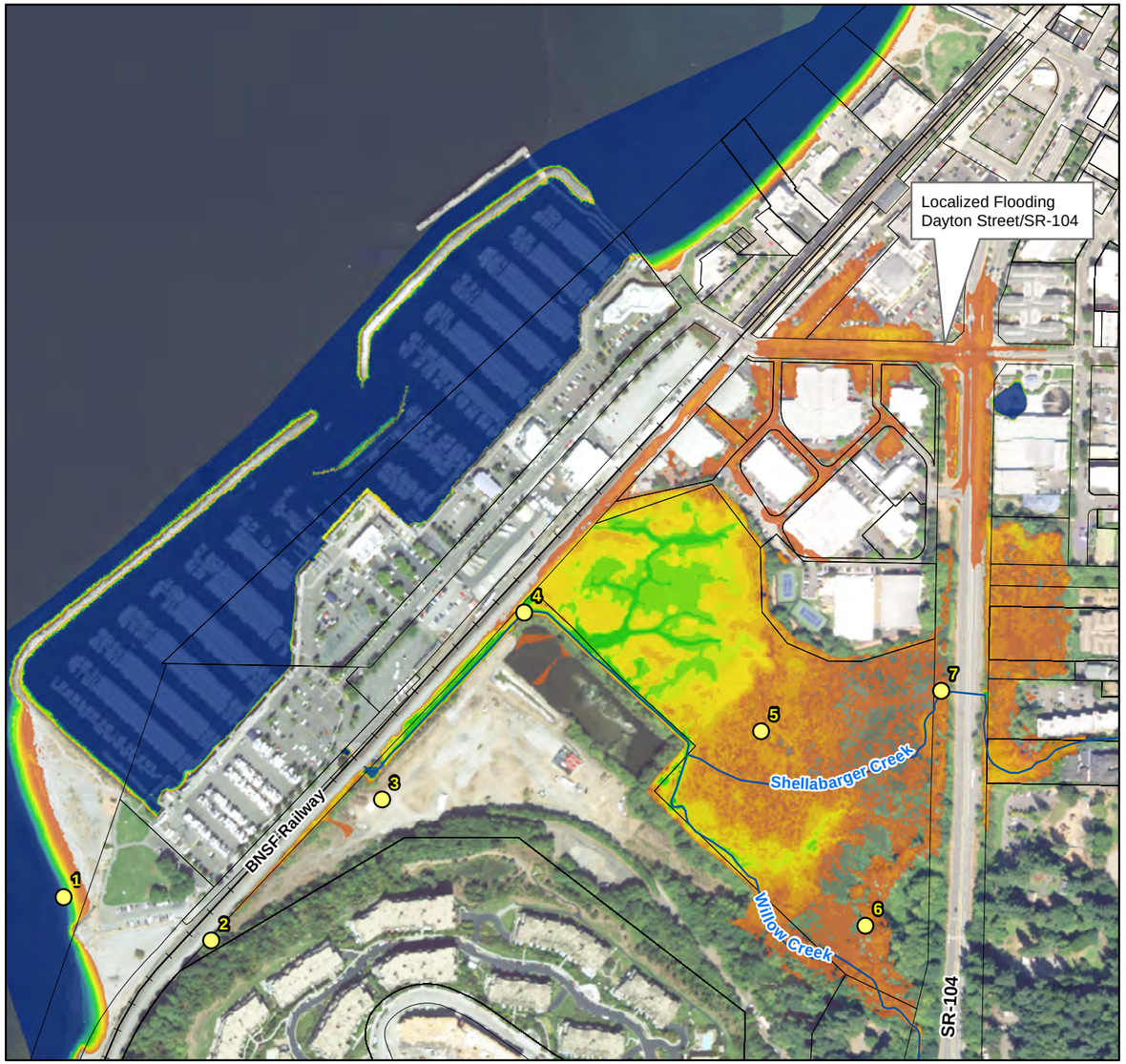
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 29B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure17B_Existing_Alternative5_KingTideSLR2100_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N W E S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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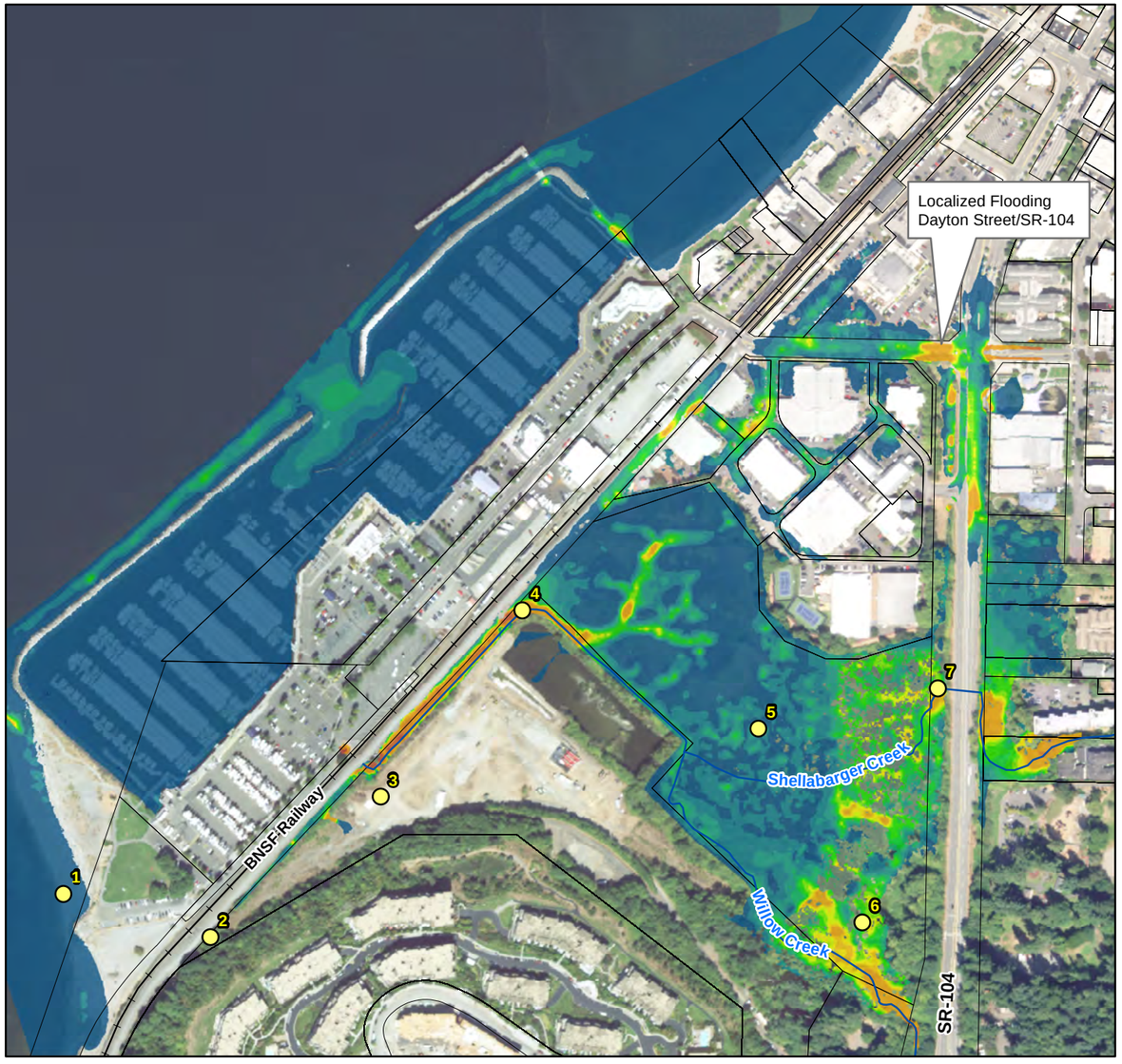
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 30A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure18A_Existing_Alternative5_KingTide_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N W E S

CITY OF EDMONDS Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 30B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure18B_Existing_Alternative5_KingTide_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5
KING TIDE WITH SLR-2100 AND
SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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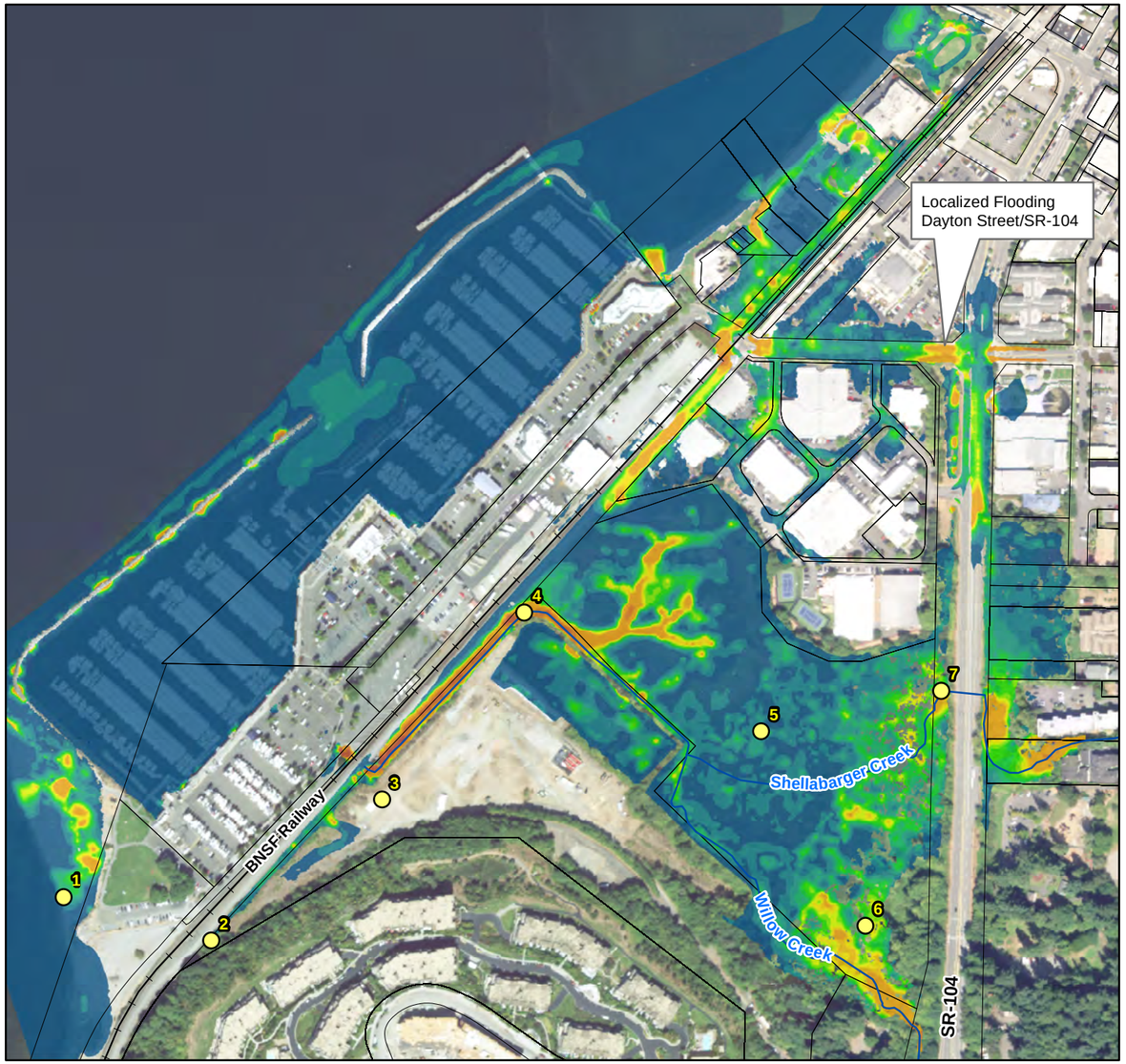
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 31A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure19A_Existing_Alternative5_KingTideSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5 KING TIDE WITH SLR-2100 AND SAIC 1% (100-YR) AEP INFLOW HYDROGRAPHS MAXIMUM VELOCITIES (FT/S)

N W E S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 31B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure19B_Existing_Alternative5_KingTideSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5
STORM SURGE TIDE
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N W E S

0 450 900
Feet

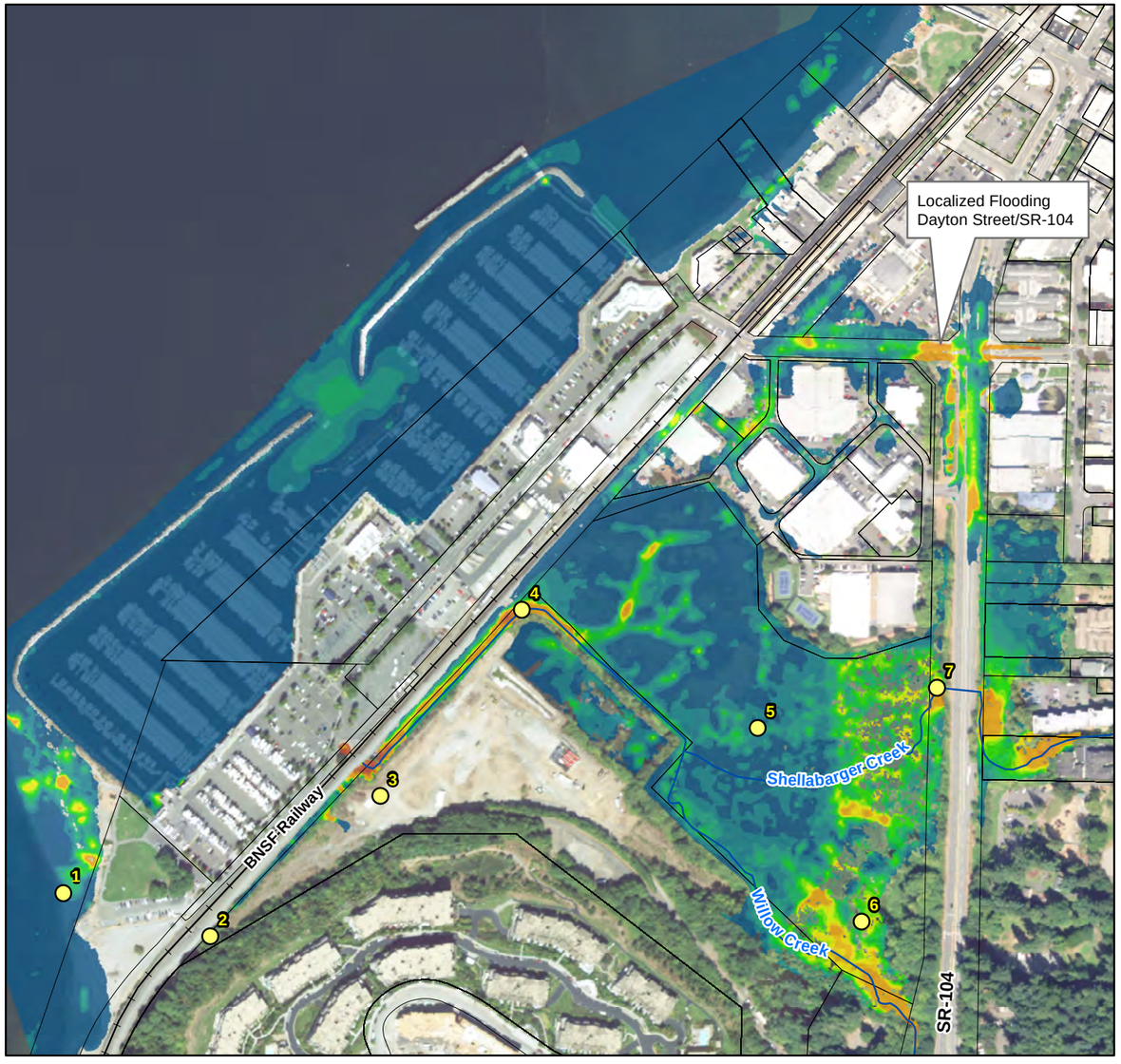
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 32A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure22A_Existing_Alternative5_StormSurge_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5
STORM SURGE TIDE
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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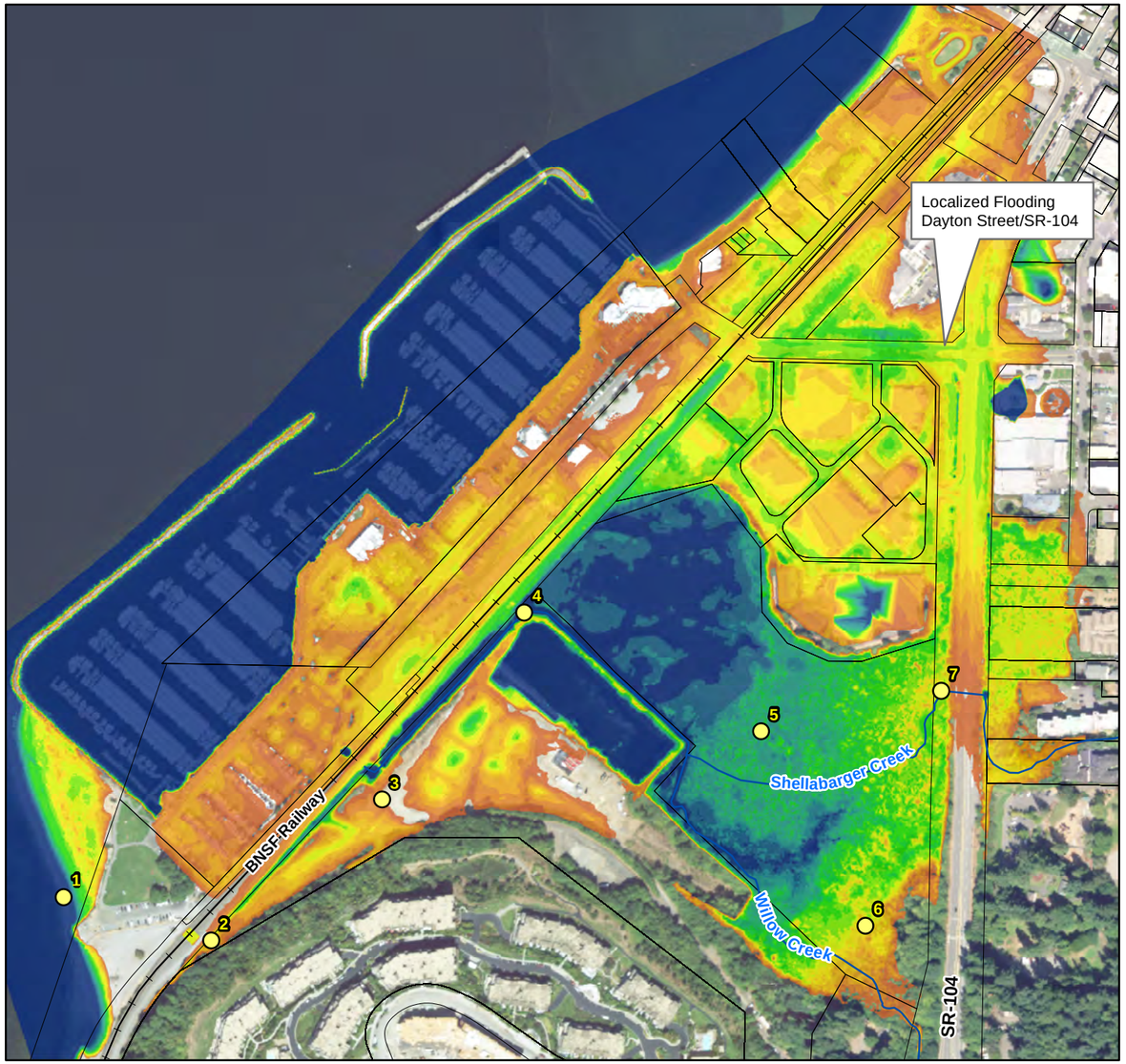
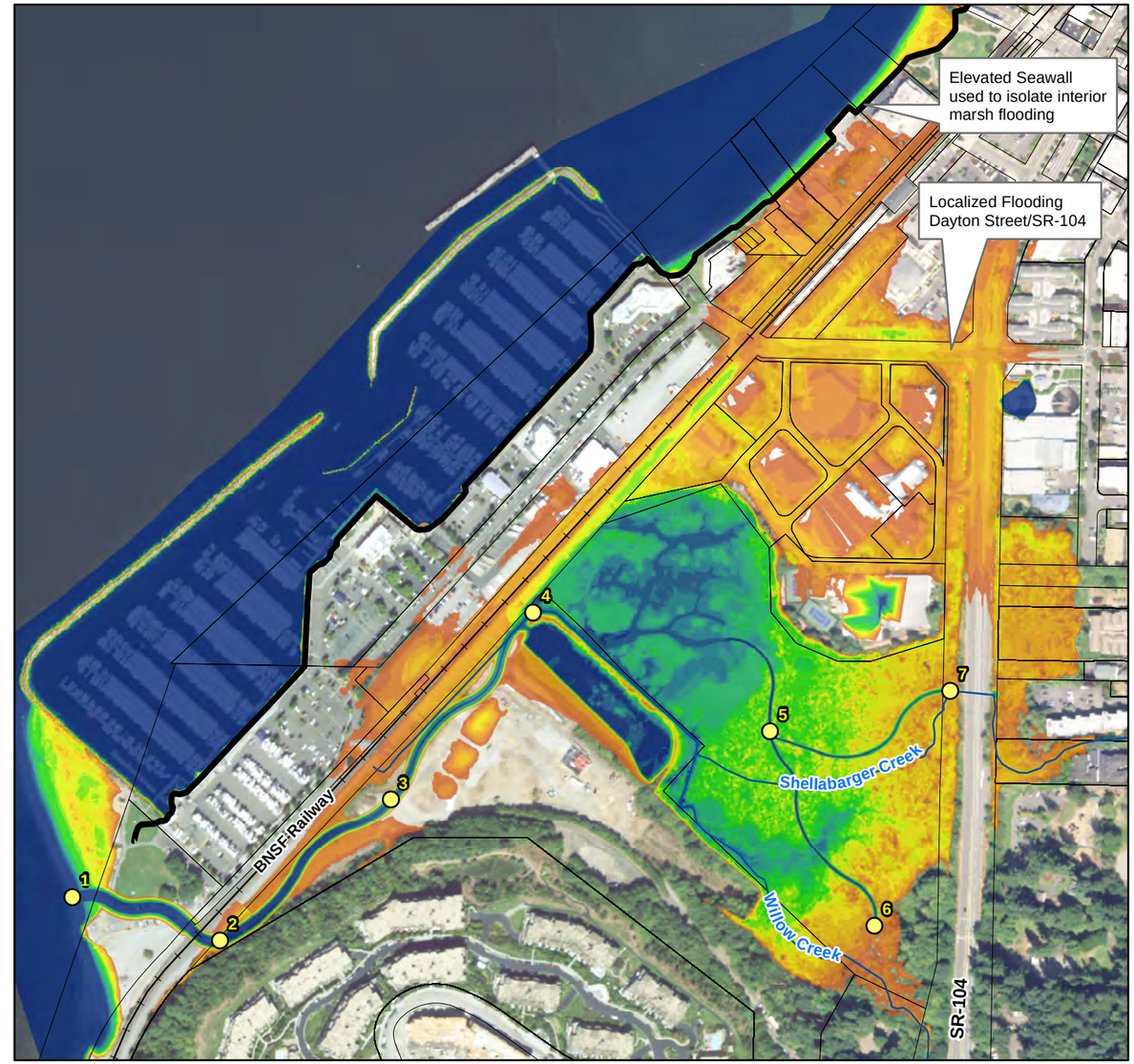
FIG. 32B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure22B_Existing_Alternative5_StormSurge_SAIC_Velocities.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 5
STORM SURGE TIDE WITH SLR-2100
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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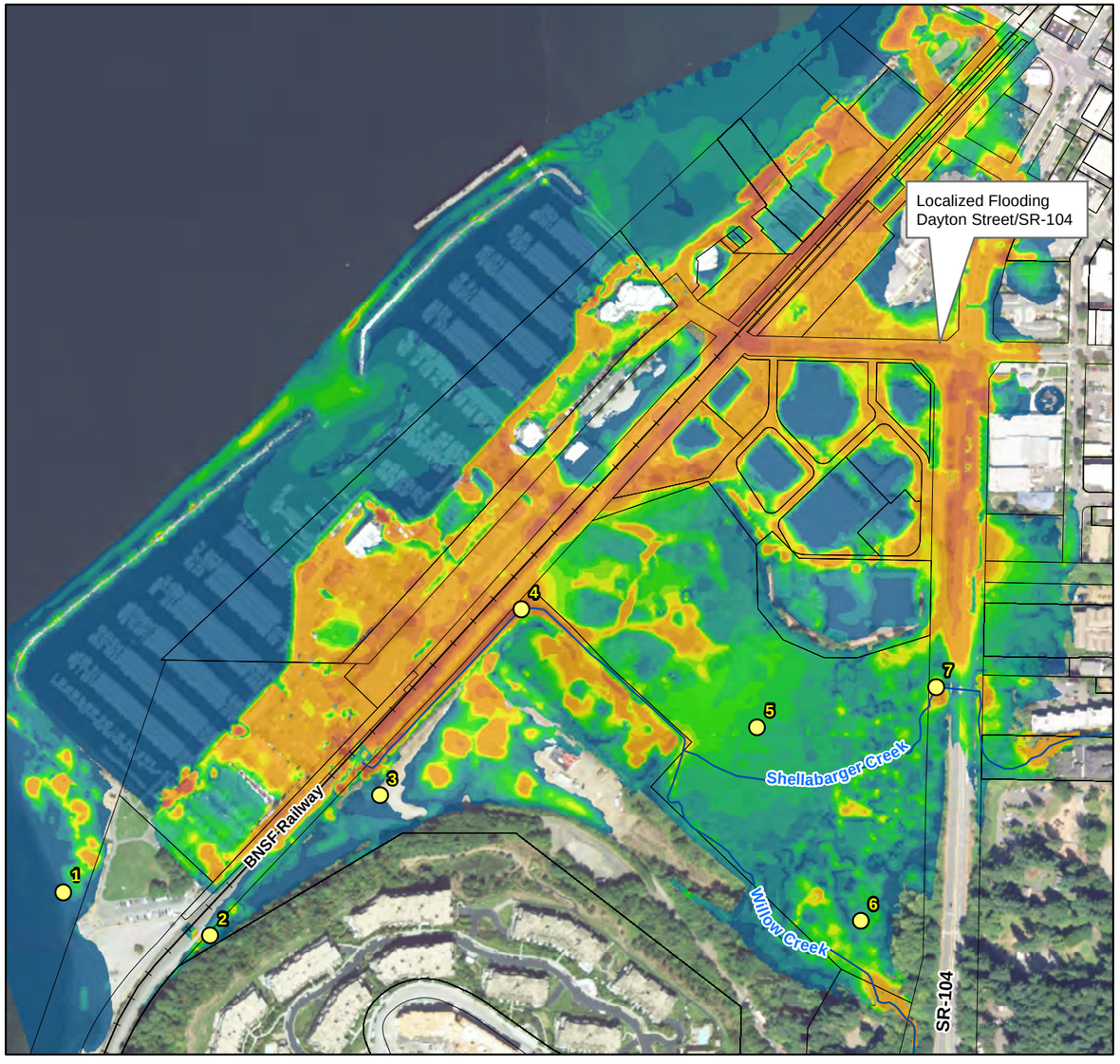
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 33A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure23A_Existing_Alternative5_StormSurgeSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 5
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 5
STORM SURGE TIDE WITH SLR-2100
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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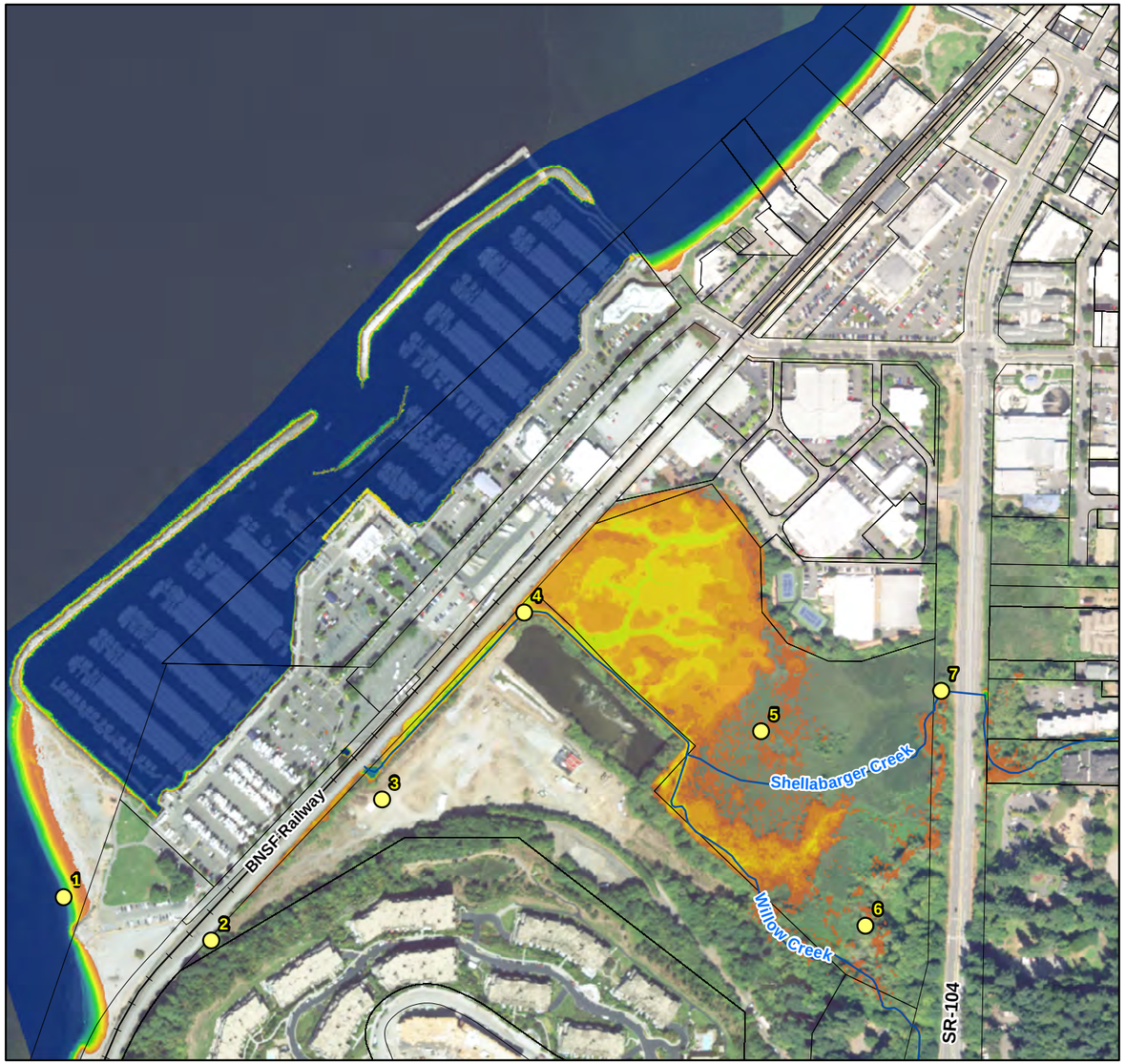
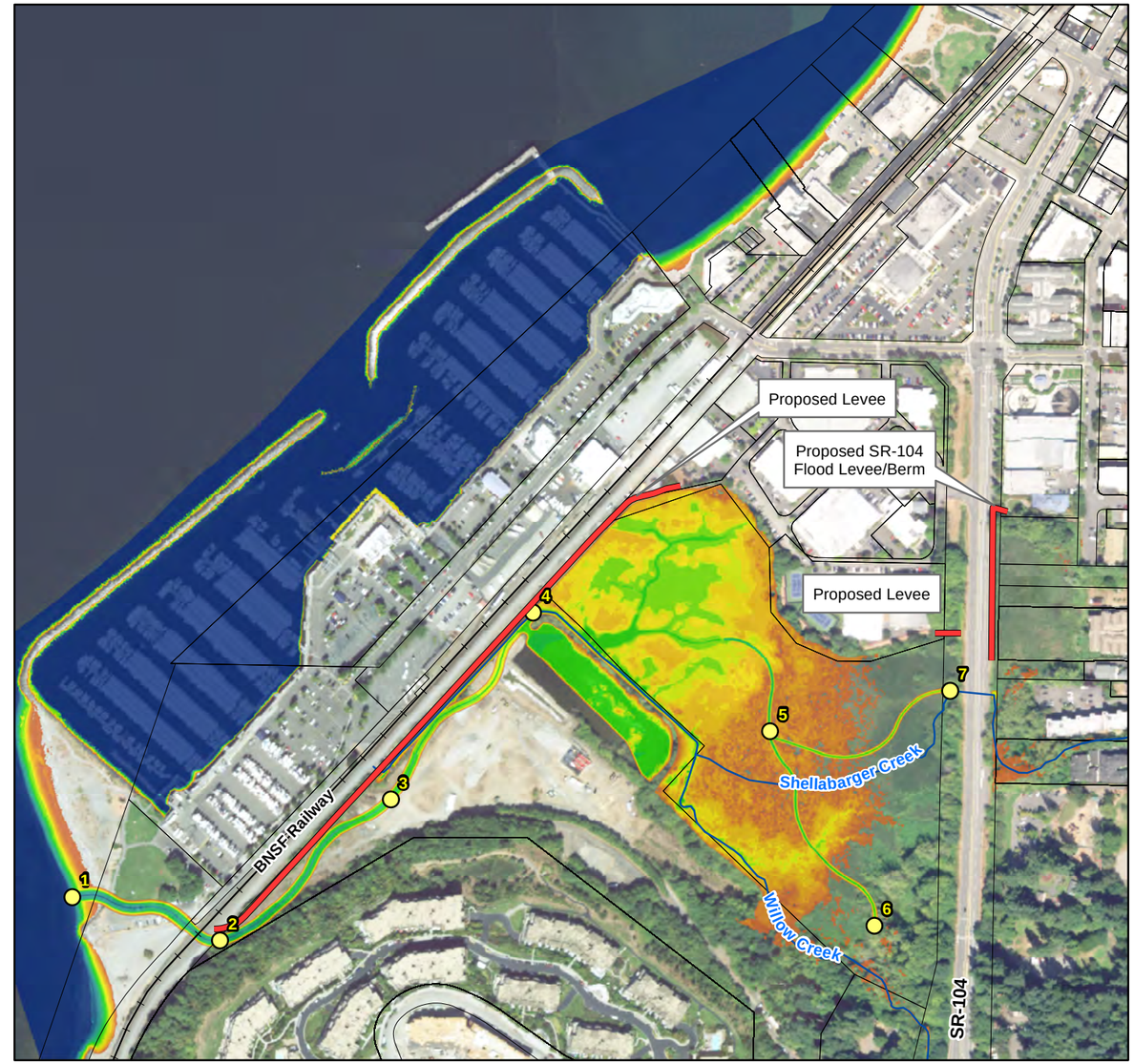
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 33B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure23B_Existing_Alternative5_StormSurgeSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
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EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 34A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure26A_Existing_Alternative6_KingTide_Habitat_Depth.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS

ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

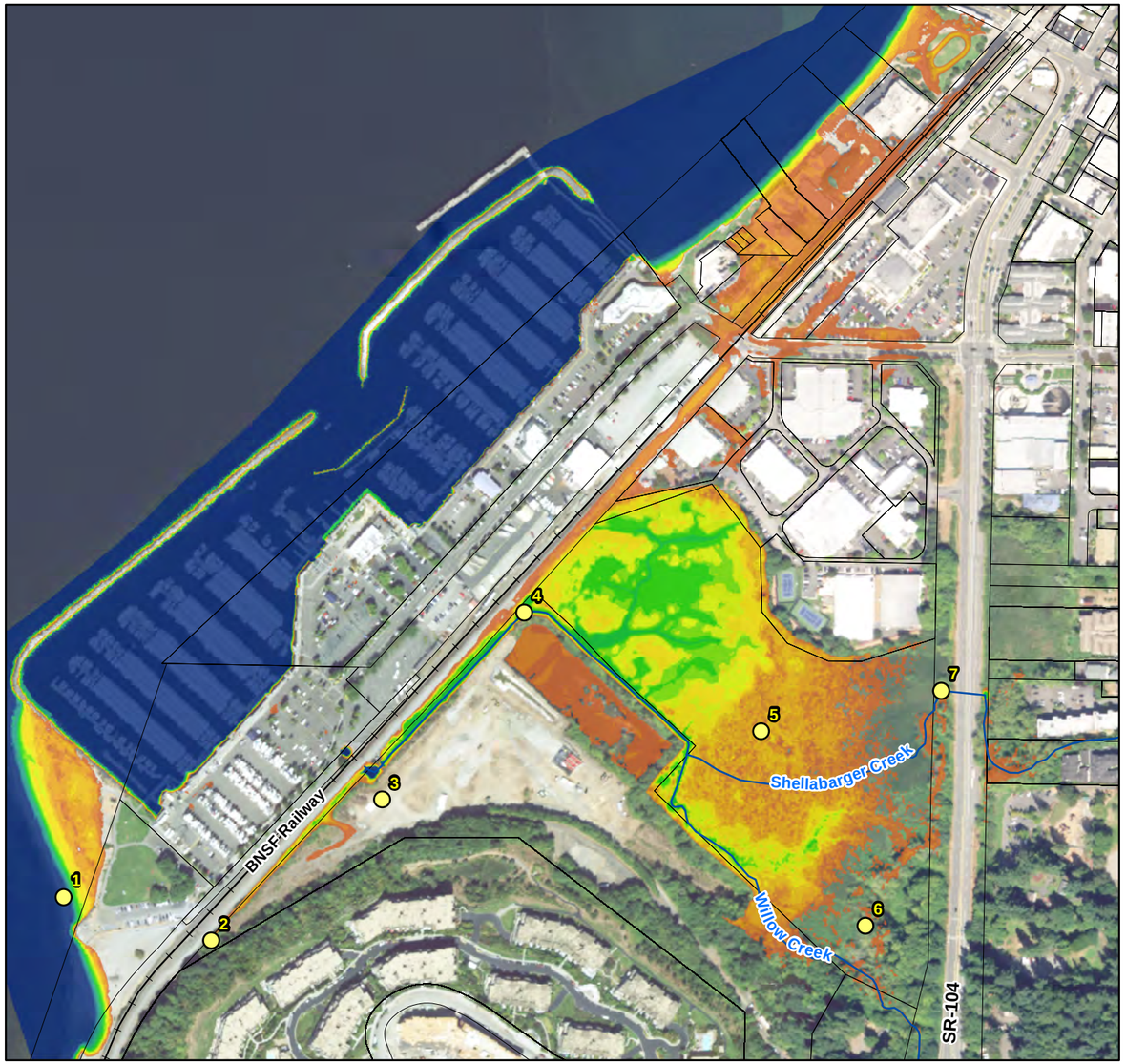
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

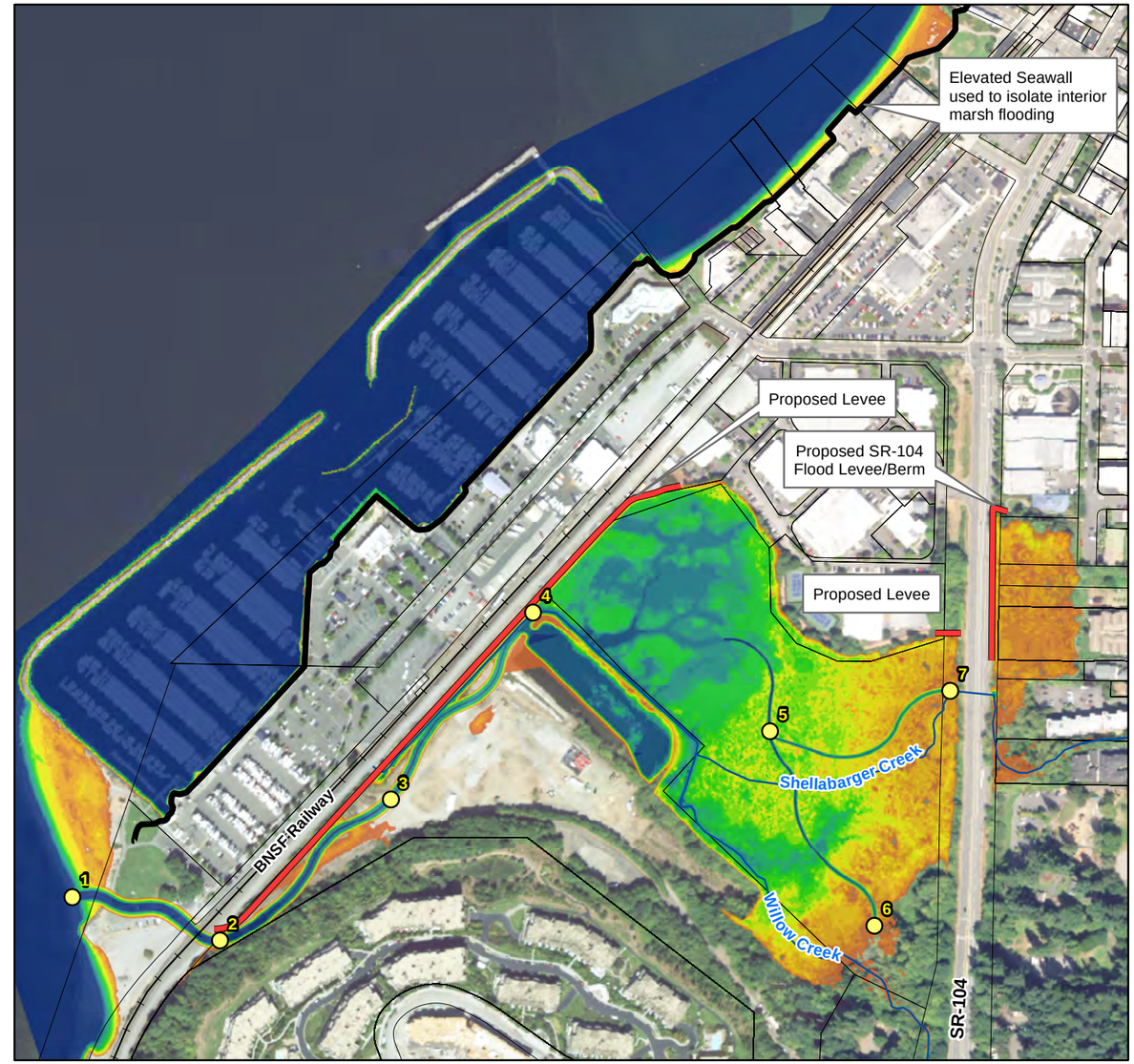
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 34B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure26B_Existing_Alternative6_KingTide_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SLR-2100
AND LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

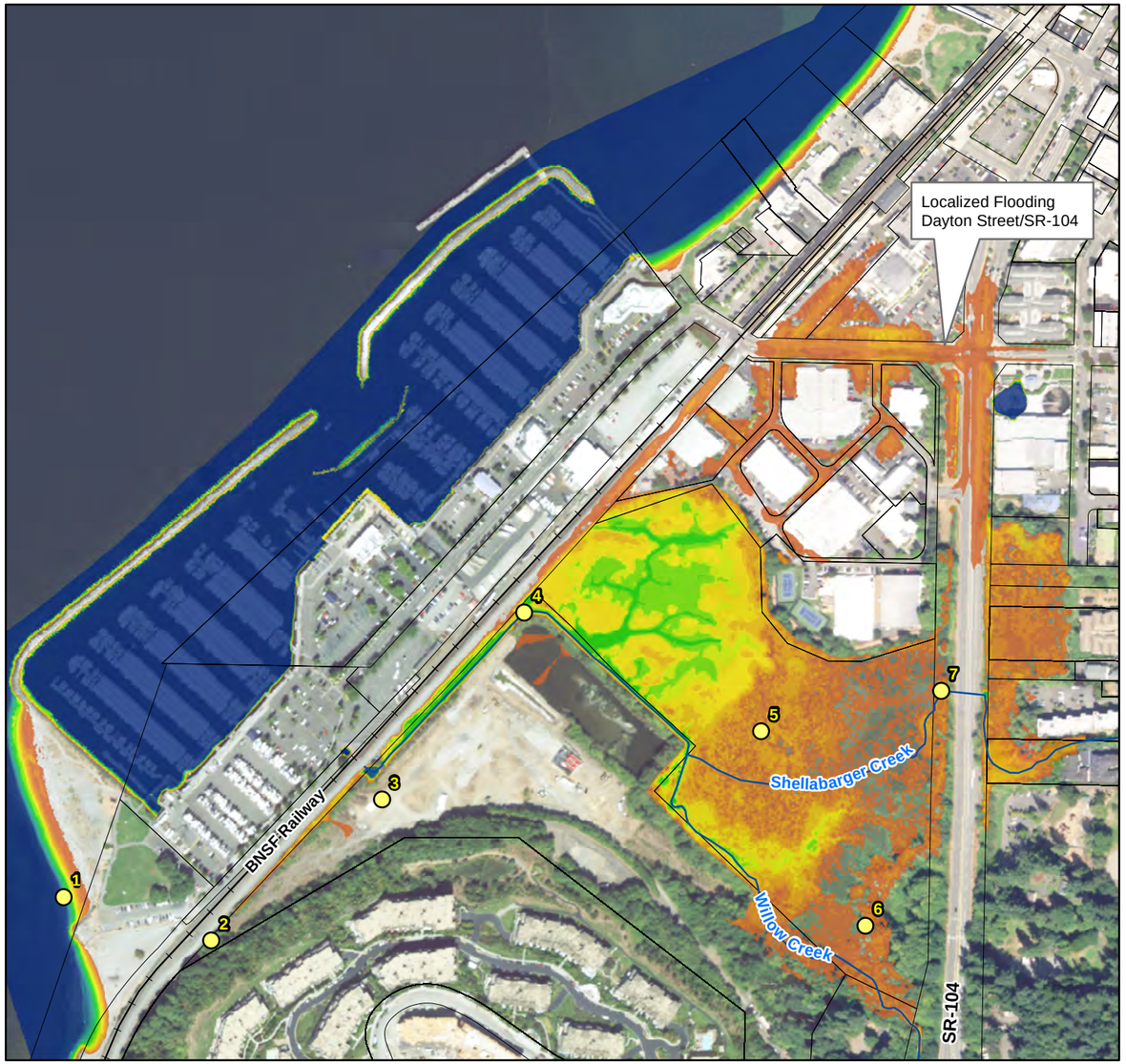
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 35A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure27A_Existing_Alternative6_KingTideSLR2100_Habitat_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

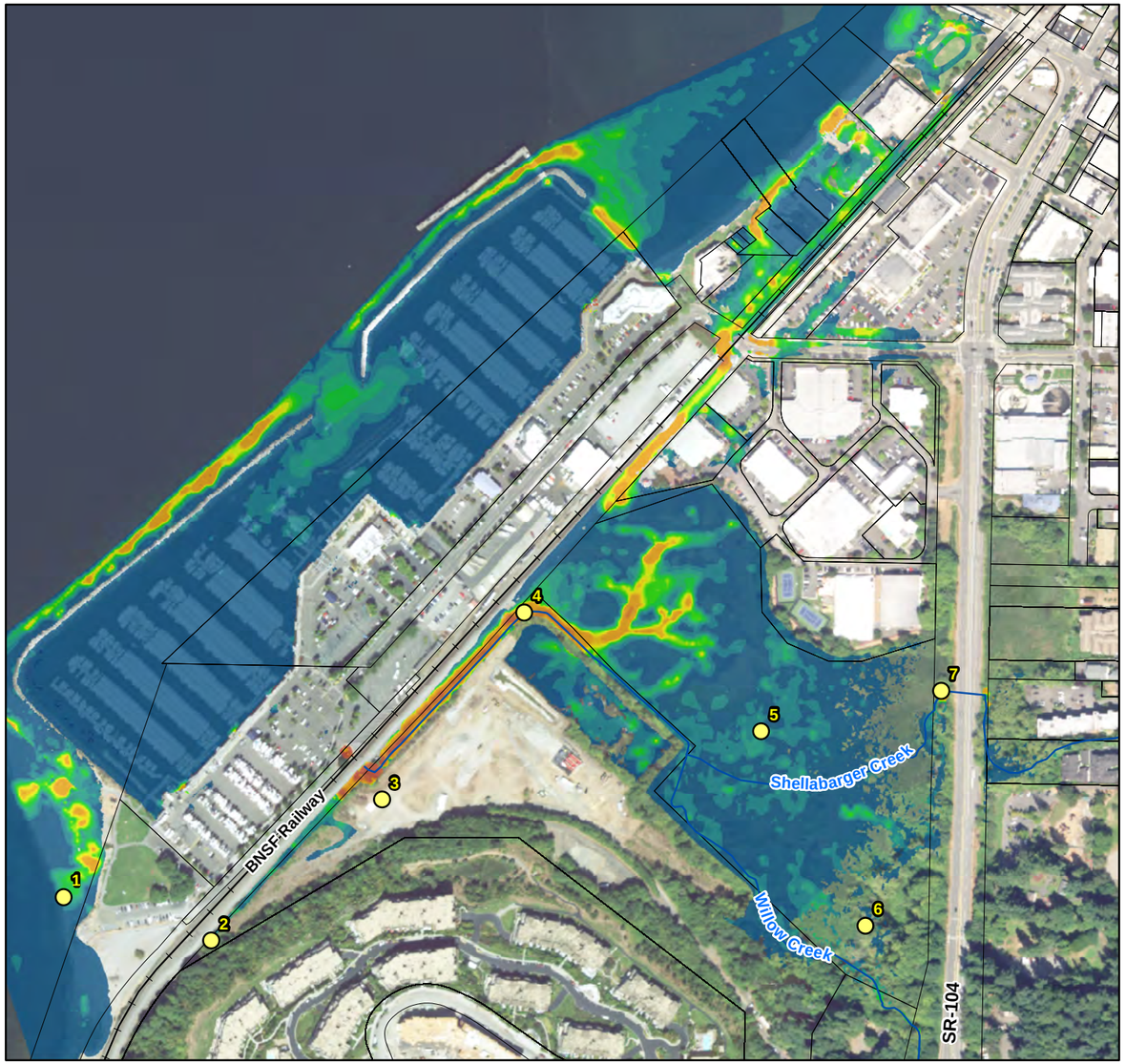
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

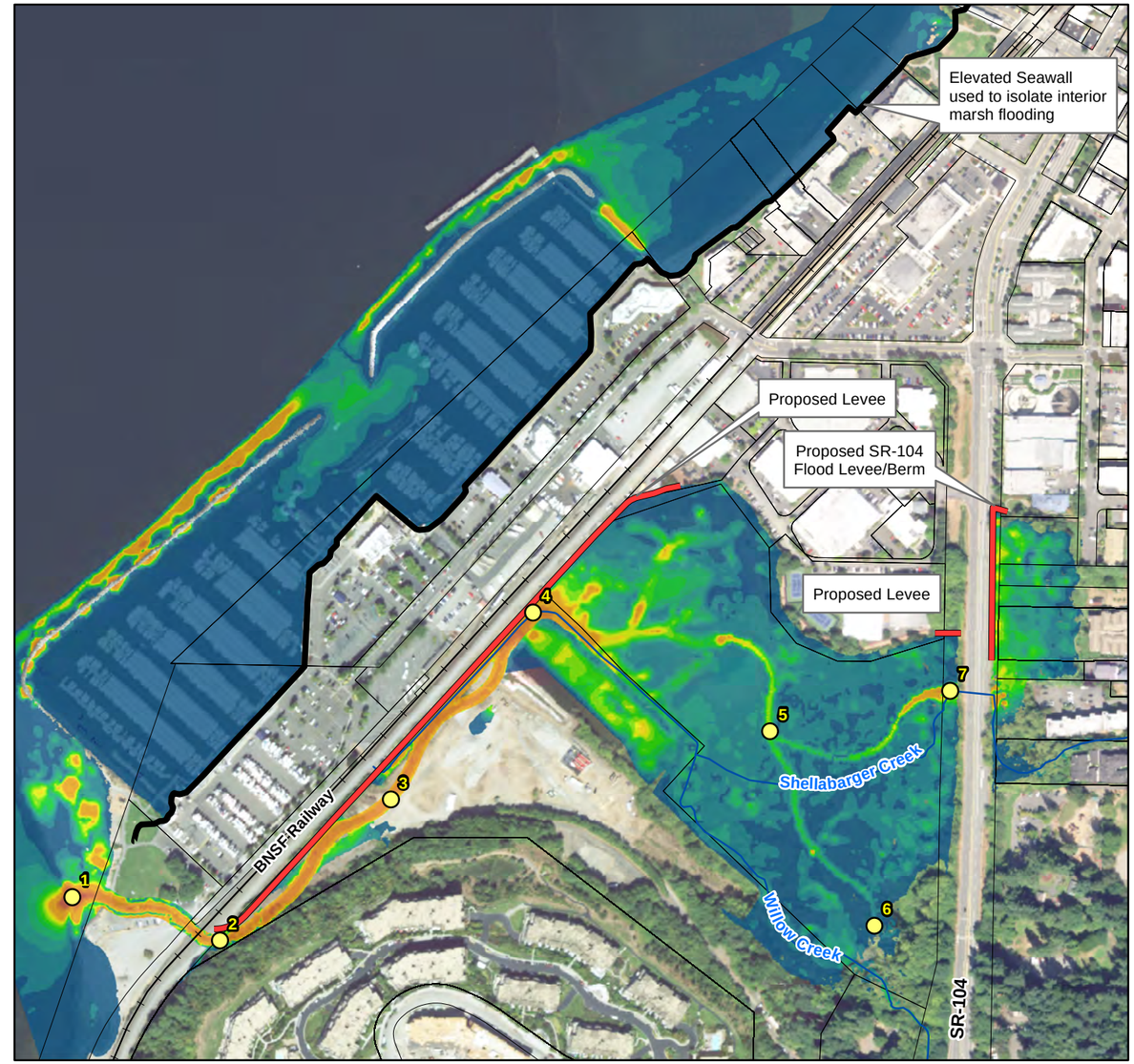
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 36A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure28A_Existing_Alternative6_KingTide_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SLR-2100
AND LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N W E S

0 450 900
Feet

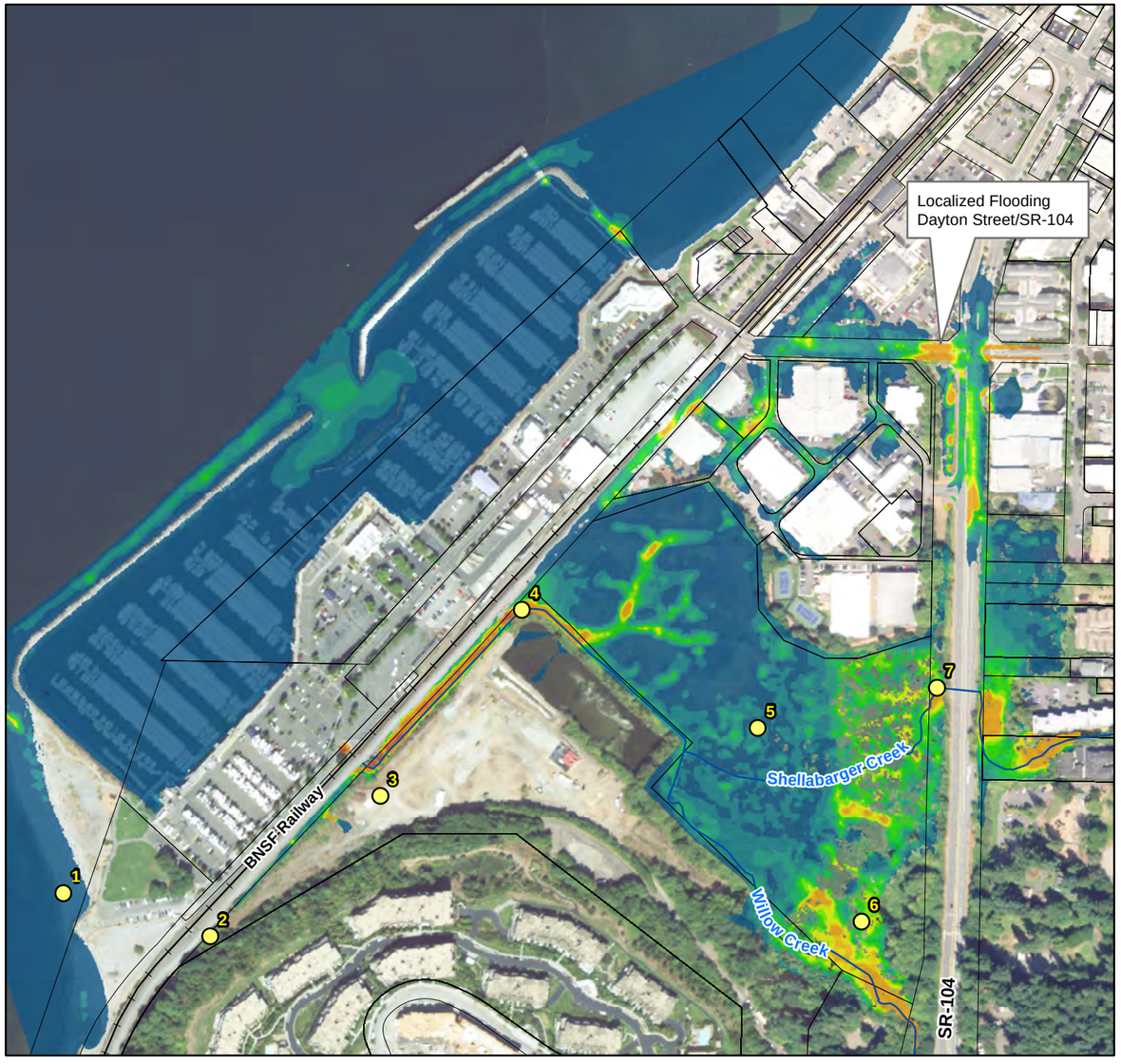
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

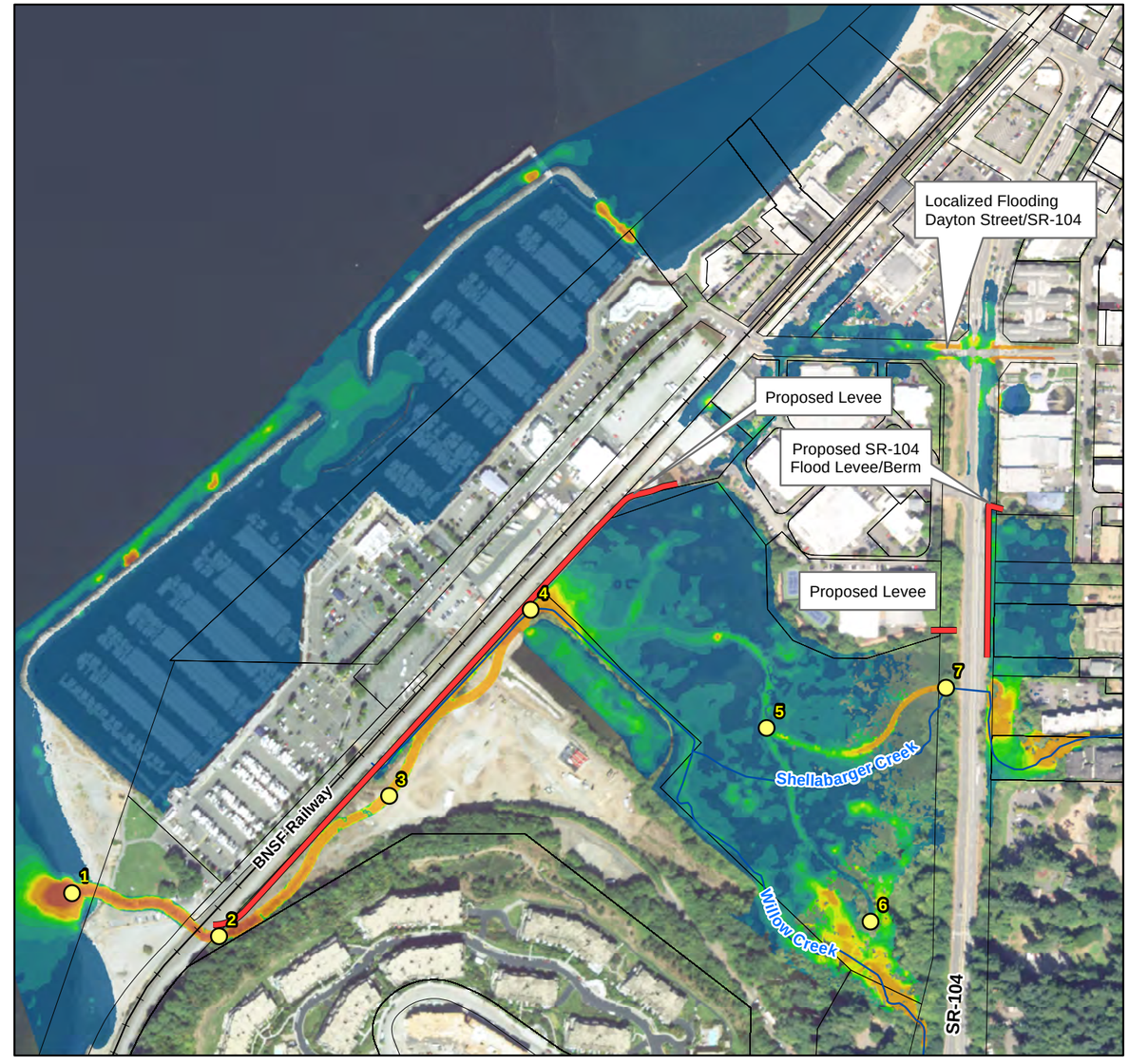
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 35B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure27B_Existing_Alternative6_KingTideSLR2100_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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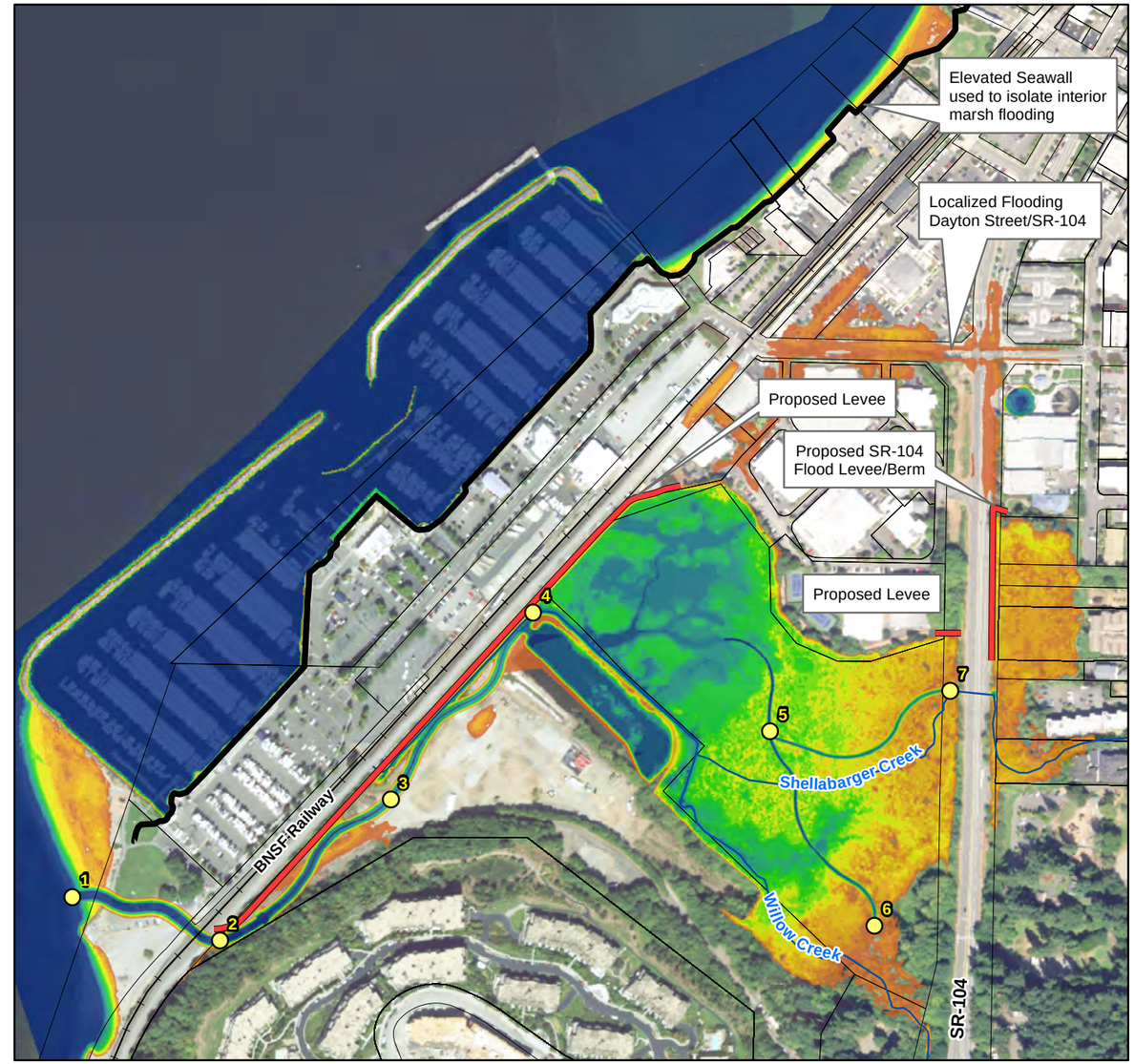
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 36B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure28B_Existing_Alternative6_KingTide_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SLR-2100 AND
SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

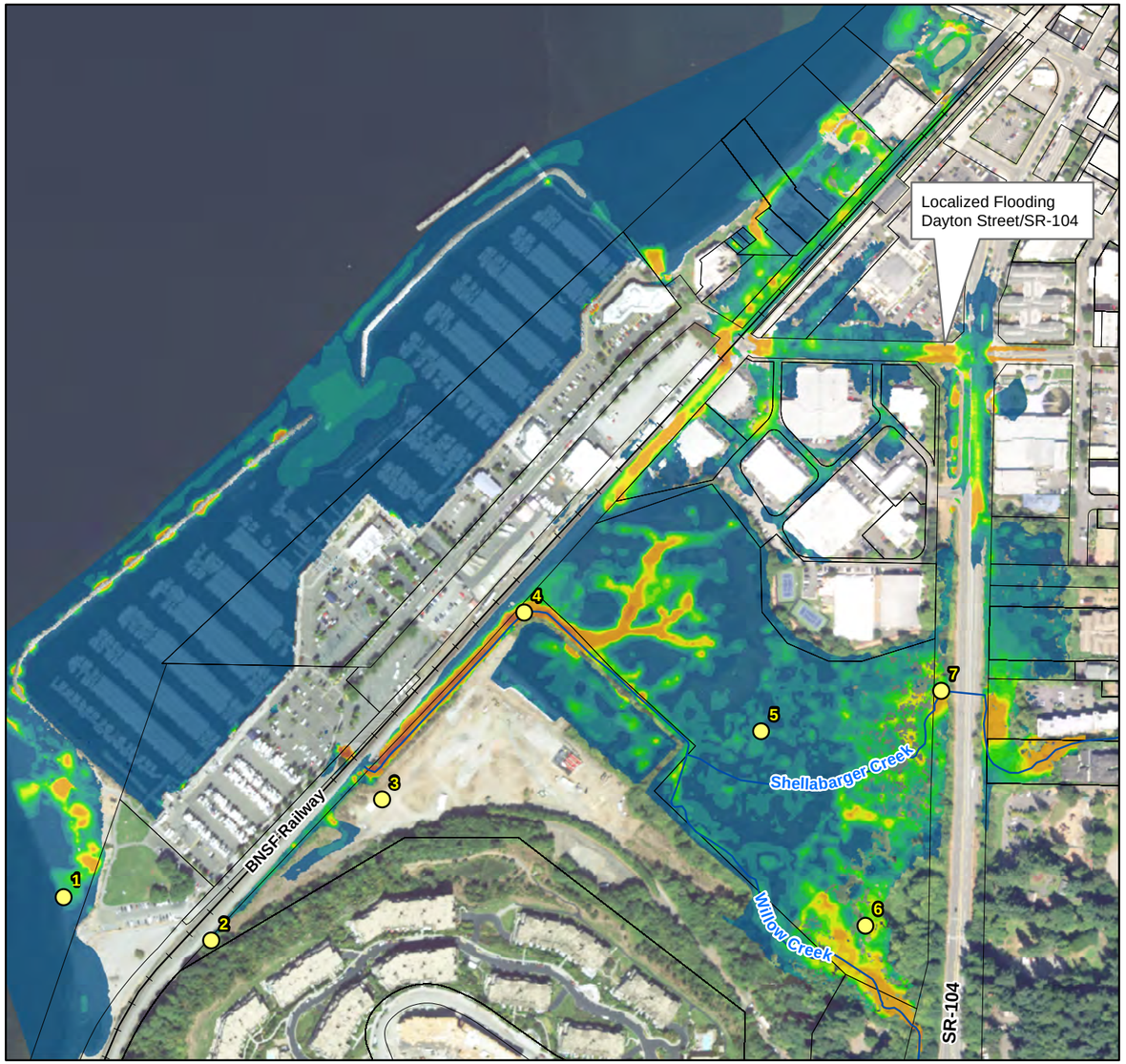
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

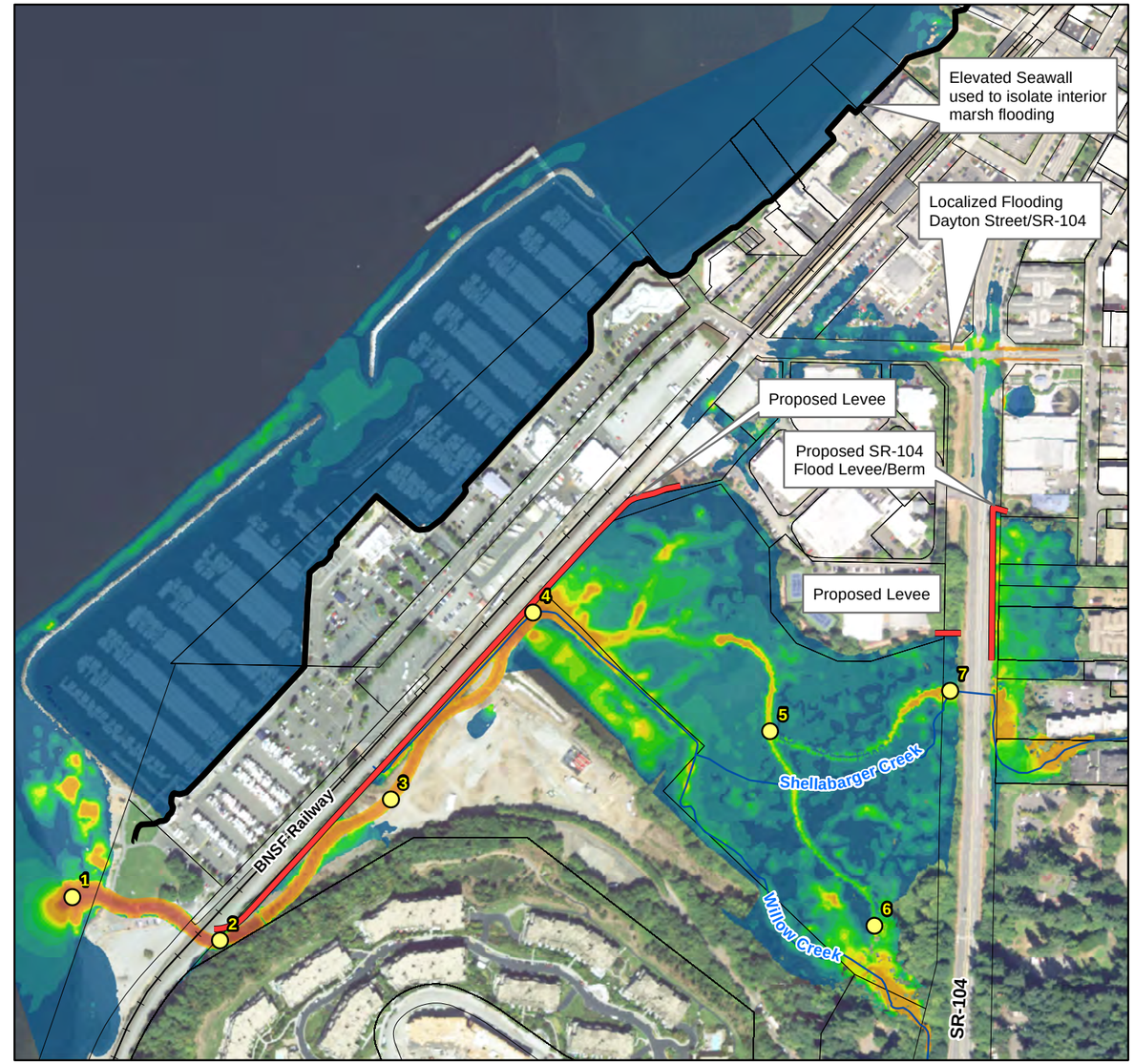
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 37A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure29A_Existing_Alternative6_KingTideSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
KING TIDE WITH SLR-2100 AND
SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 37B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure29B_Existing_Alternative6_KingTideSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS

ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
STORM SURGE TIDE
AND 1% (100-YR) SAIC
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

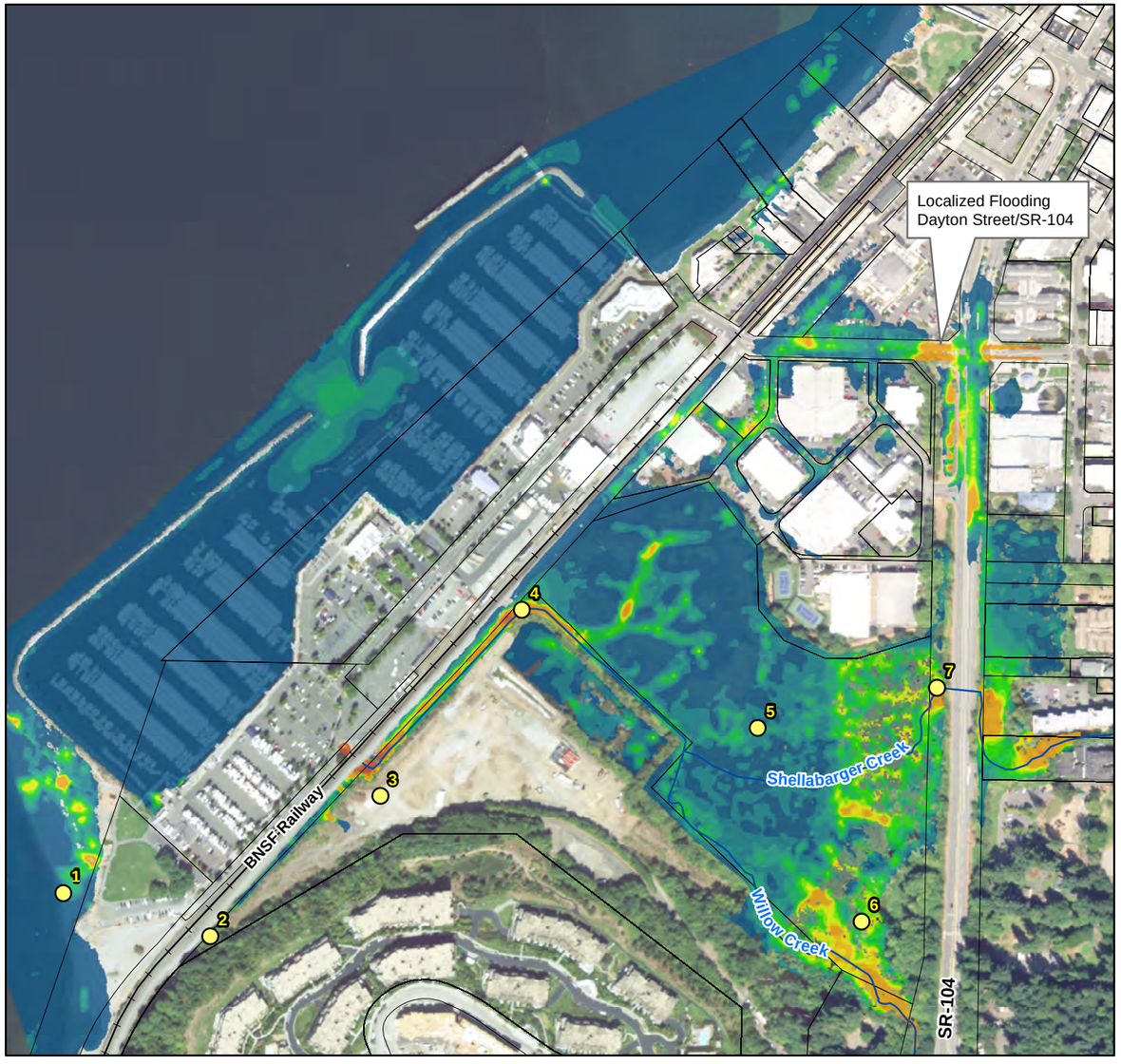
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

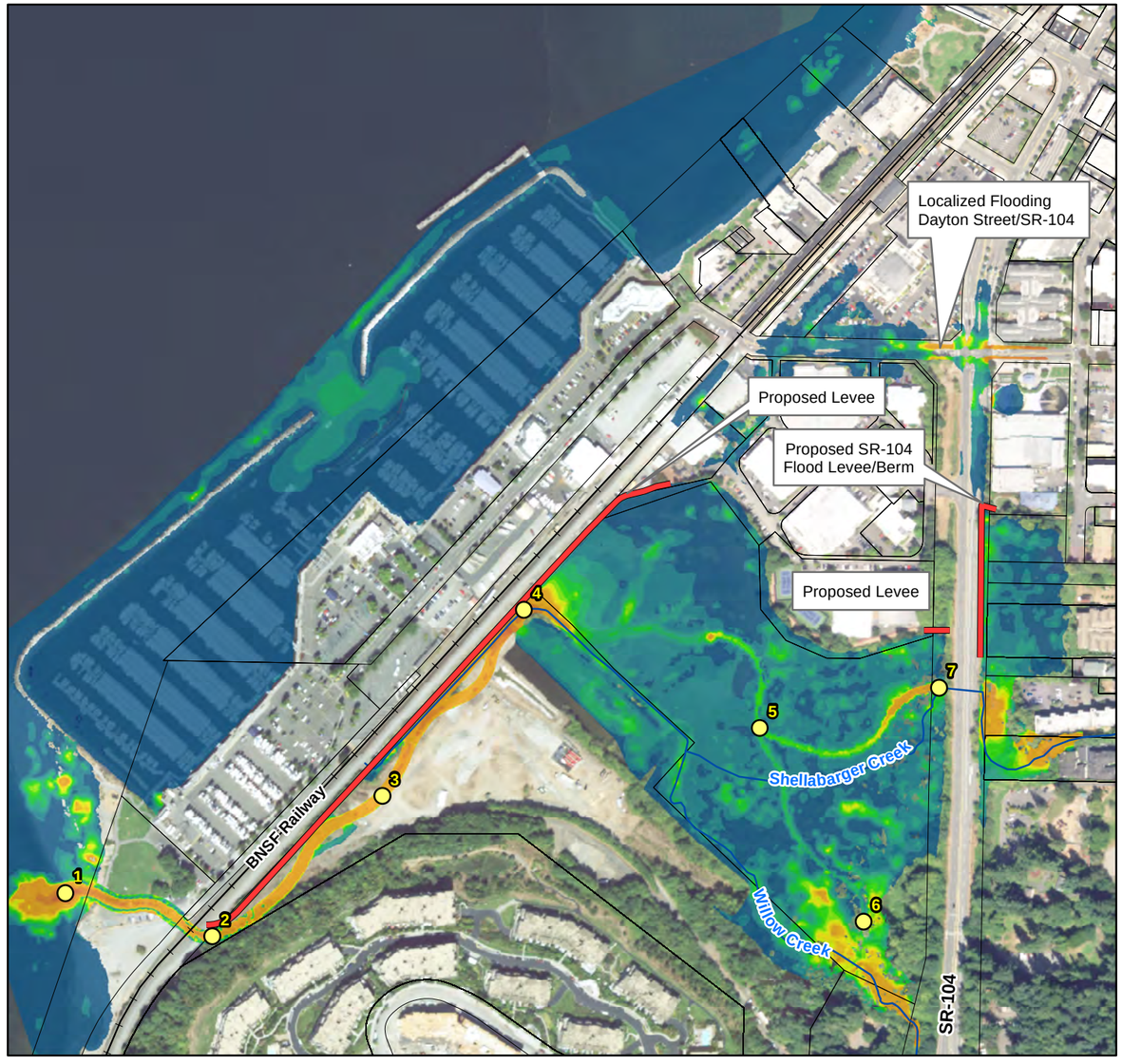
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 38A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure32A_Existing_Alternative6_StormSurge_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
STORM SURGE TIDE
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

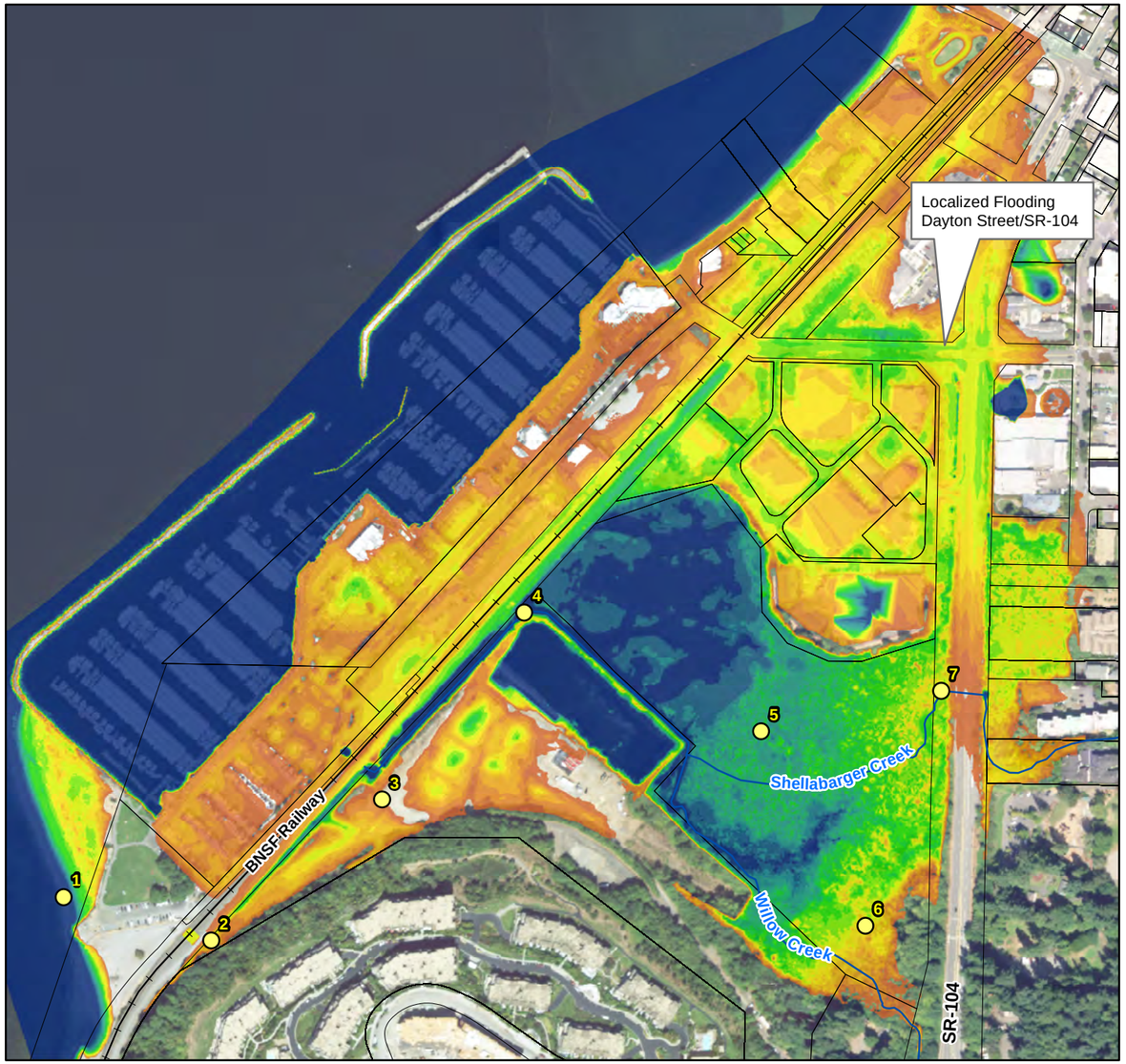
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

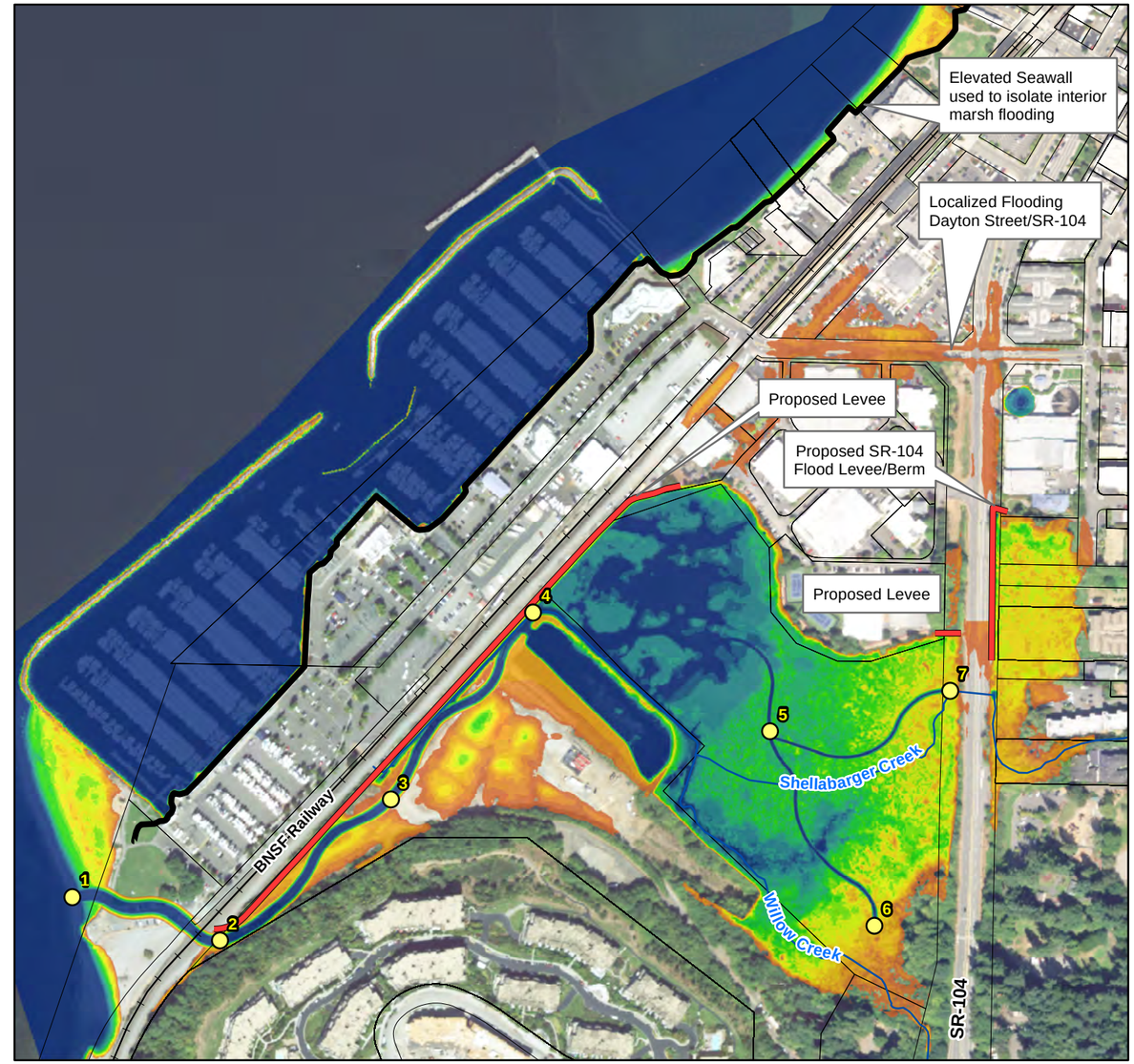
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 38B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure32B_Existing_Alternative6_StormSurge_SAIC_Velocities.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 6
STORM SURGE TIDE WITH SLR-2100
AND 1% (100-YR) SAIC
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N W E S

0 450 900
Feet

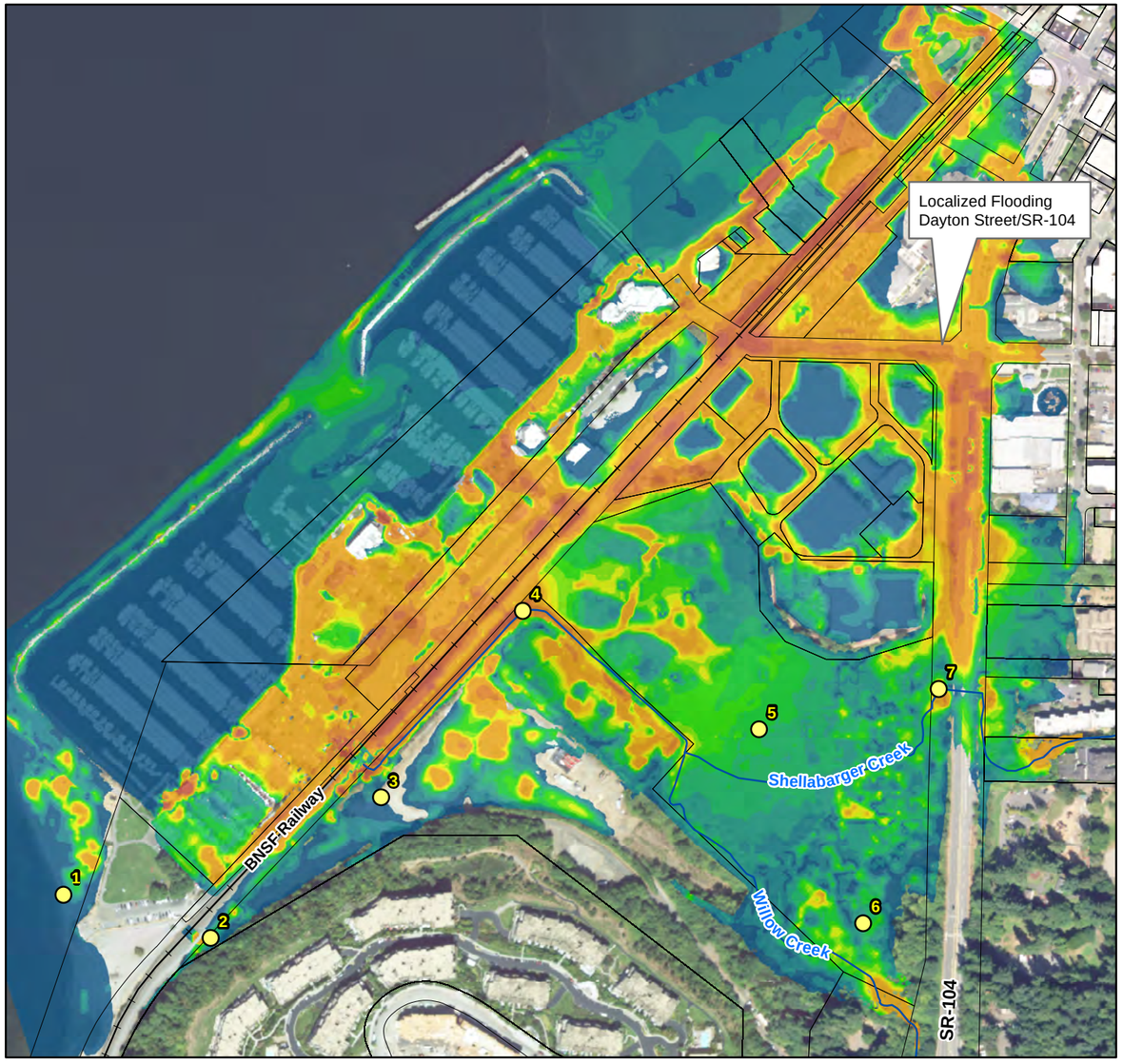
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

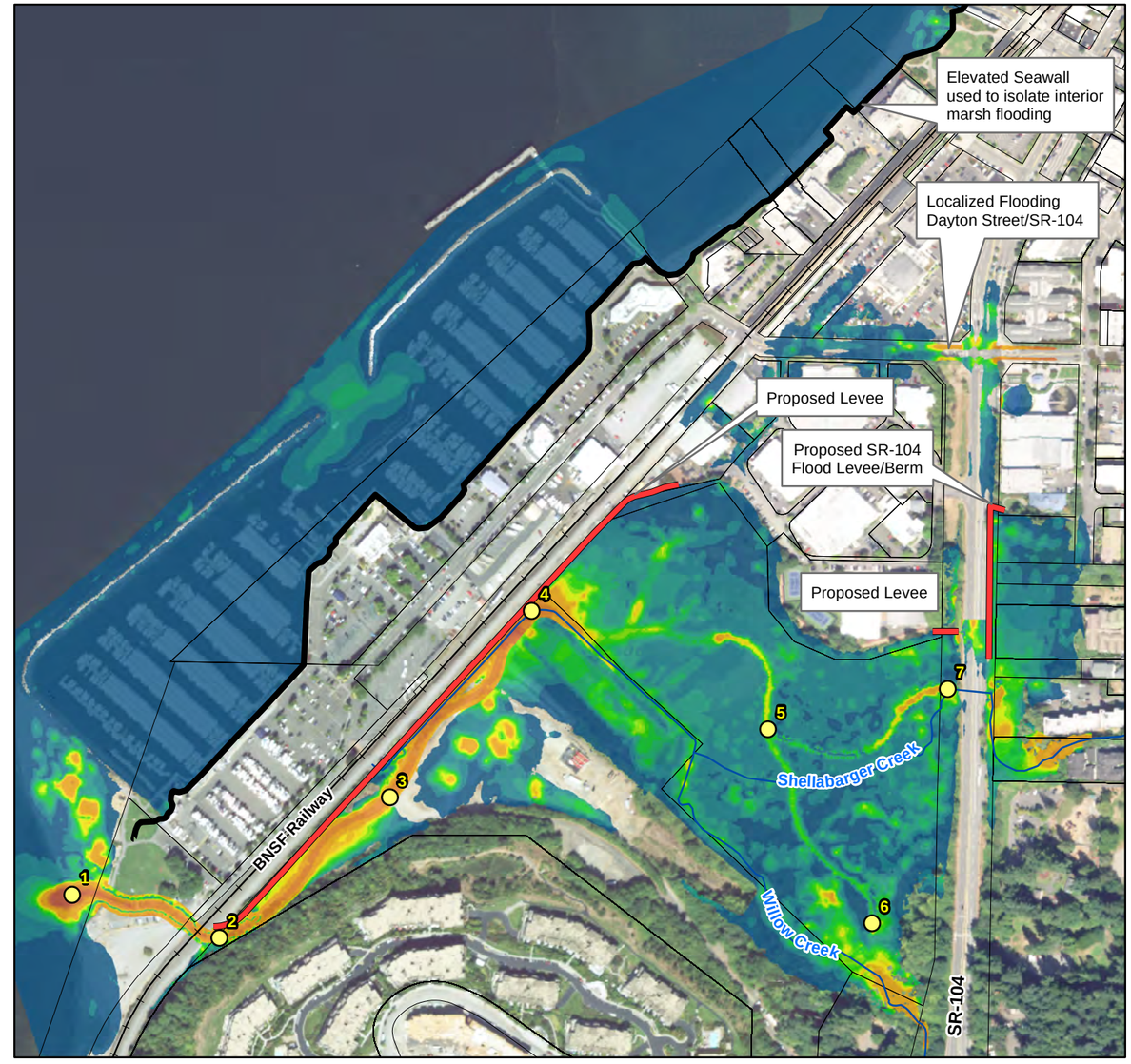
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 39A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure33A_Existing_Alternative6_StormSurgeSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 6
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION LEVEES/BERMS

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 6
STORM SURGE TIDE WITH SLR-2100
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

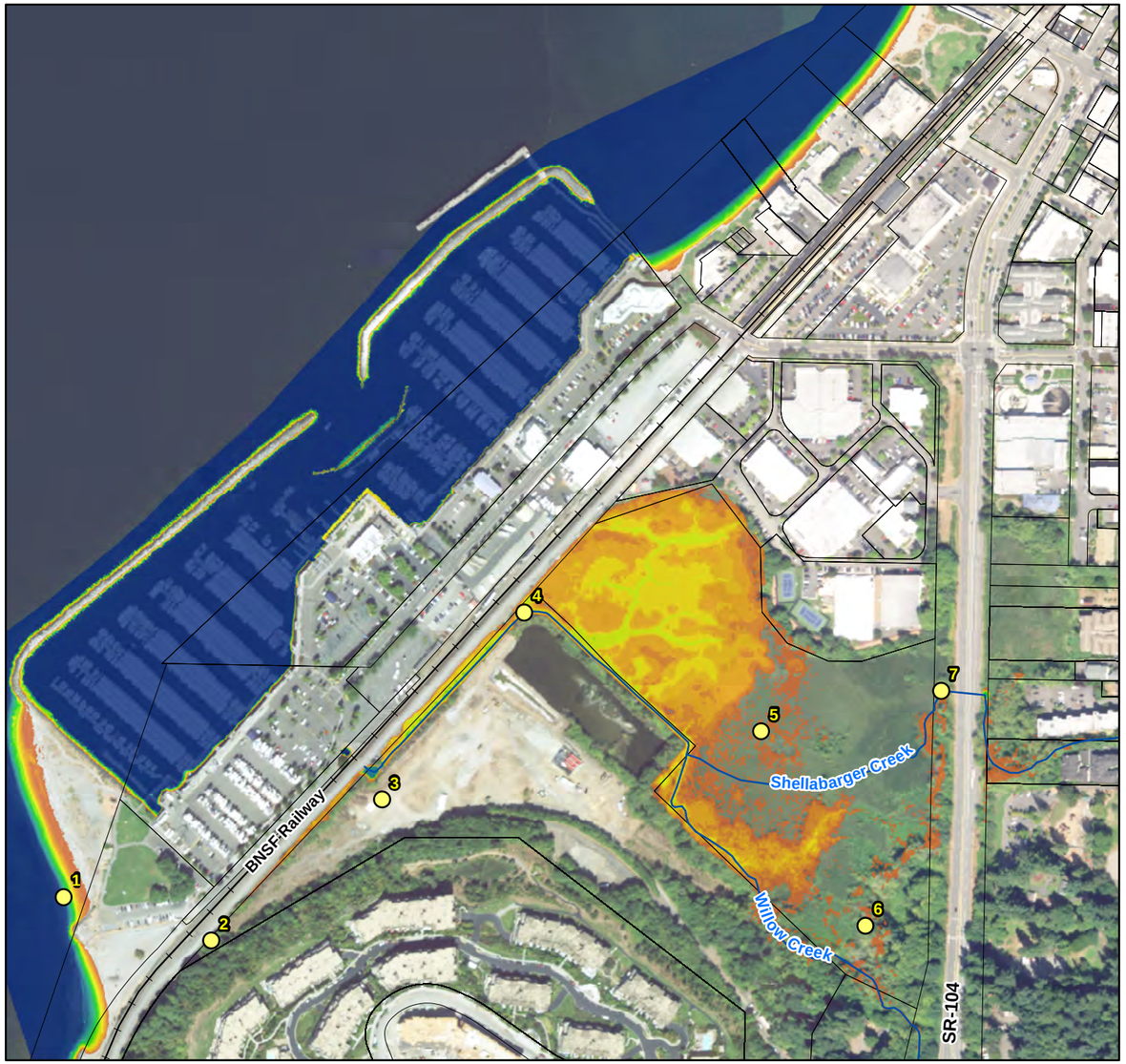
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

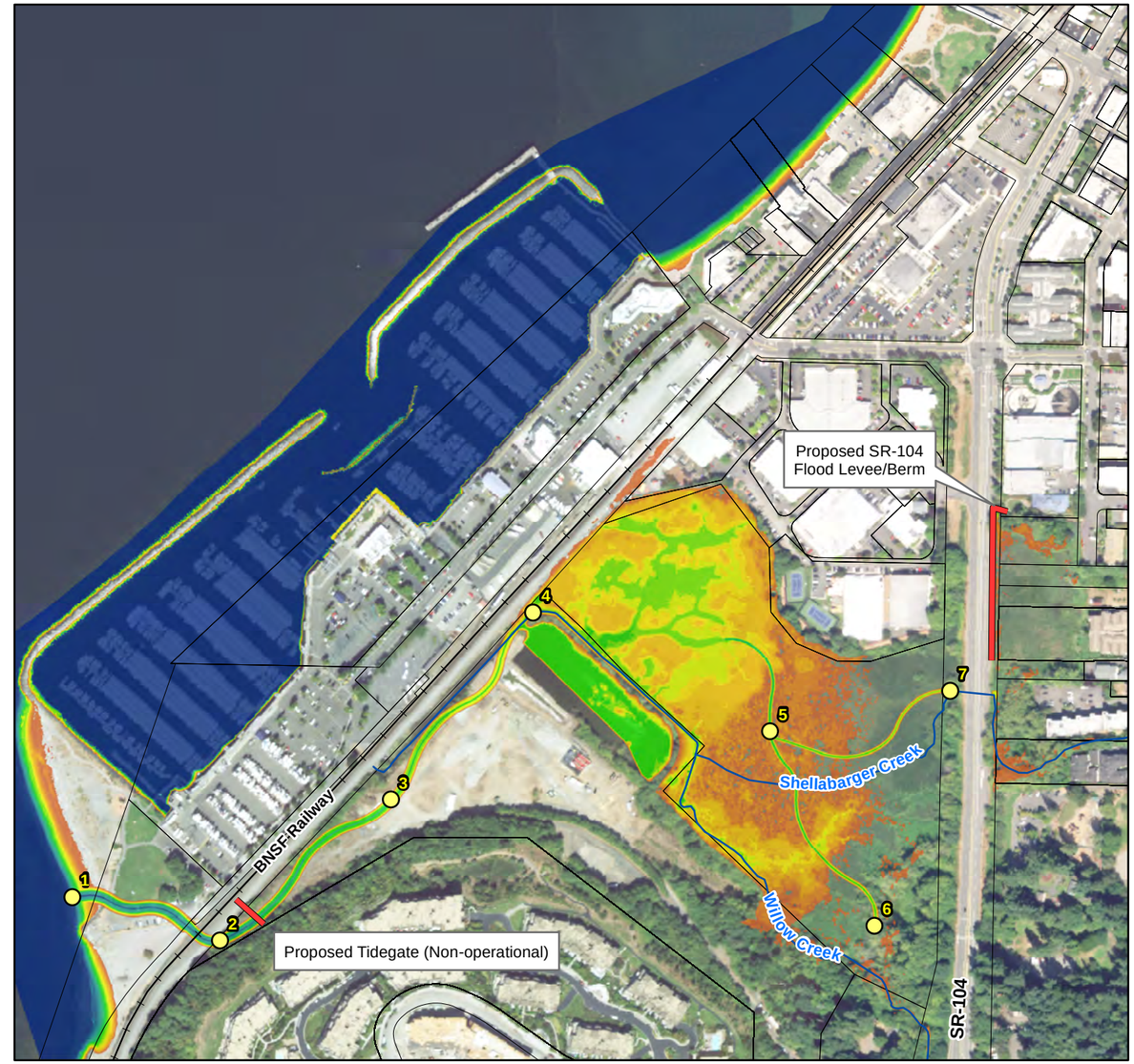
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 39B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure33B_Existing_Alternative6_StormSurgeSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 7
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

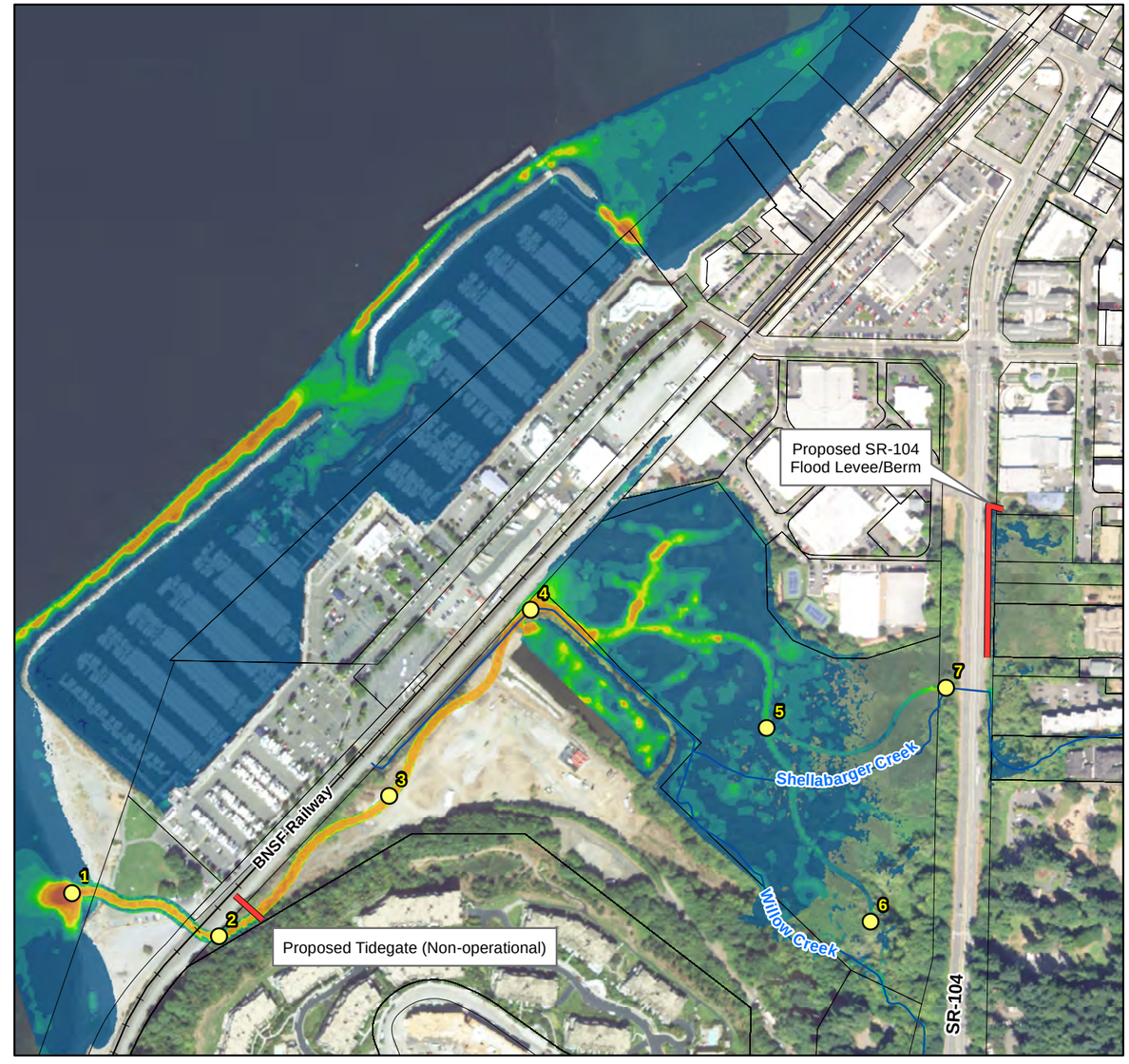
June 2019 **21-1-12588-050**

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 40A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure36A_Existing_Alternative7_KingTide_Habitat_Depth.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7
KING TIDE WITH
LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

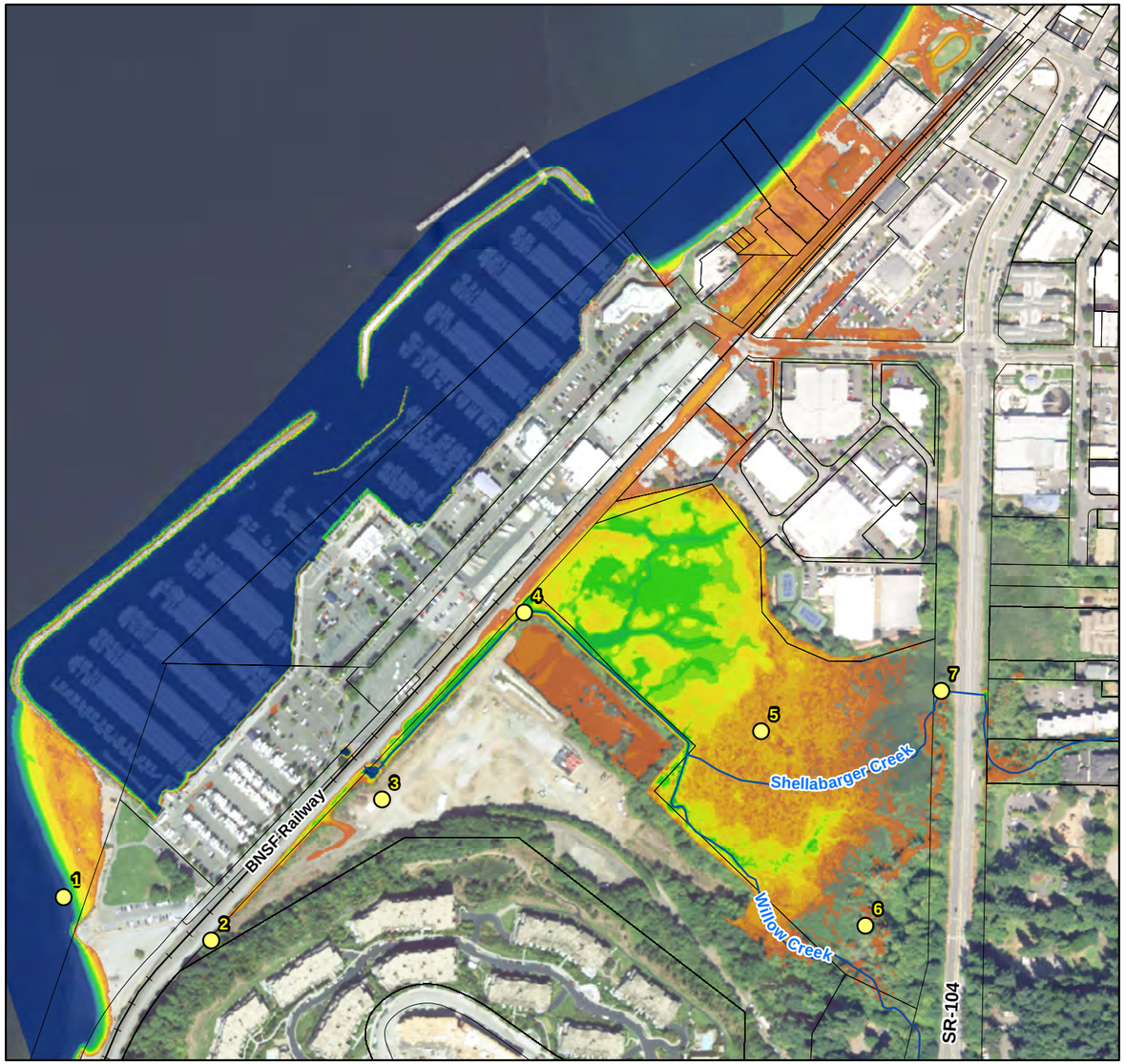
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 40B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure36B_Existing_Alternative7_KingTide_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 7
KING TIDE WITH SLR-2100
AND LATE SPRING FISH
HABITAT INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

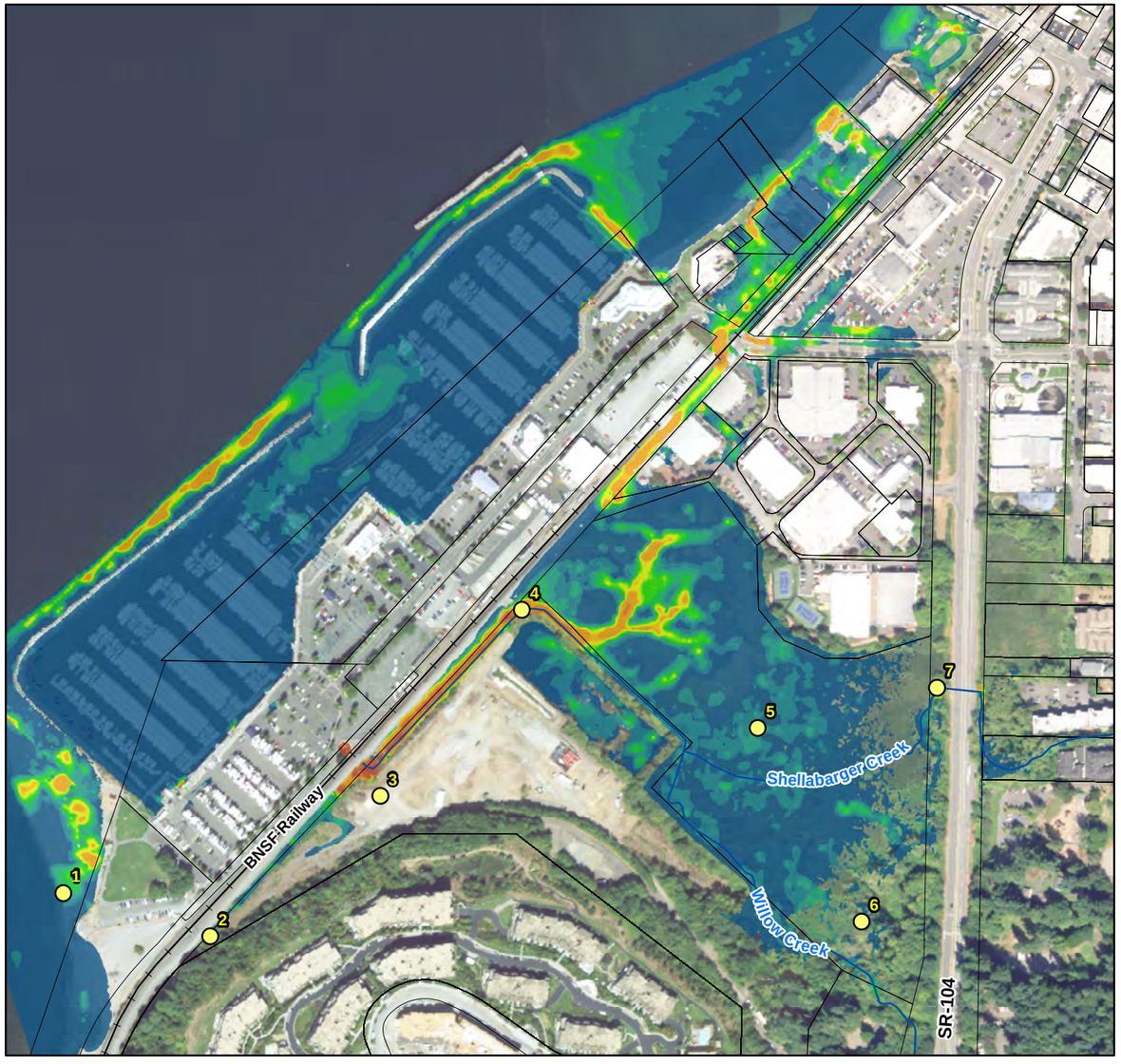
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

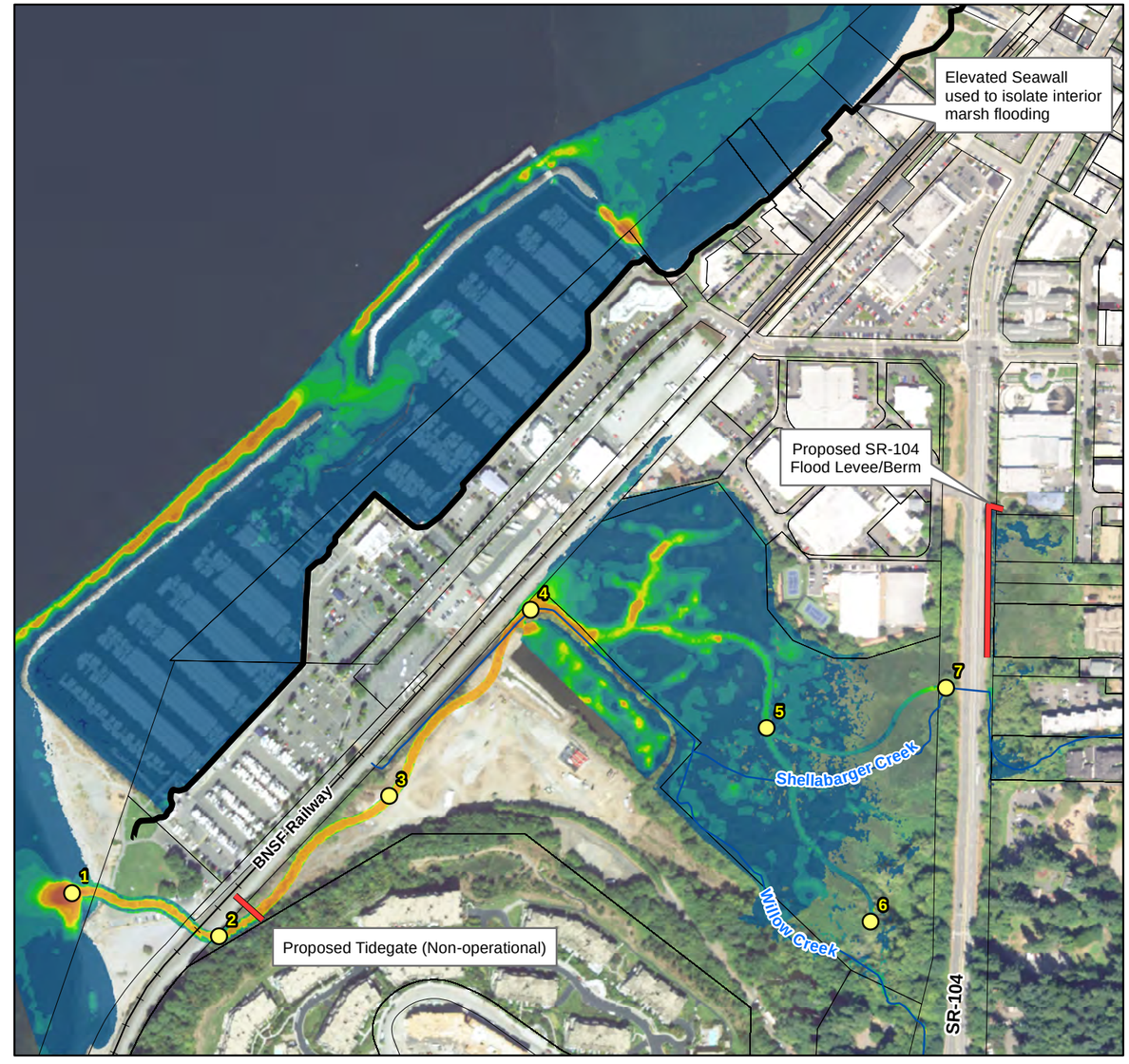
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 41A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure37A_Existing_Alternative7_KingTideSLR2100_Habitat_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL WITH FISH HABITAT CHANNEL AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7 KING TIDE WITH SLR-2100 AND LATE SPRING FISH HABITAT INFLOW HYDROGRAPHS MAXIMUM VELOCITIES (FT/S)

N W E S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT EXPANDED MARSH CONCEPT DESIGN AND HYDRAULIC MODELING EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

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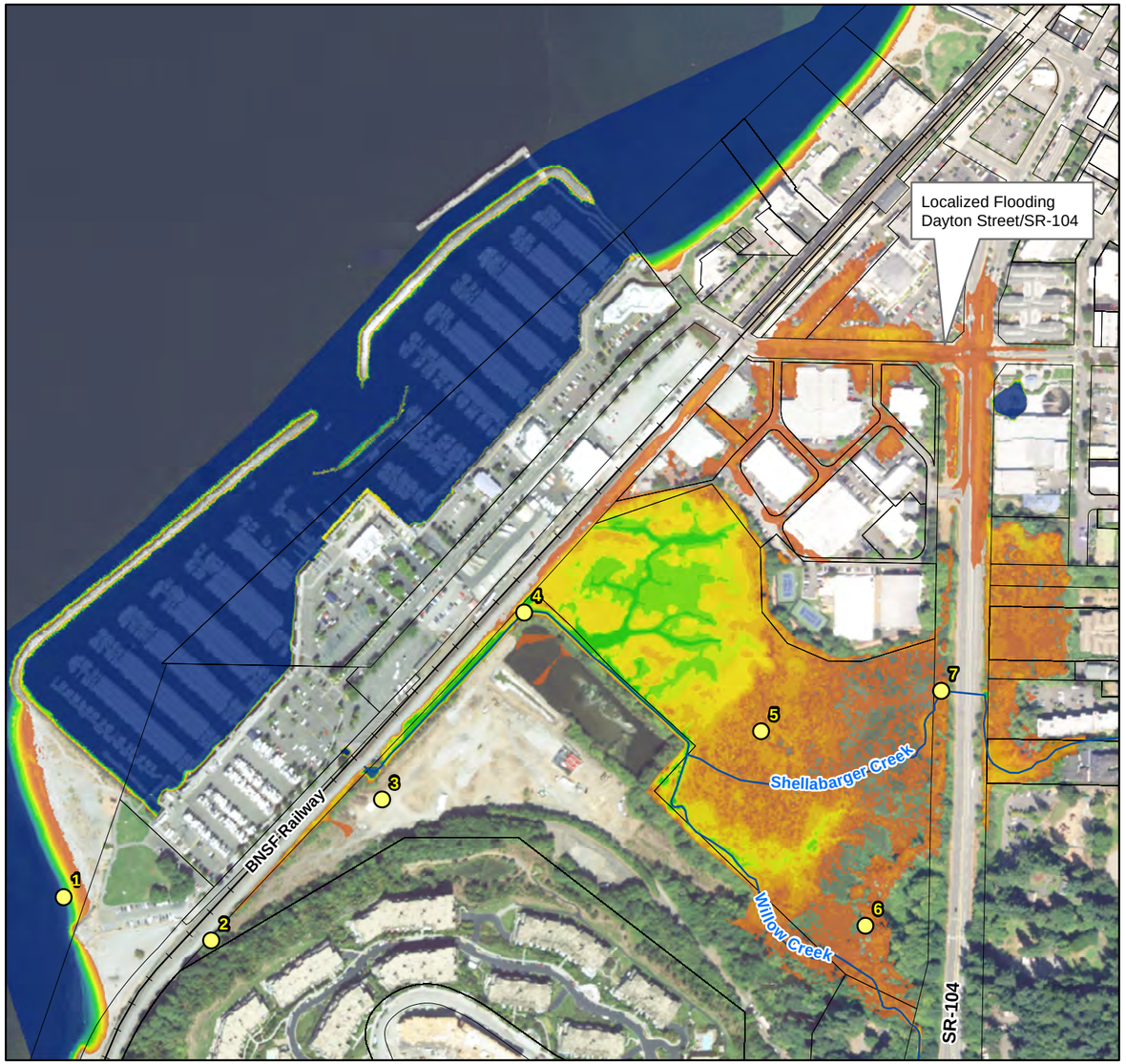
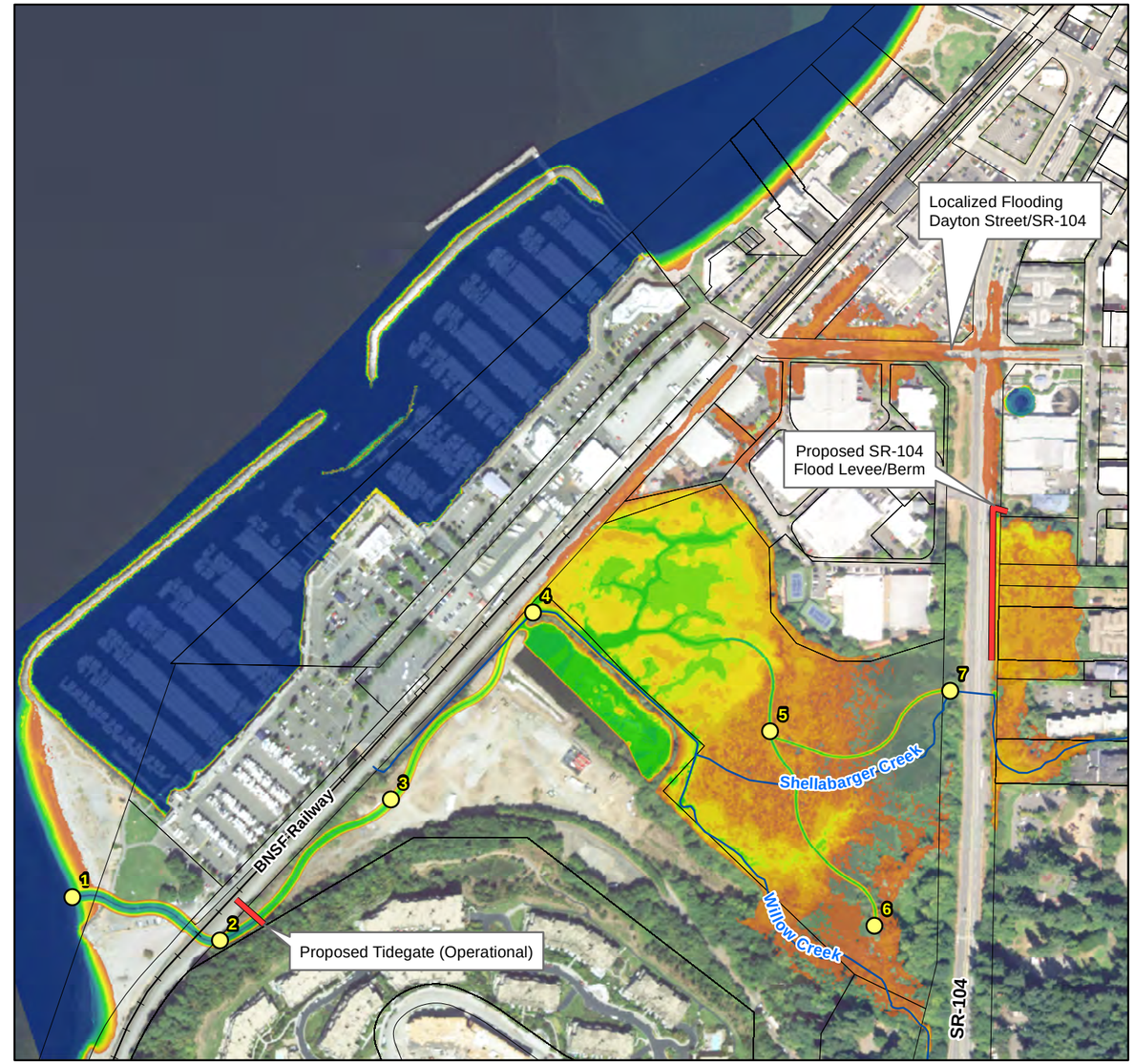
FIG. 41B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure37B_Existing_Alternative7_KingTideSLR2100_Habitat_Velocity.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 7
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 | 21-1-12588-050

SHANNON & WILSON, INC.
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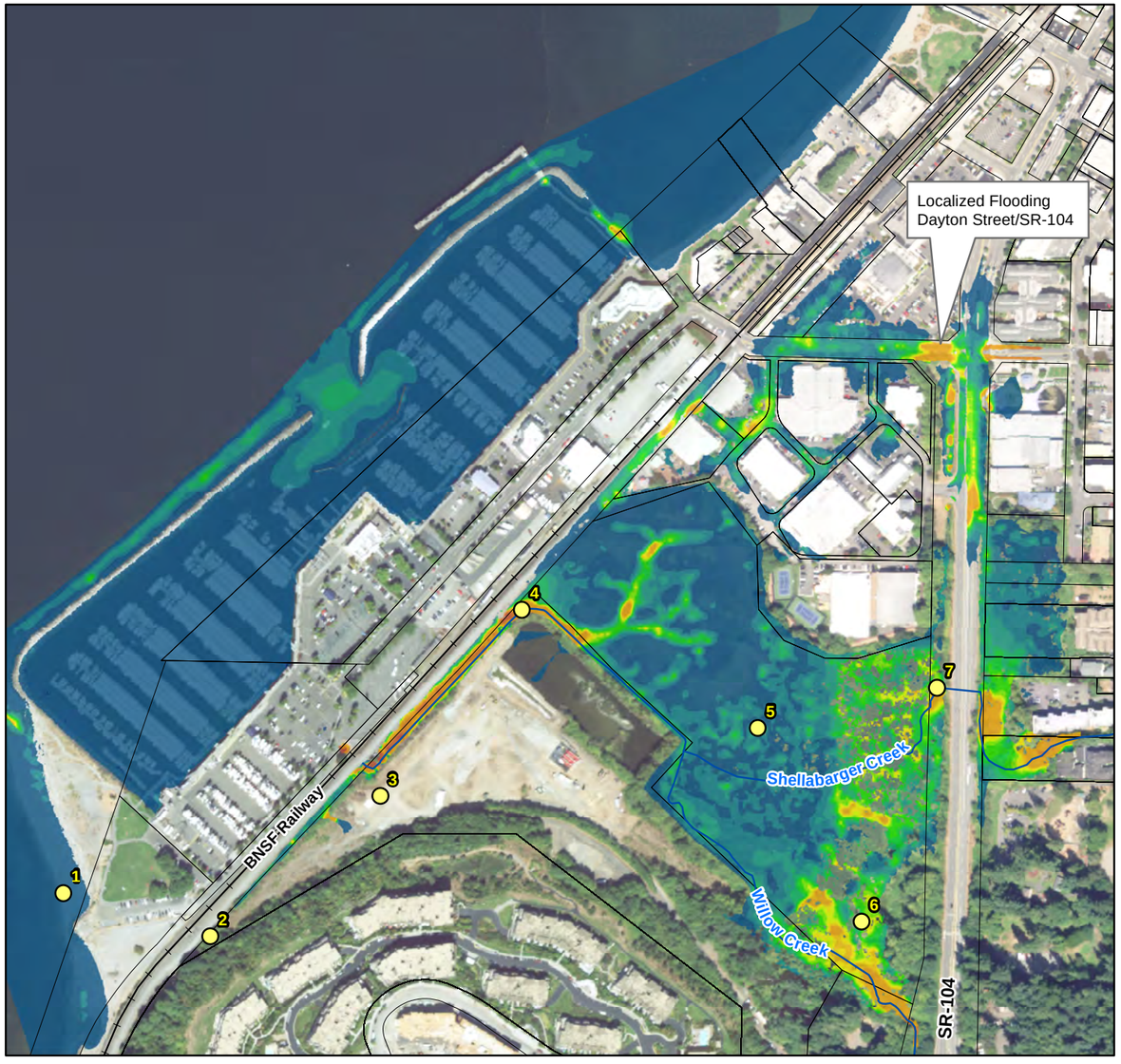
FIG. 42A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure38A_Existing_Alternative7_KingTide_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS

ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7
KING TIDE WITH SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
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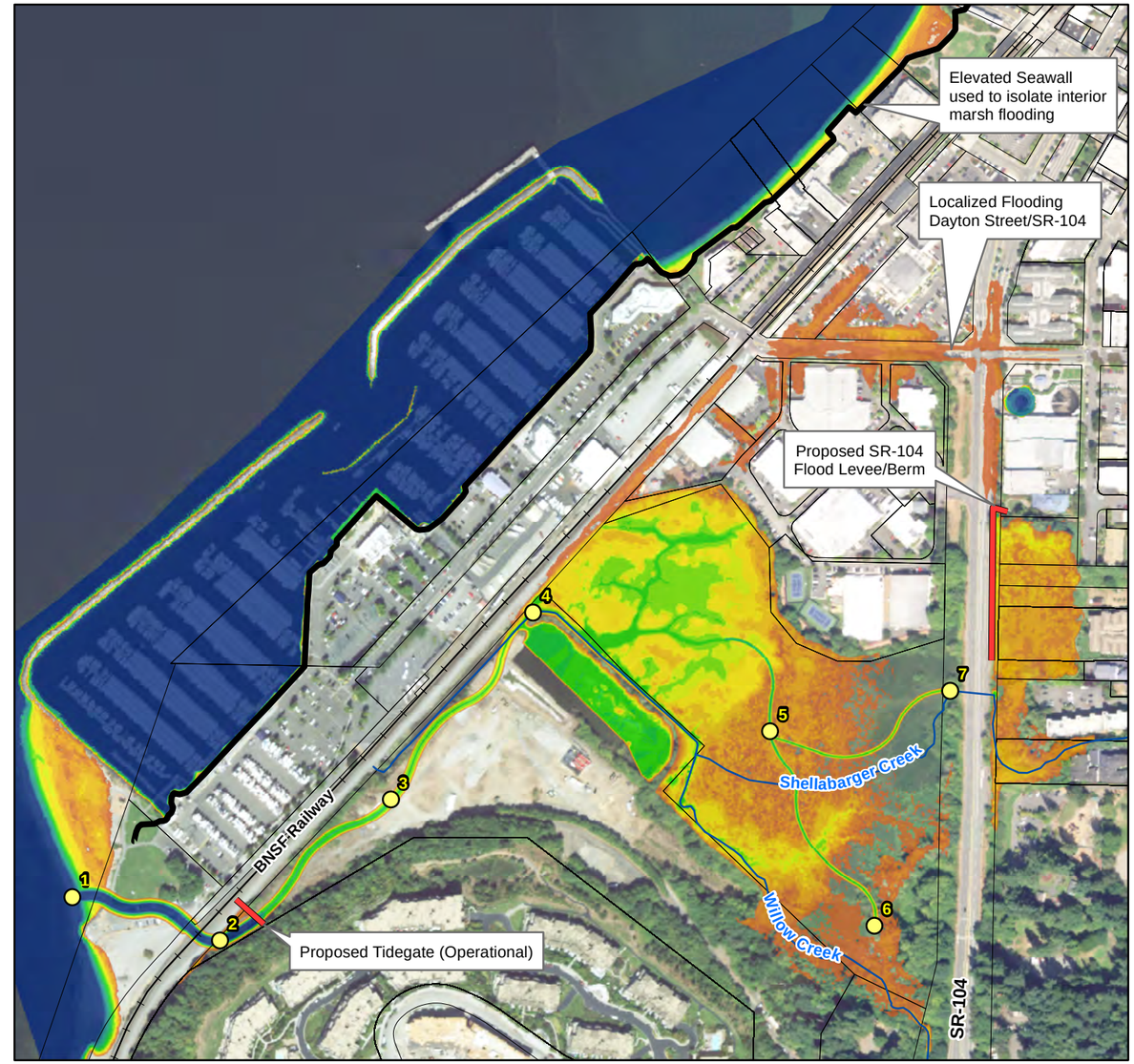
FIG. 42B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure38B_Existing_Alternative7_KingTide_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 7
KING TIDE WITH SLR-2100 AND
SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

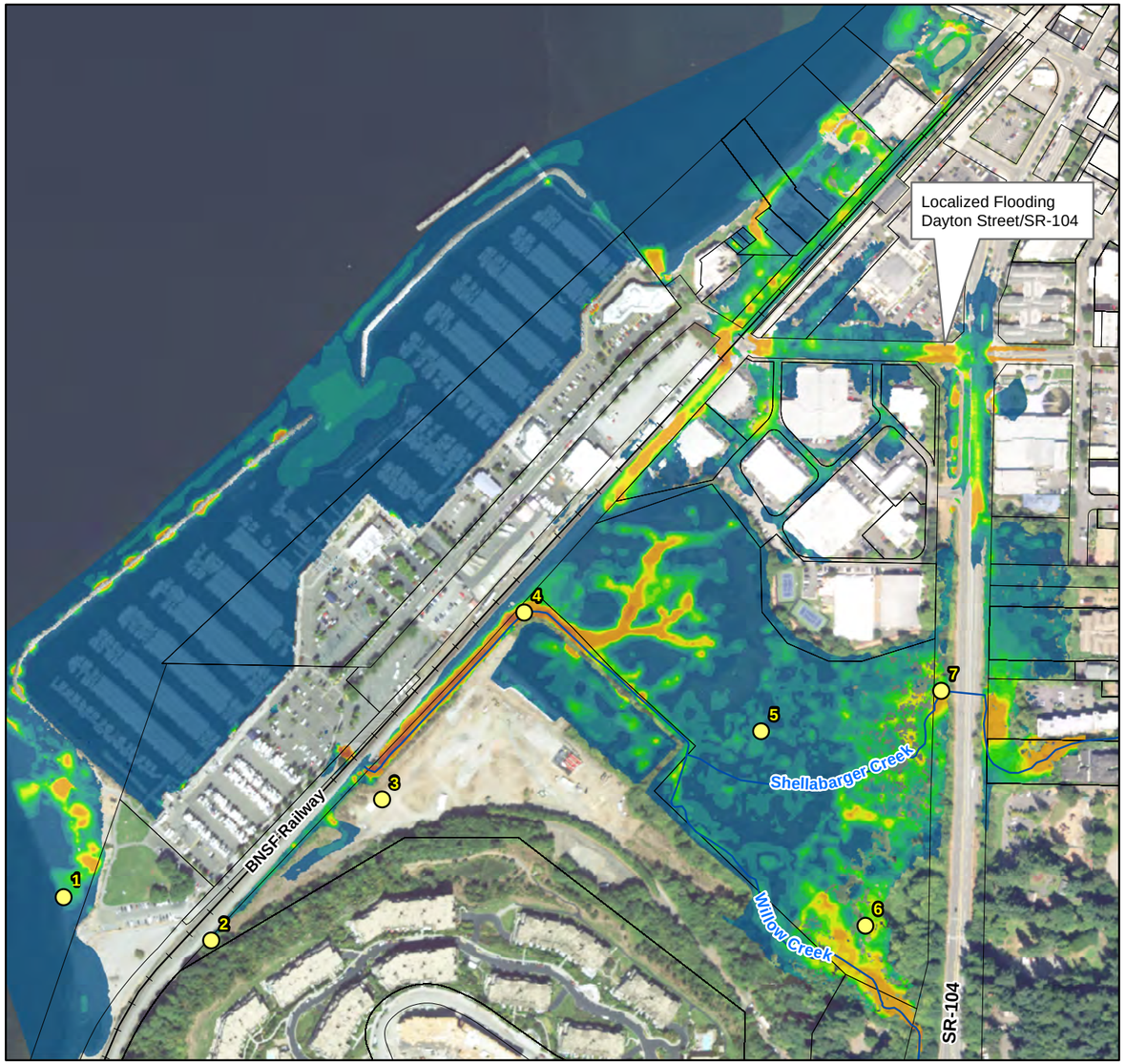
WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

June 2019 **21-1-12588-050**

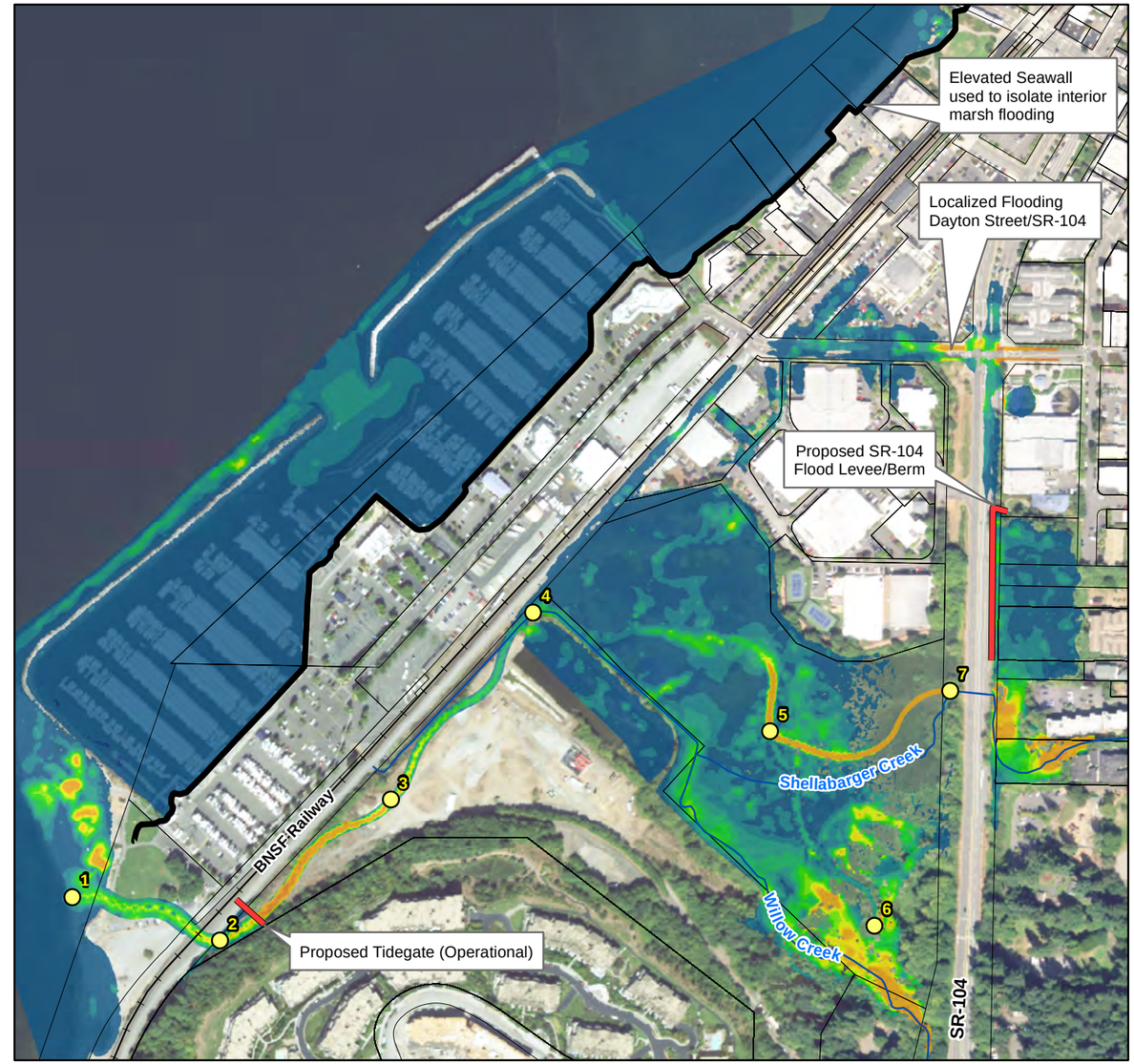
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 43A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure39A_Existing_Alternative7_KingTideSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7
KING TIDE WITH SLR-2100 AND
SAIC 1% (100-YR) AEP
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

CITY OF EDMONDS
Est. 1890

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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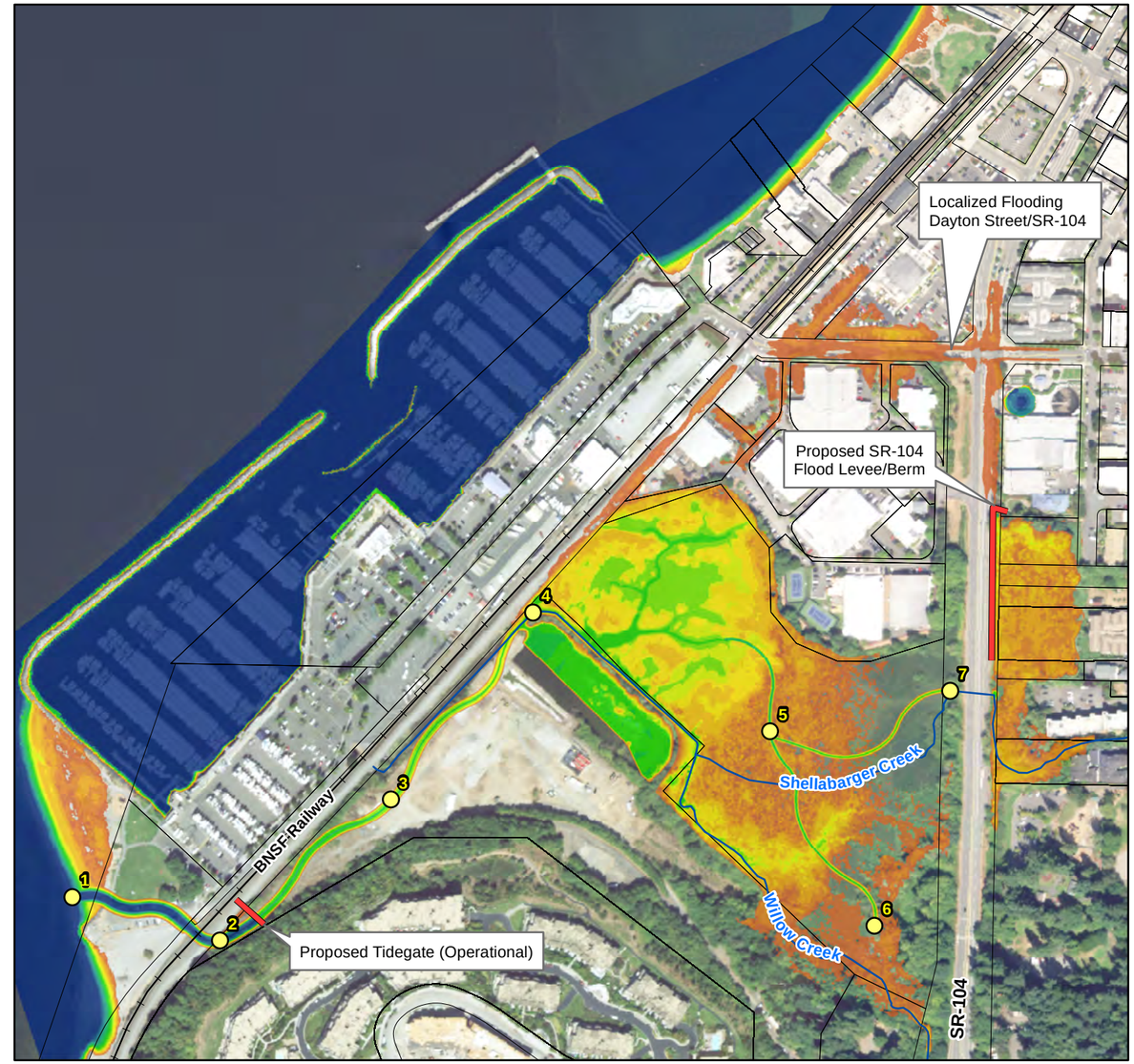
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 43B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure39B_Existing_Alternative7_KingTideSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

- 0 - 0.5 FT
- 0.5 - 1 FT
- 1 - 1.5 FT
- 1.5 - 2 FT
- 2 - 2.5 FT
- 2.5 - 3 FT
- 3 - 3.5 FT
- 3.5 - 4 FT
- 4 - 4.5 FT
- 4.5 - 5 FT
- 5 - 5.5 FT
- 5.5 - 6 FT
- 6 - 6.5 FT
- 6.5+ FT

EXISTING AND ALTERNATIVE 7
STORM SURGE TIDE
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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SHANNON & WILSON, INC.
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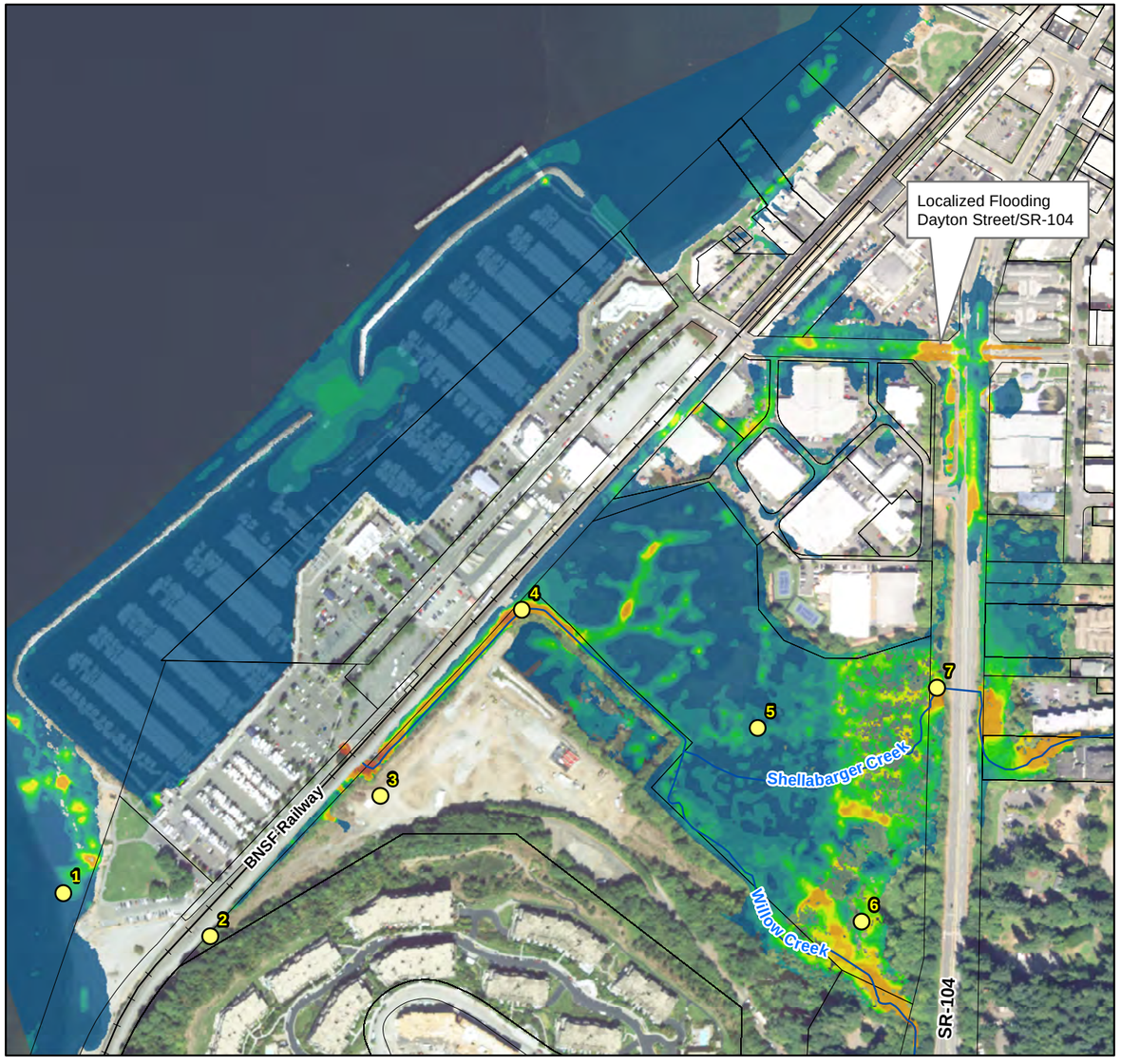
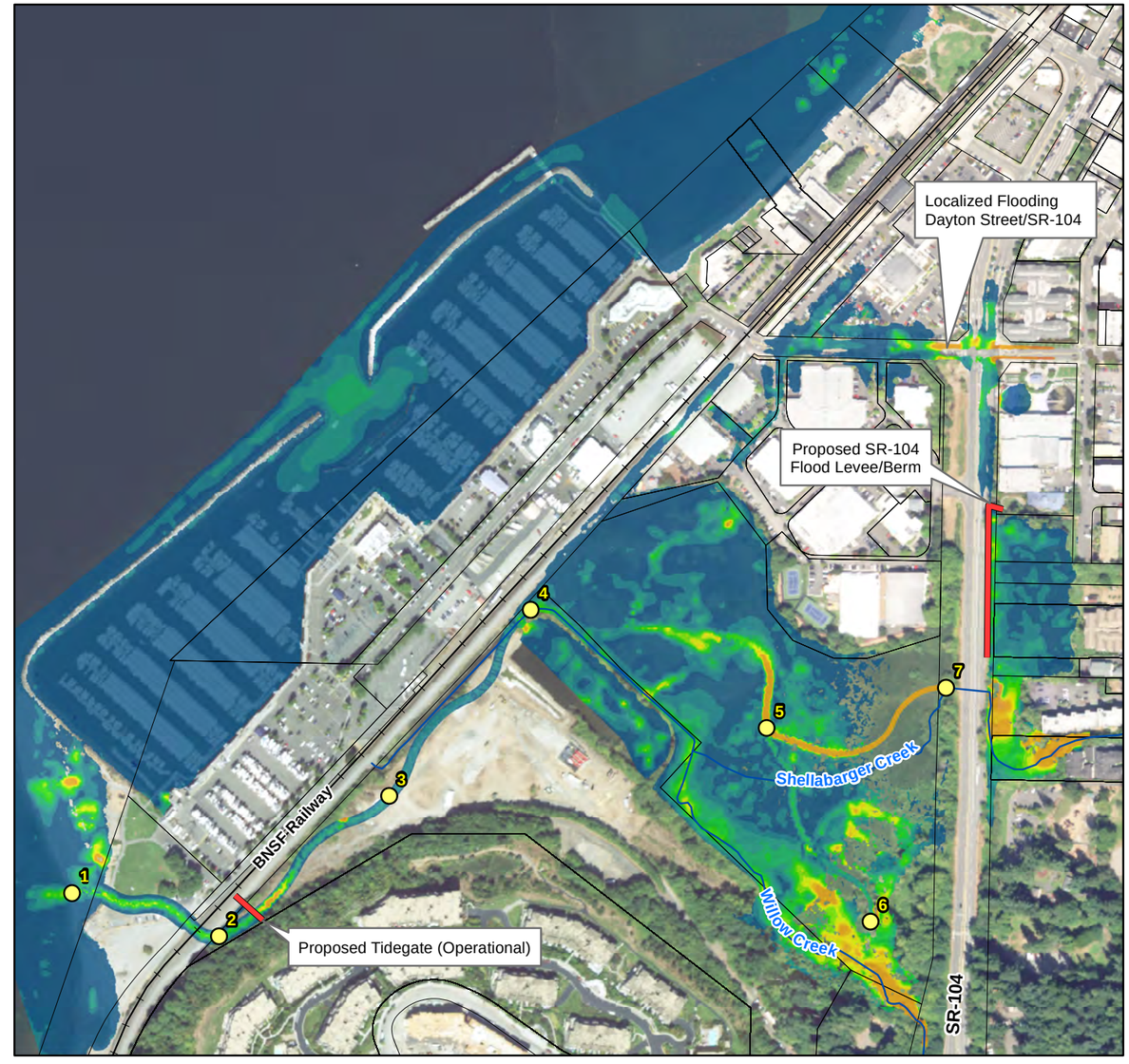
FIG. 44A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure42A_Existing_Alternative7_StormSurge_SAIC_Depth.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7
STORM SURGE TIDE
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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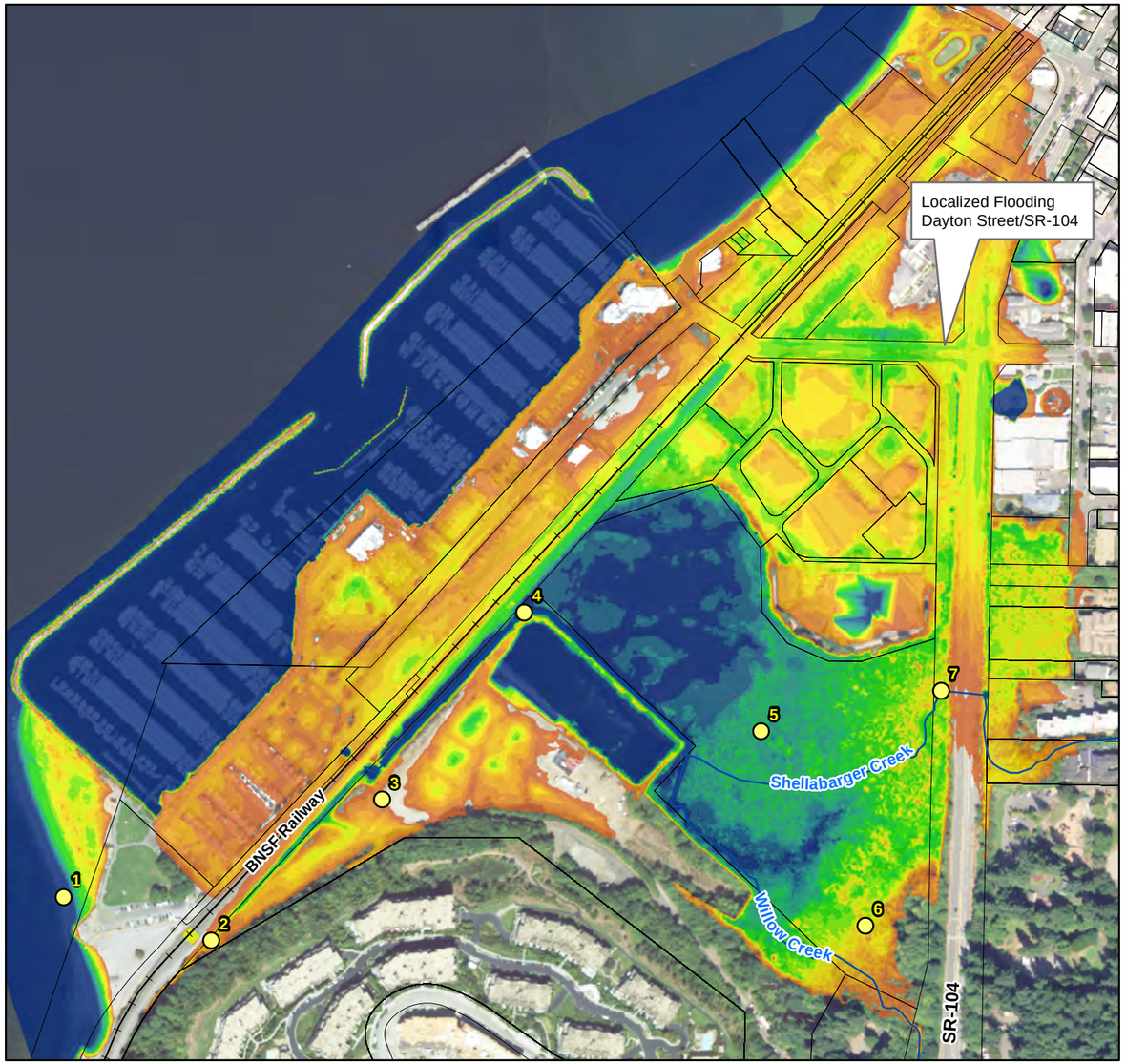
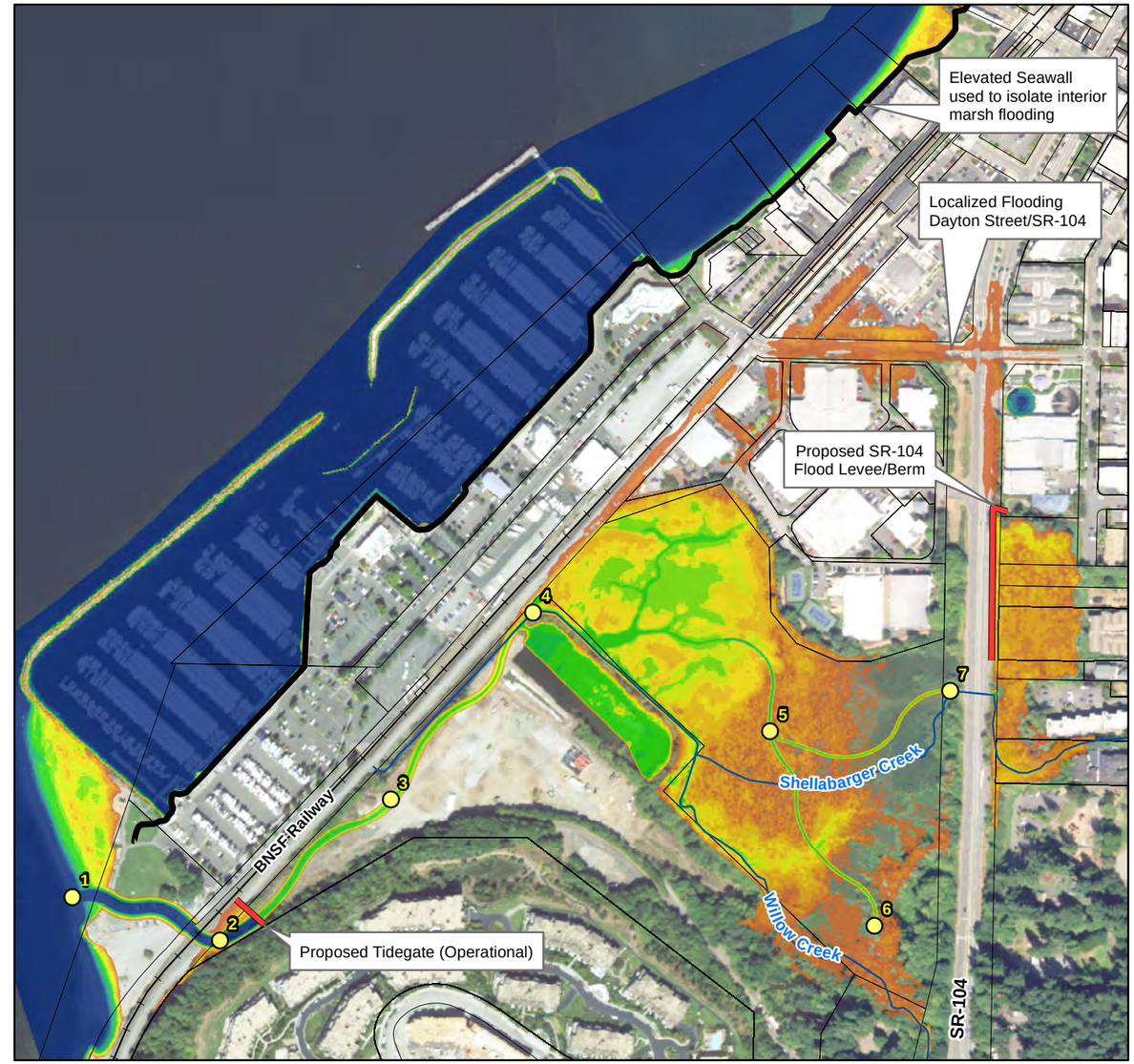
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 44B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure42B_Existing_Alternative7_StormSurge_SAIC_Velocities.mxd Date: 12/20/2018 CCB



EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Inundation Depths

0 - 0.5 FT	3.5 - 4 FT
0.5 - 1 FT	4 - 4.5 FT
1 - 1.5 FT	4.5 - 5 FT
1.5 - 2 FT	5 - 5.5 FT
2 - 2.5 FT	5.5 - 6 FT
2.5 - 3 FT	6 - 6.5 FT
3 - 3.5 FT	6.5+ FT

EXISTING AND ALTERNATIVE 7
STORM SURGE TIDE WITH SLR-2100
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM INUNDATION DEPTHS (FT)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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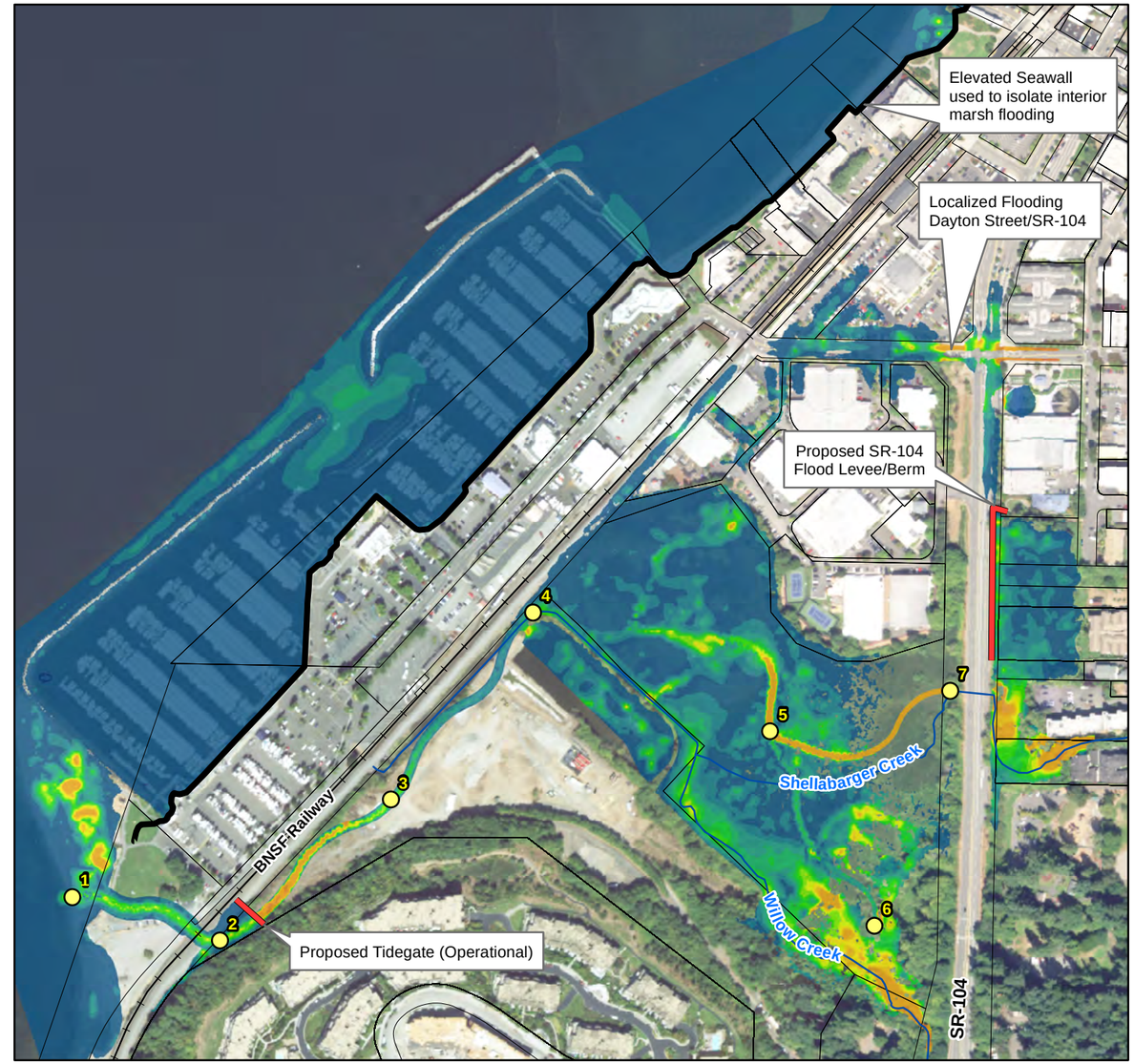
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 45A

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure43A_Existing_Alternative7_StormSurgeSLR2100_SAIC_Depth.mxd Date: 12/20/2018 CCB

EXISTING CONDITIONS



ALTERNATIVE 7
MEANDERING DAYLIGHT CHANNEL
WITH FISH HABITAT CHANNEL
AND FLOOD PROTECTION BERMS AND TIDEGATE

Velocities

0.0 - 0.1 FT/S	0.8 - 0.9 FT/S
0.1 - 0.2 FT/S	0.9 - 1.0 FT/S
0.2 - 0.3 FT/S	1.0 - 2.0 FT/S
0.3 - 0.4 FT/S	2.0 - 3.0 FT/S
0.4 - 0.5 FT/S	3.0 - 4.0 FT/S
0.5 - 0.6 FT/S	4.0 - 5.0 FT/S
0.7 - 0.8 FT/S	5.0+ FT/S

EXISTING AND ALTERNATIVE 7
STORM SURGE TIDE WITH SLR-2100
AND SAIC 1% (100-YR)
INFLOW HYDROGRAPHS
MAXIMUM VELOCITIES (FT/S)

N
W E
S

0 450 900
Feet

CITY OF EDMONDS
Est. 1890

WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT
DESIGN AND HYDRAULIC MODELING
EDMONDS, WASHINGTON

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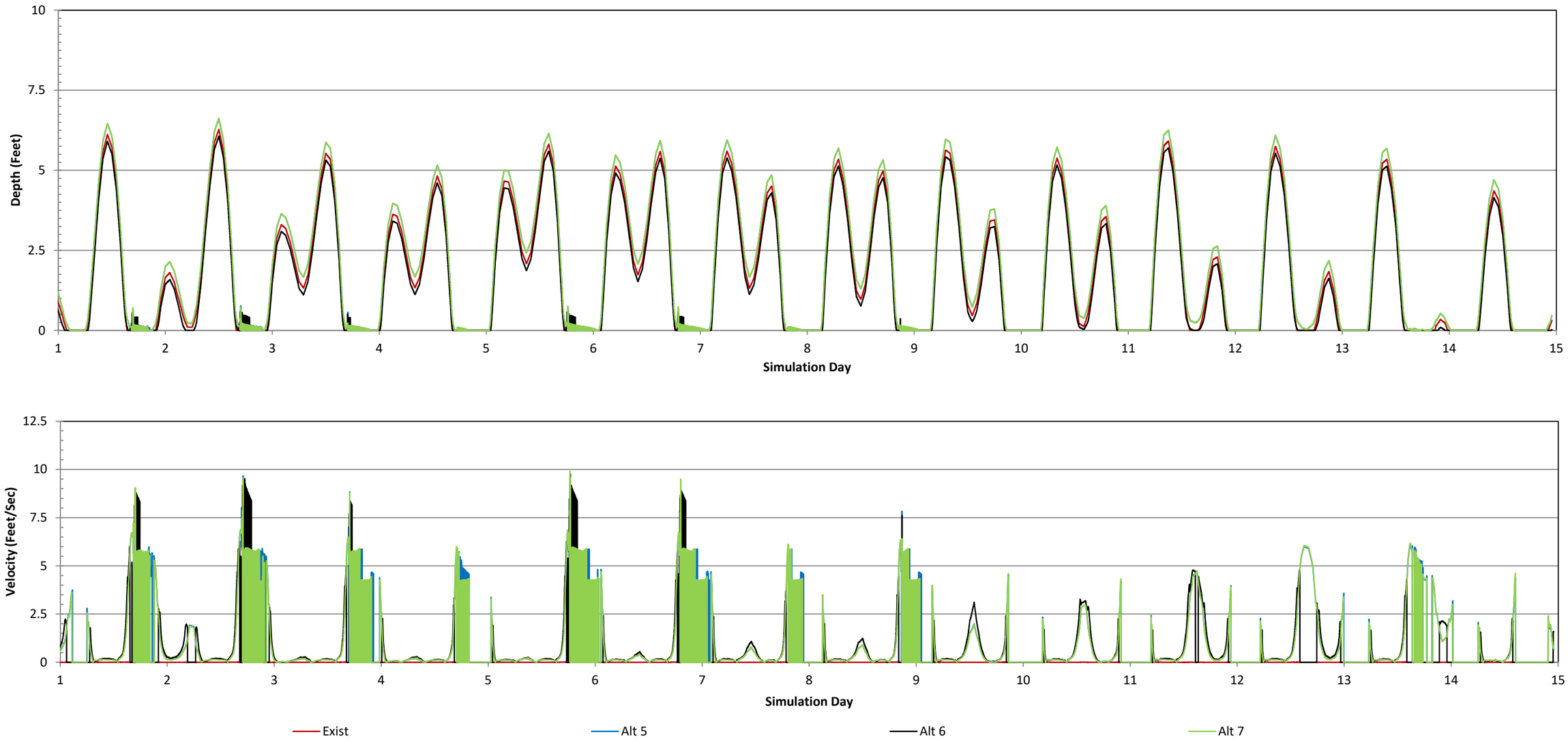
SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 45B

Filename: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Report\Figures\MXD\Figure43B_Existing_Alternative7_StormSurgeSLR2100_SAIC_Velocities.mxd Date: 12/20/2018 CCB



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES NODE 1 - OUTLET OF DAYLIGHT CHANNEL

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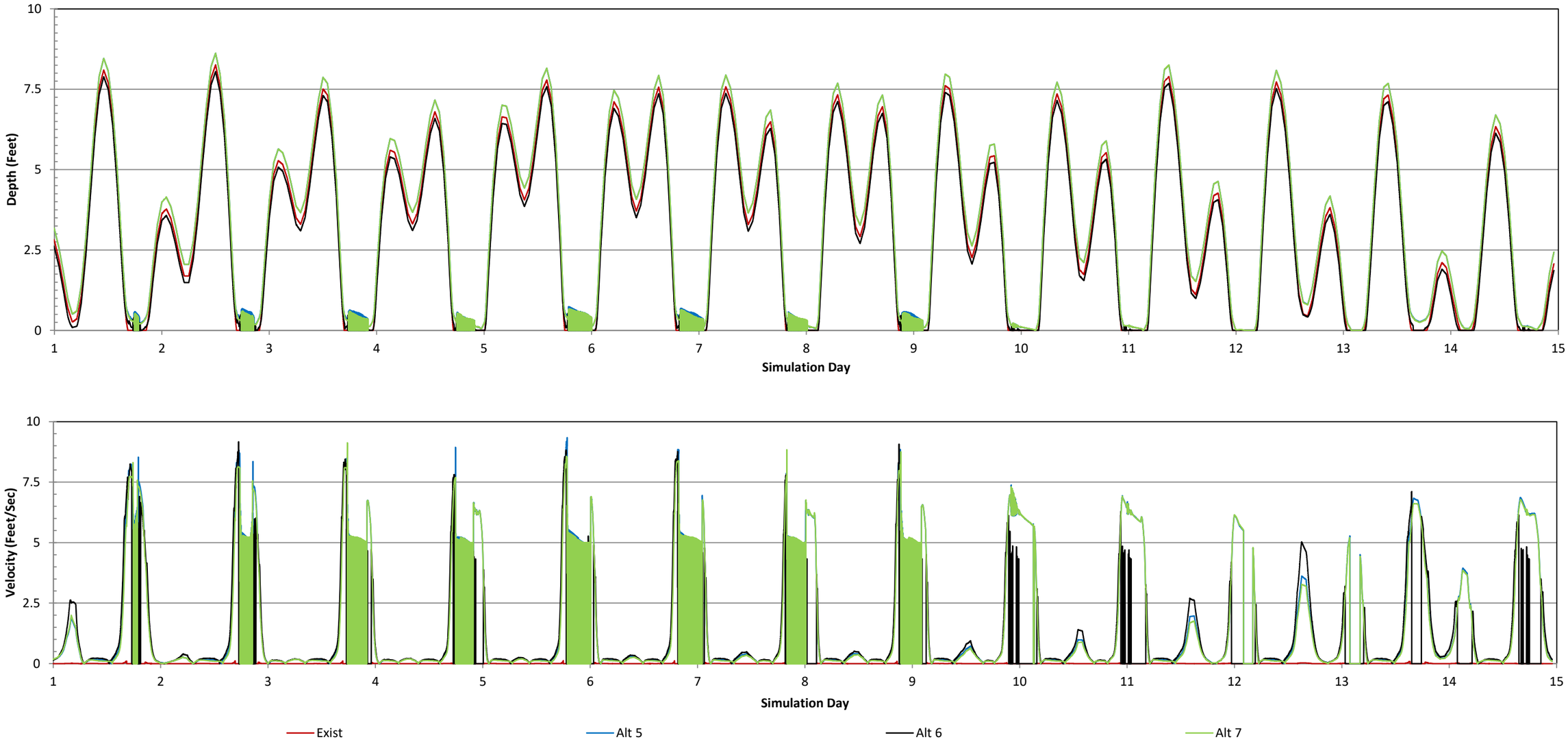
FIG. 46

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 1 - OUTLET OF DAYLIGHT CHANNEL

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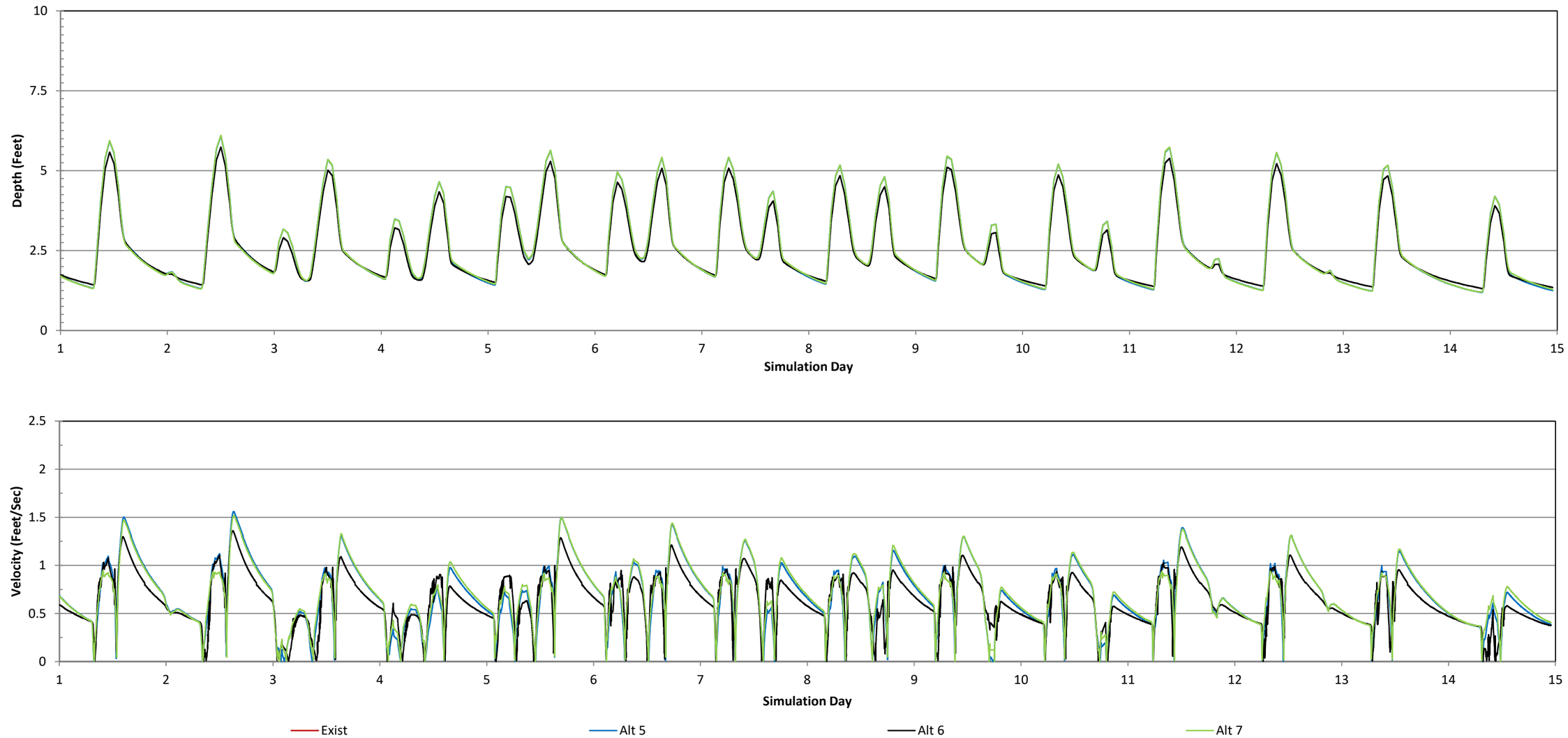
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 47

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES NODE 2 - UPSTREAM OF BNSF BRIDGE

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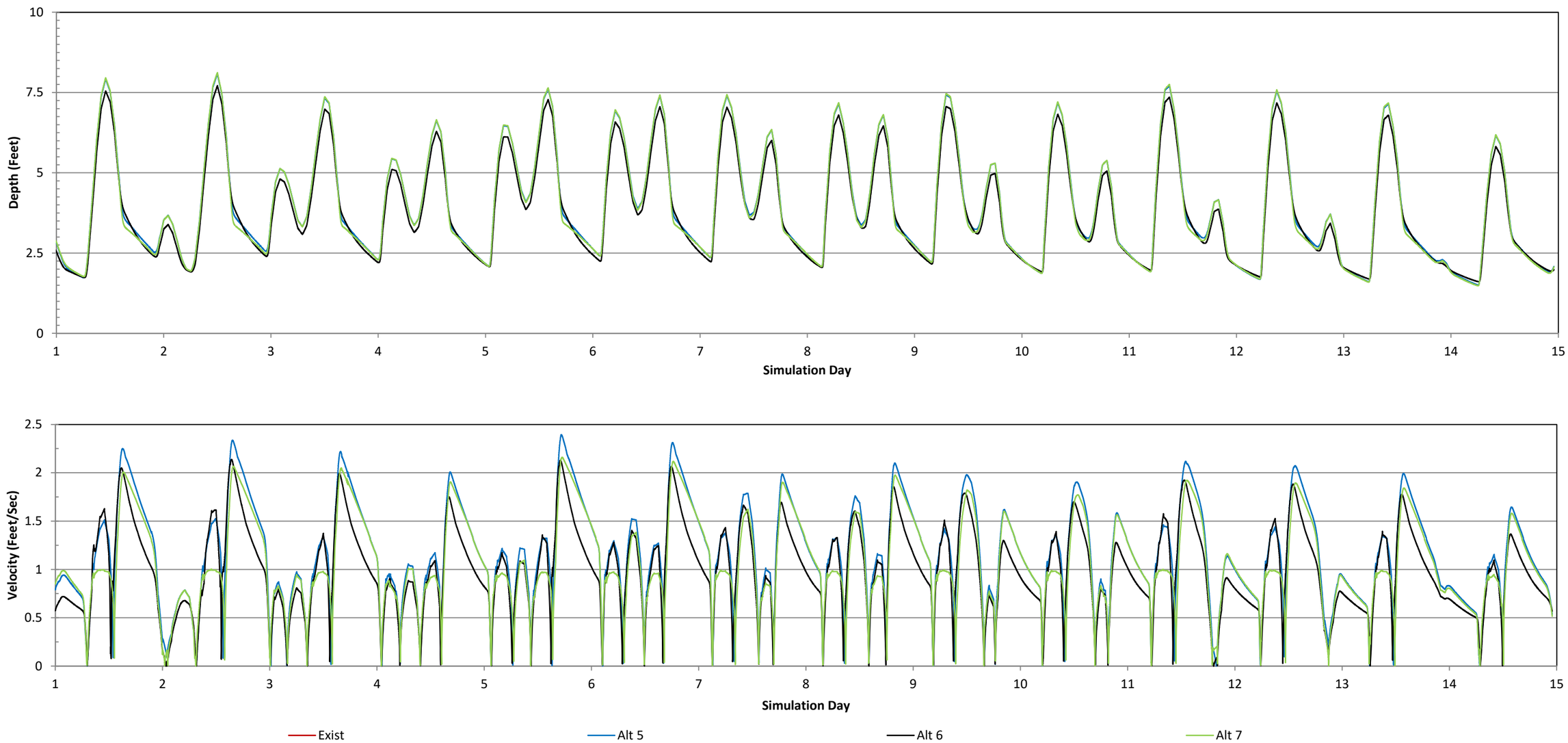
FIG. 48

Printed: 3-11-19 20:30 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGS\FIGURES_20190311\[21-1-12588-050-FIGS46-XX.xlsx]Fig11_Hydrographs-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 2 - UPSTREAM OF BNSF BRIDGE

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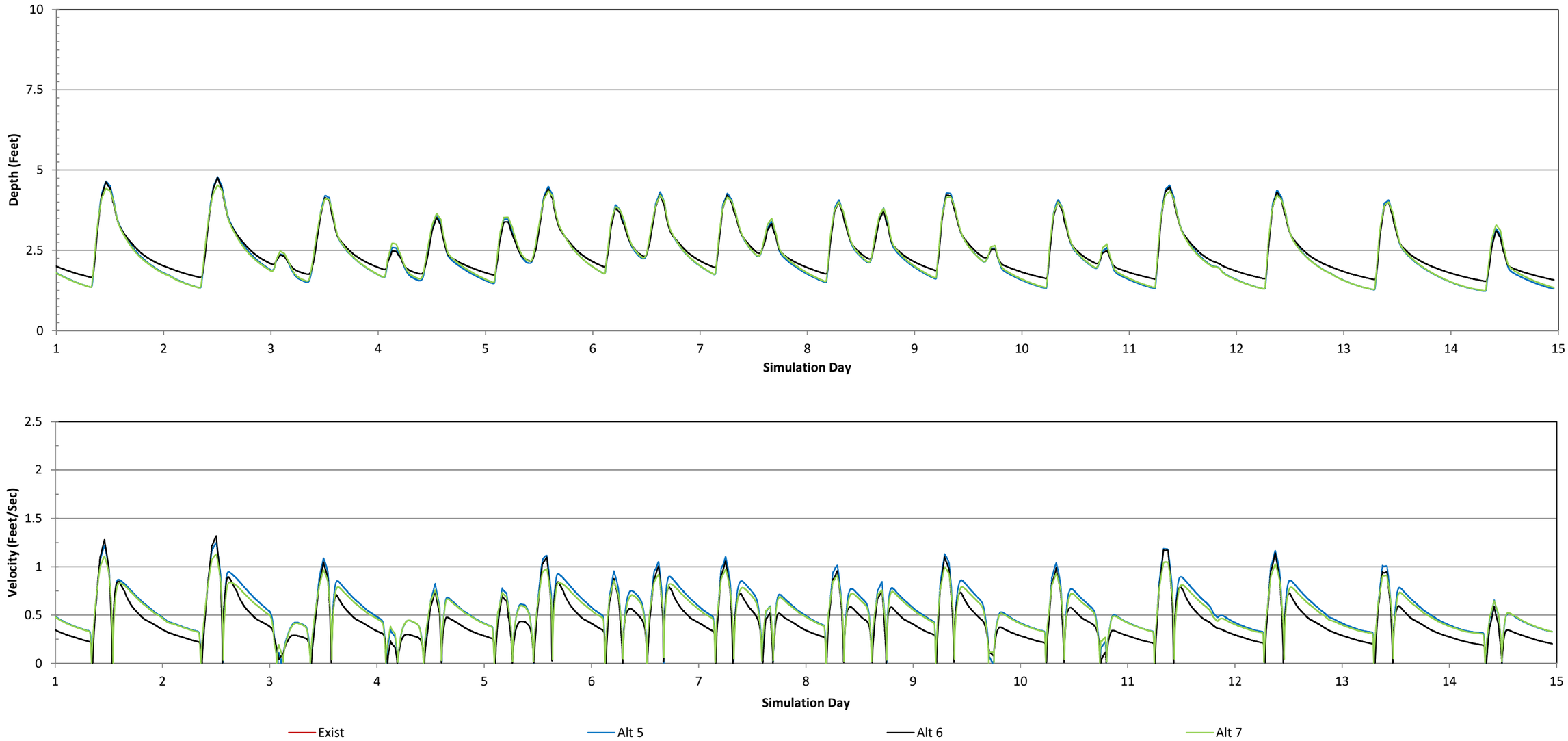
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 49

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES NODE 3 - UPSTREAM OF BNSF BRIDGE

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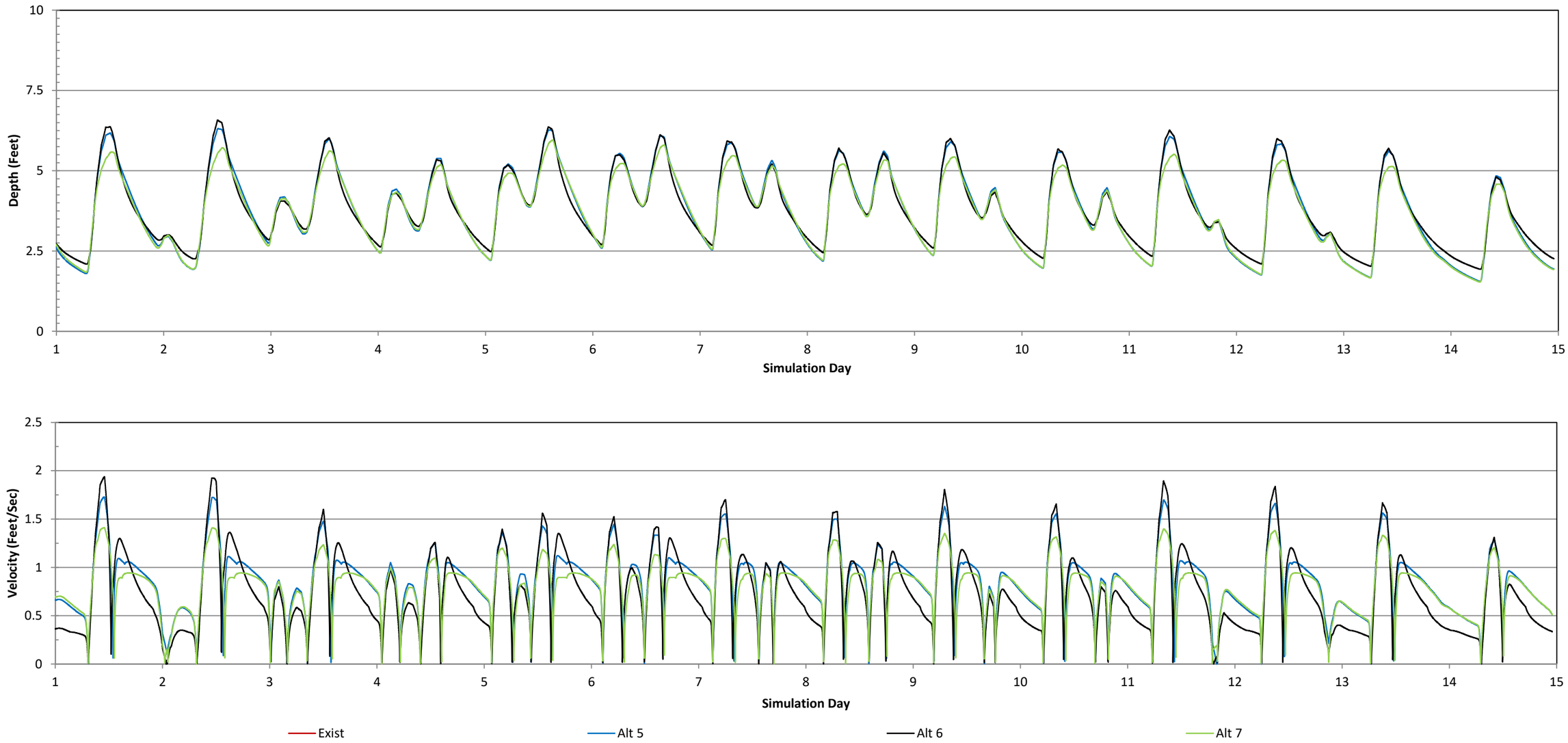
FIG. 50

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 3 - UPSTREAM OF BNSF BRIDGE

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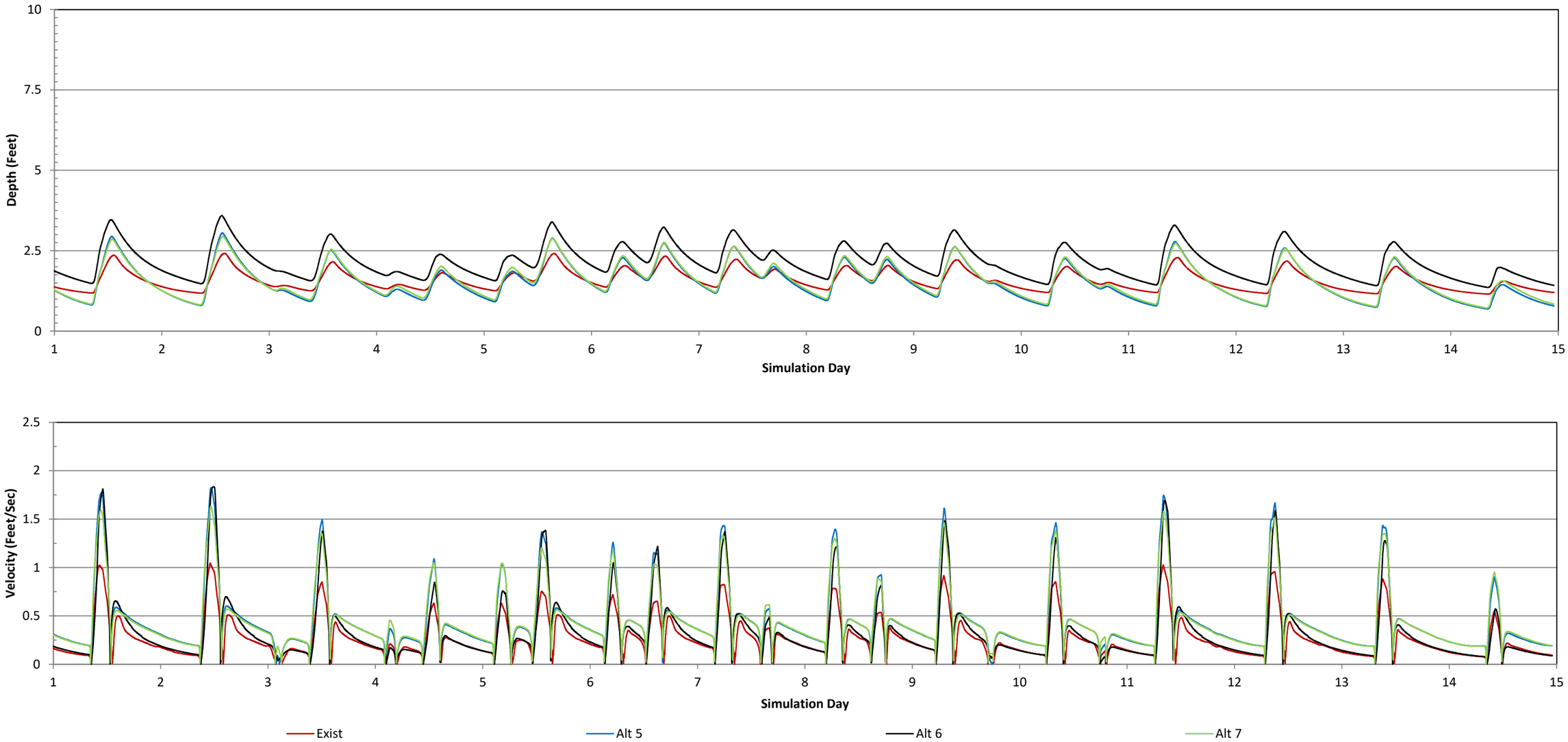
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 51

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES
NODE 4 - UPSTREAM OF DAYLIGHT CHANNEL

June 2019 | 21-1-12588-050

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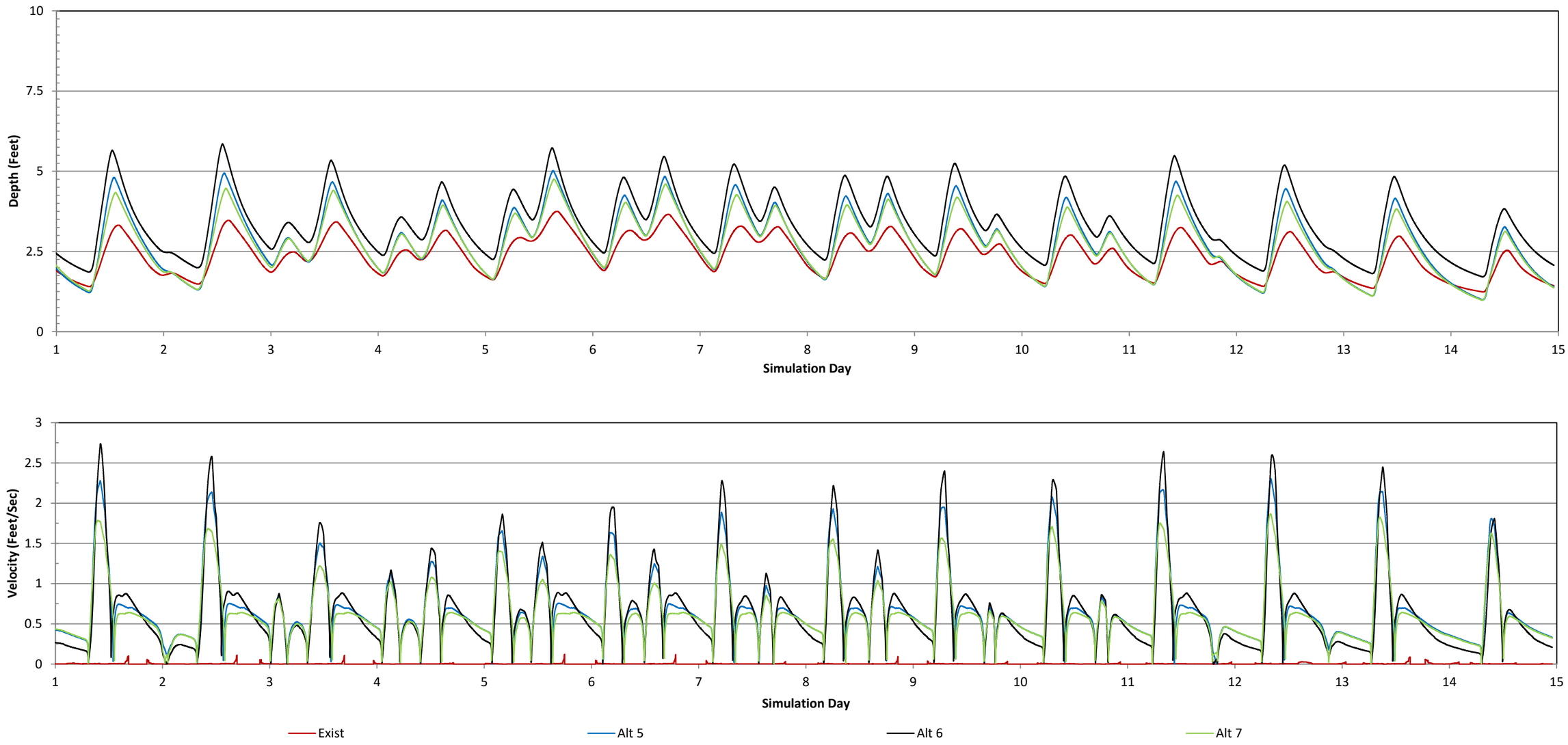
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 52

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 4 - UPSTREAM OF DAYLIGHT CHANNEL

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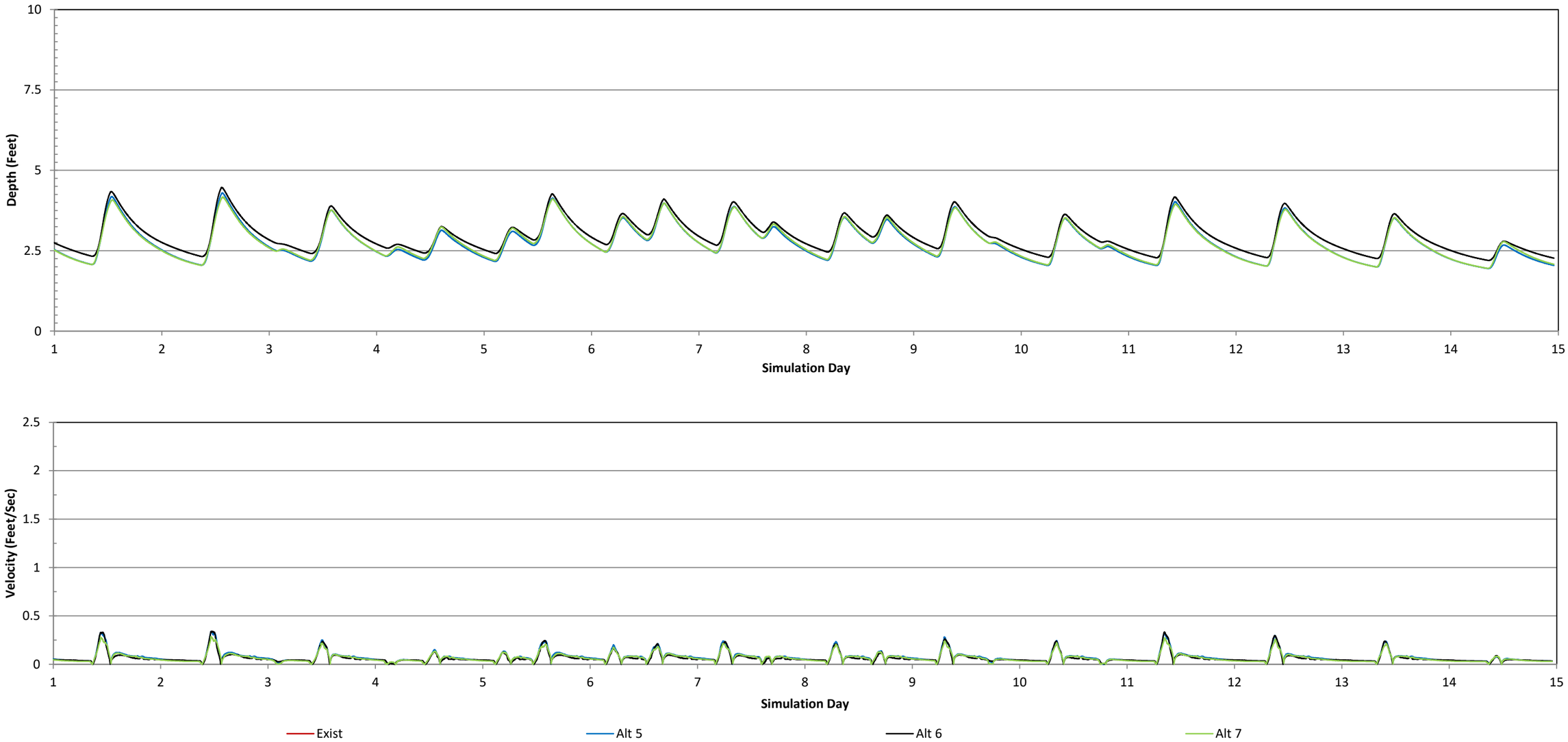
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 53

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES NODE 5 - CENTER OF MARSH

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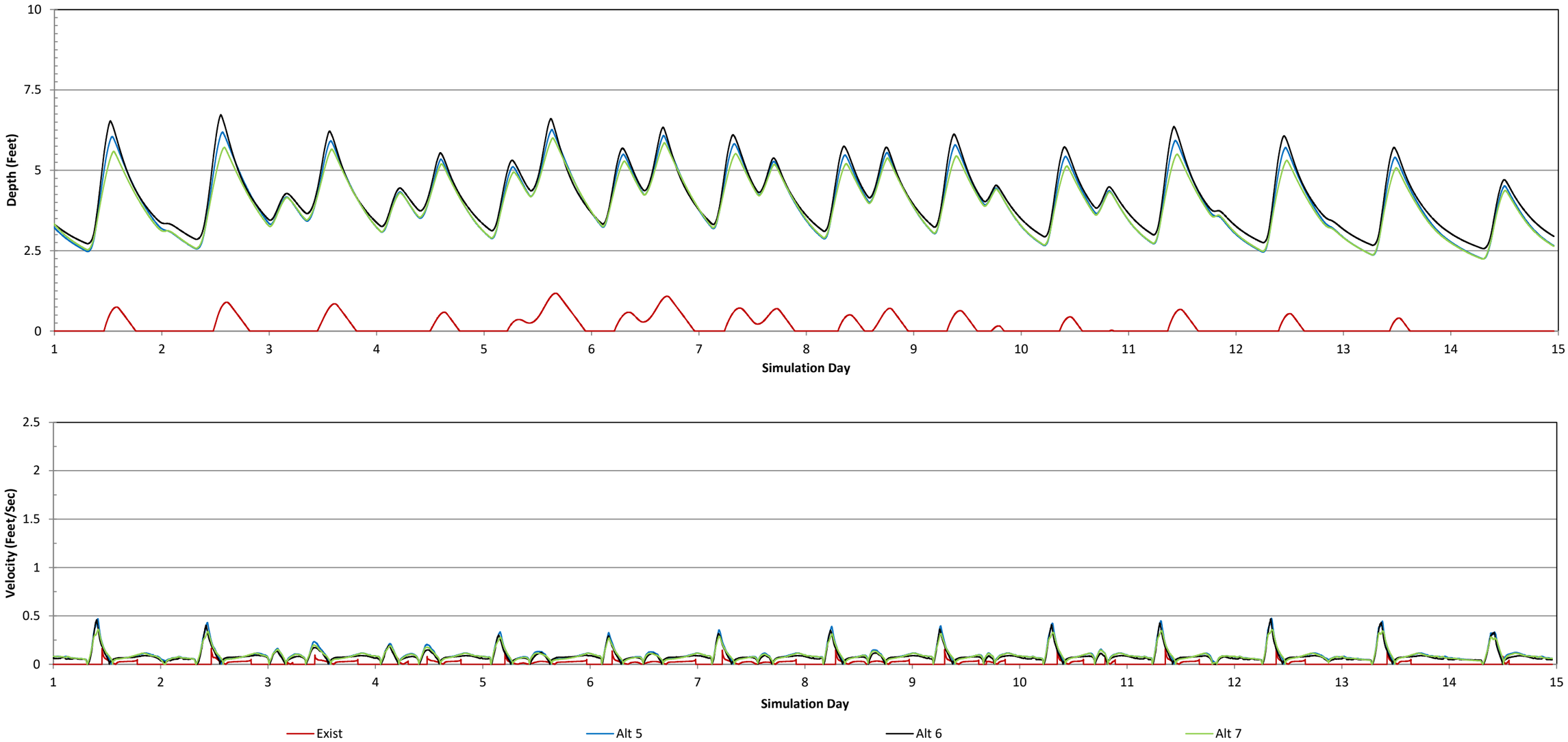
FIG. 54

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 5 - CENTER OF MARSH

June 2019 | 21-1-12588-050

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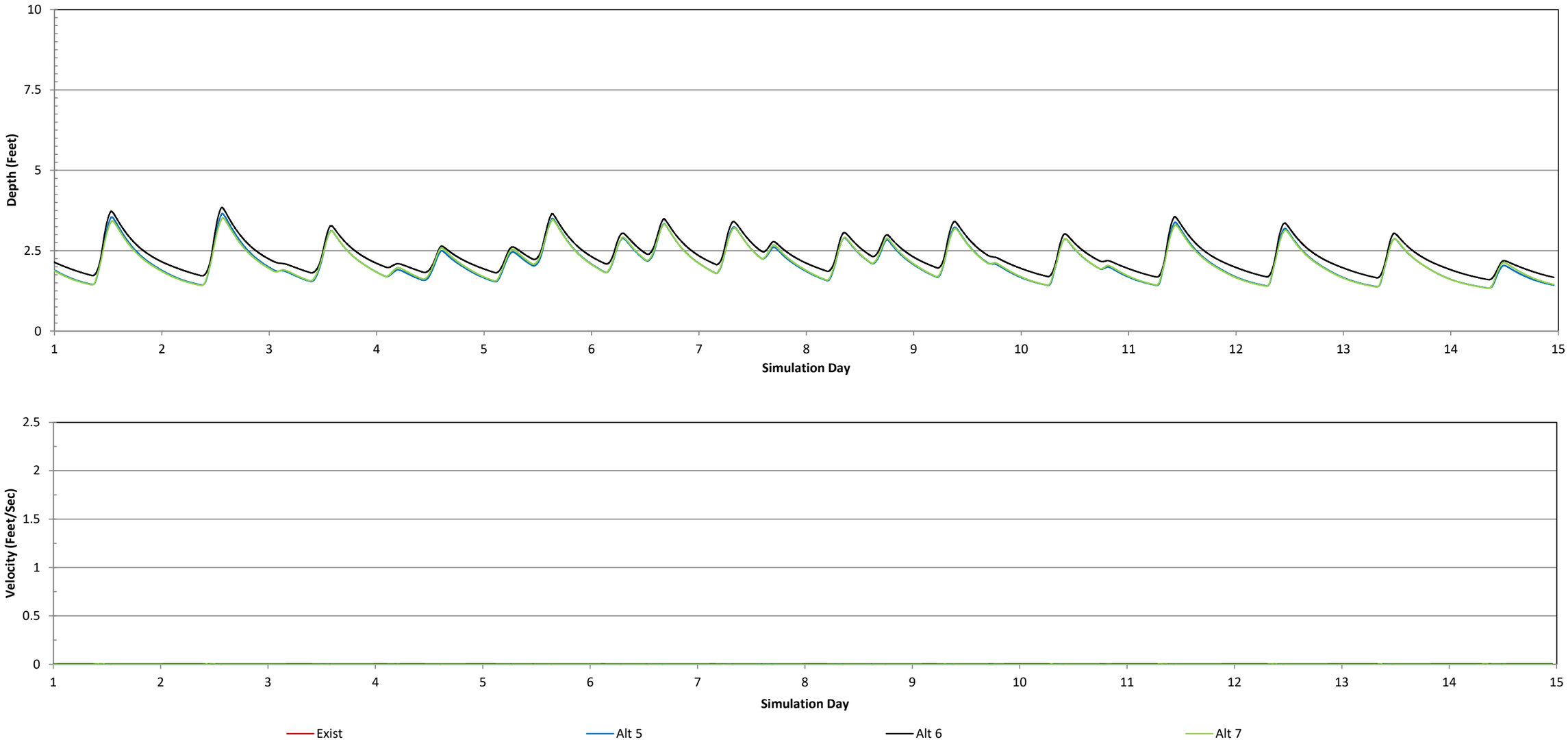
FIG. 55

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES NODE 6 - WILLOW CREEK DOWNSTREAM OF HATCHERY

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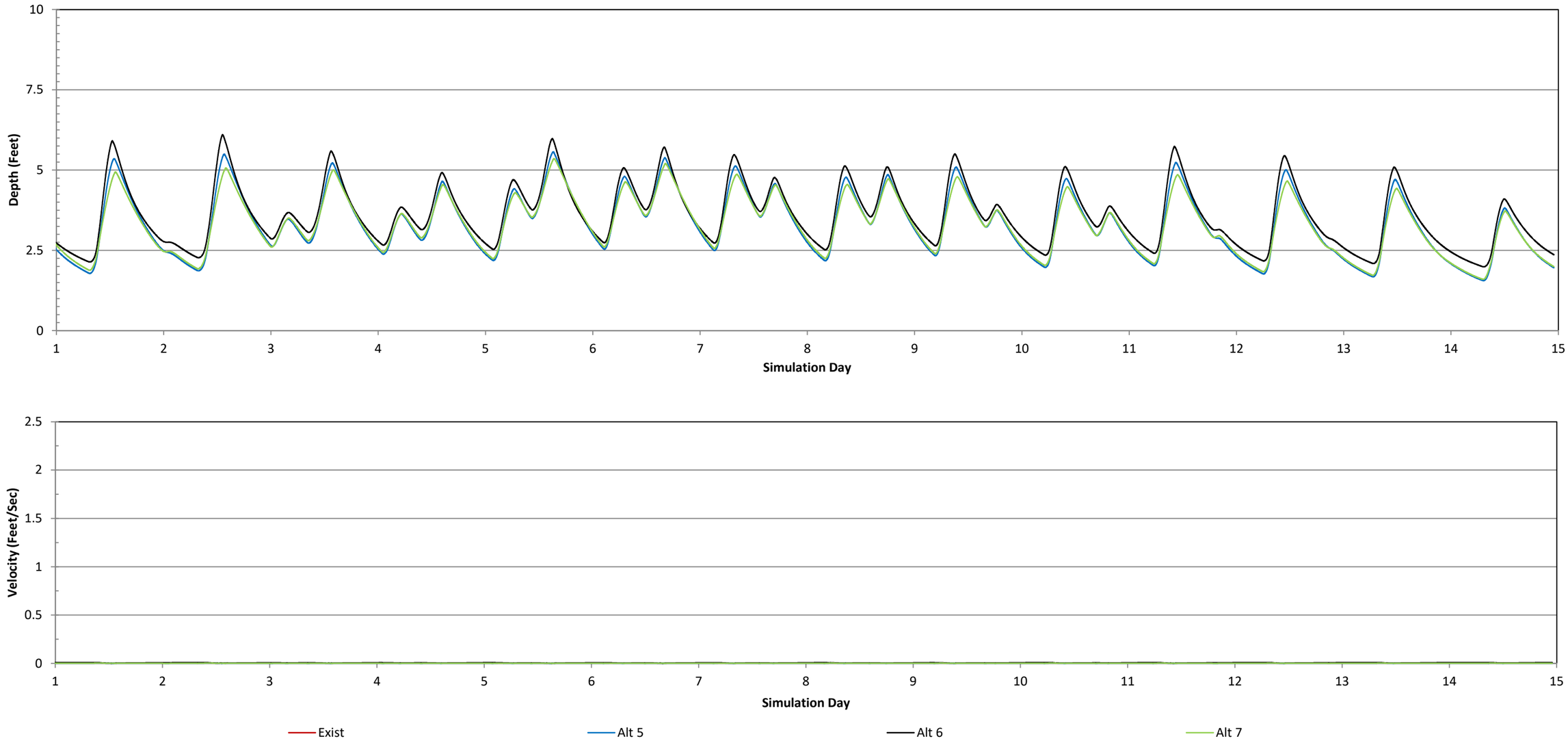
FIG. 56

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 5 - WILLOW CREEK DOWNSTREAM OF

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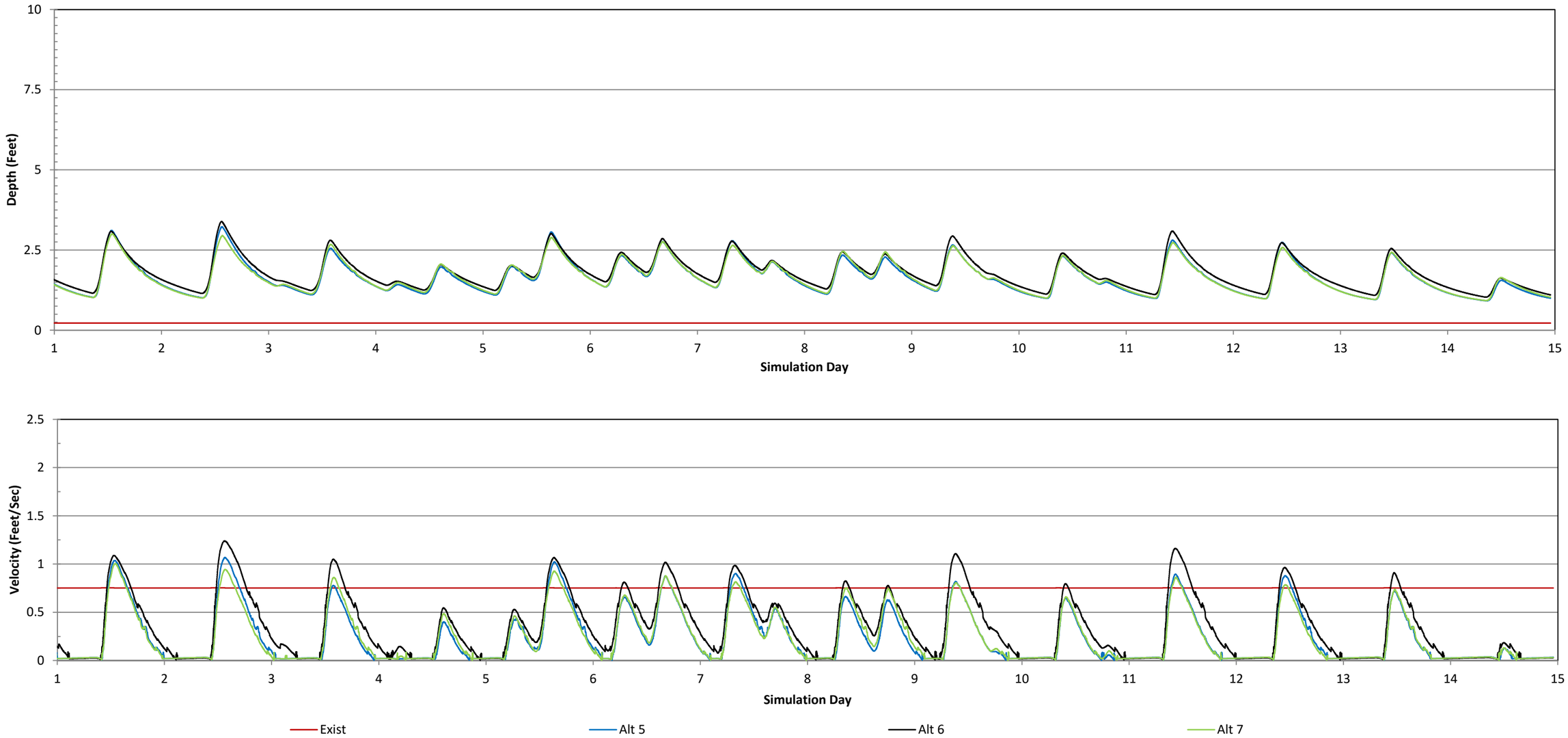
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 57

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE FLOOD DEPTHS AND VELOCITIES
NODE 7 - SHELLABARGER CREEK
DOWSTREAM OF SR 104

June 2019 21-1-12588-050

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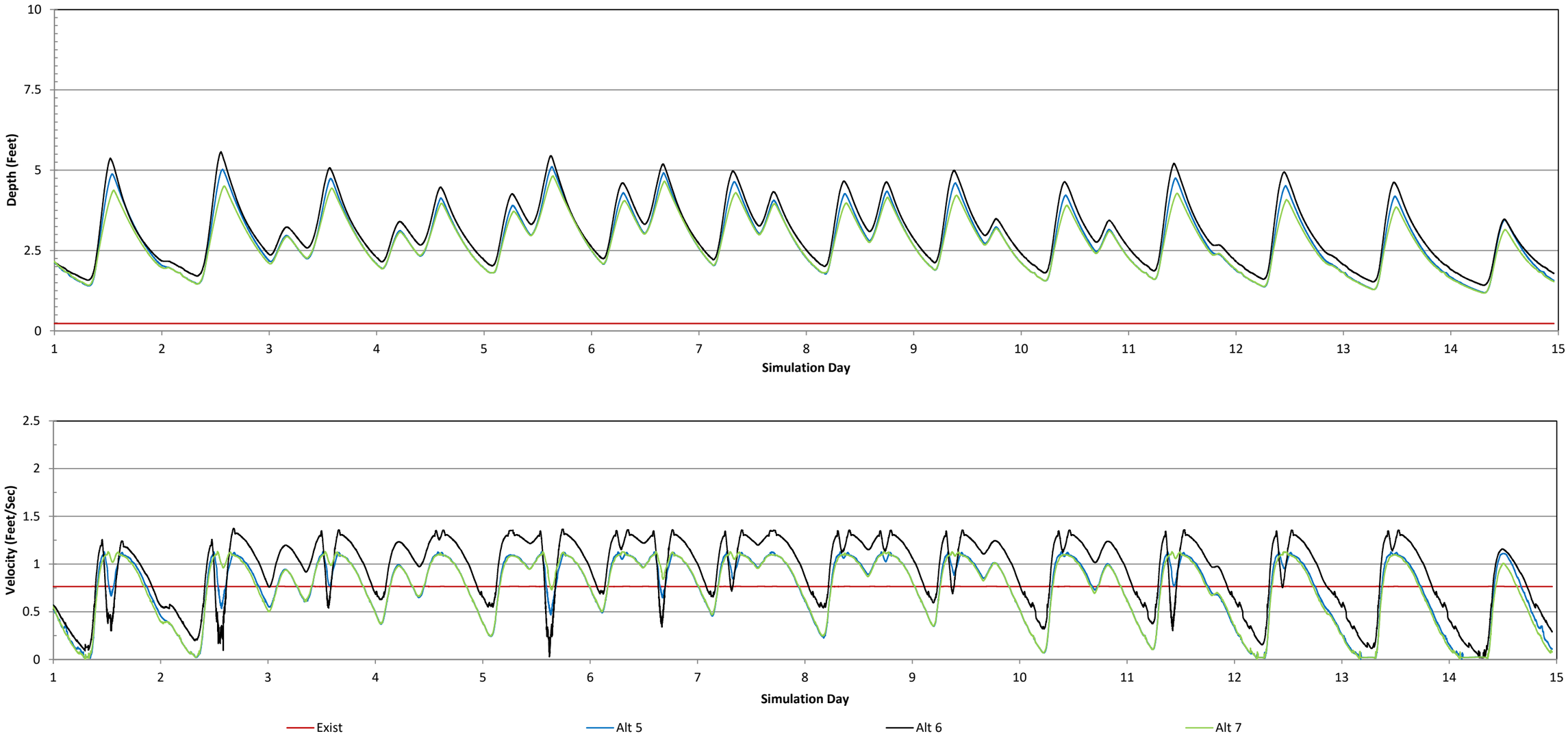
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 58

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-



WILLOW CREEK DAYLIGHT PROJECT
EXPANDED MARSH CONCEPT DESIGN AND
HYDRAULIC MODELING EDMONDS, WA

LATE SPRING HABITAT FLOWS AND KING TIDE WITH SEA LEVEL RISE FLOOD DEPTHS AND VELOCITIES
NODE 7 - SHELLABARGER CREEK

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 59

Printed: 3-08-19 21:14 File: I:\EF\21-1 SEA\12500s\12588 Willow Creek Daylight H& and Soils Study\050 H&H FINAL ALTS - FLOODGATE\Deliverables\FIGURES_POST_COMMENTS\[21-1-12588-050-FIGS46-XX.xlsx]Fig59_Node7SLR-

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent

IMPORTANT INFORMATION

such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

IMPORTANT INFORMATION

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland