

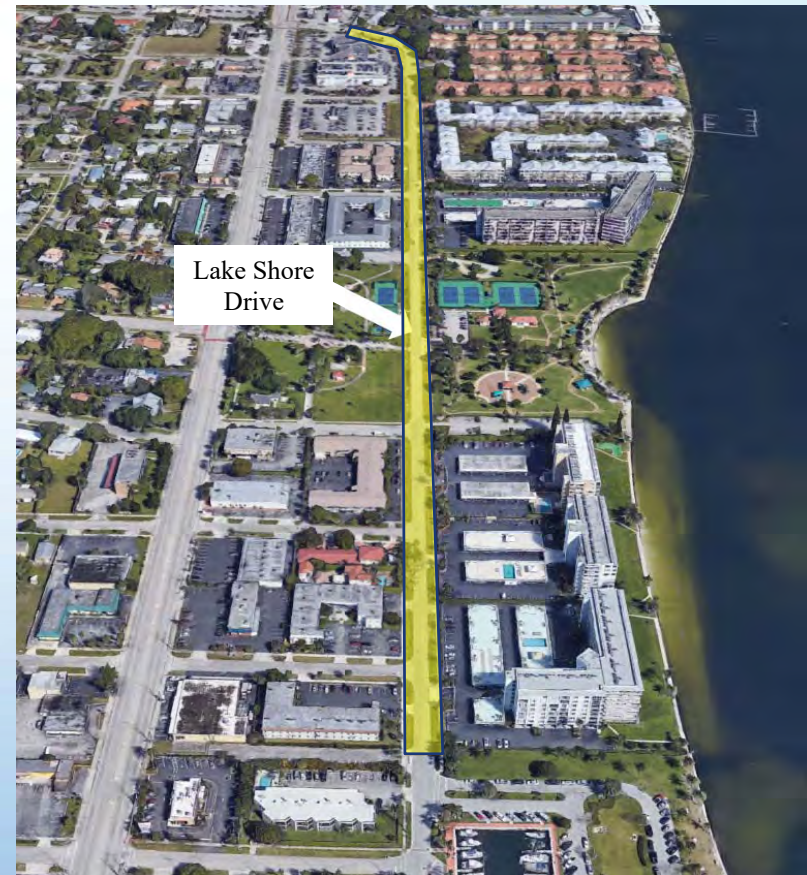


KEEPING AHEAD OF SEA LEVEL RISE - A HOLISTIC APPROACH IN LAKE PARK, FL LAKE SHORE DRIVE DRAINAGE IMPROVEMENTS

FLORIDA STORMWATER ASSOCIATION
2020 ANNUAL CONFERENCE

PROJECT DESCRIPTION

- ROADWAY FLOODING DURING KING TIDES AND HEAVY STORMS
- SEA LEVEL RISE
- VISION LAKE PARK
 - FUTURE DEVELOPMENT
 - LANDSCAPING/LIGHTING
 - PEDESTRIAN FRIENDLY
- REPLACE AGING UTILITIES
- IMPROVE WATER QUALITY TO THE LAKE WORTH LAGOON
- SUSTAINABILITY



1953
1964
2019



1953
1964
2019





LIDAR TOPOGRAPHY



FUTURE ROADWAY

PER TOWN'S CODE OF ORDINANCES

- REMAIN A 2-LANE ROAD
- PARALLEL PARKING ON WEST SIDE OF ROAD
- CONCRETE CURB & GUTTER
- SIDEWALKS & BIKE PATHS
- LANDSCAPING & LIGHTING

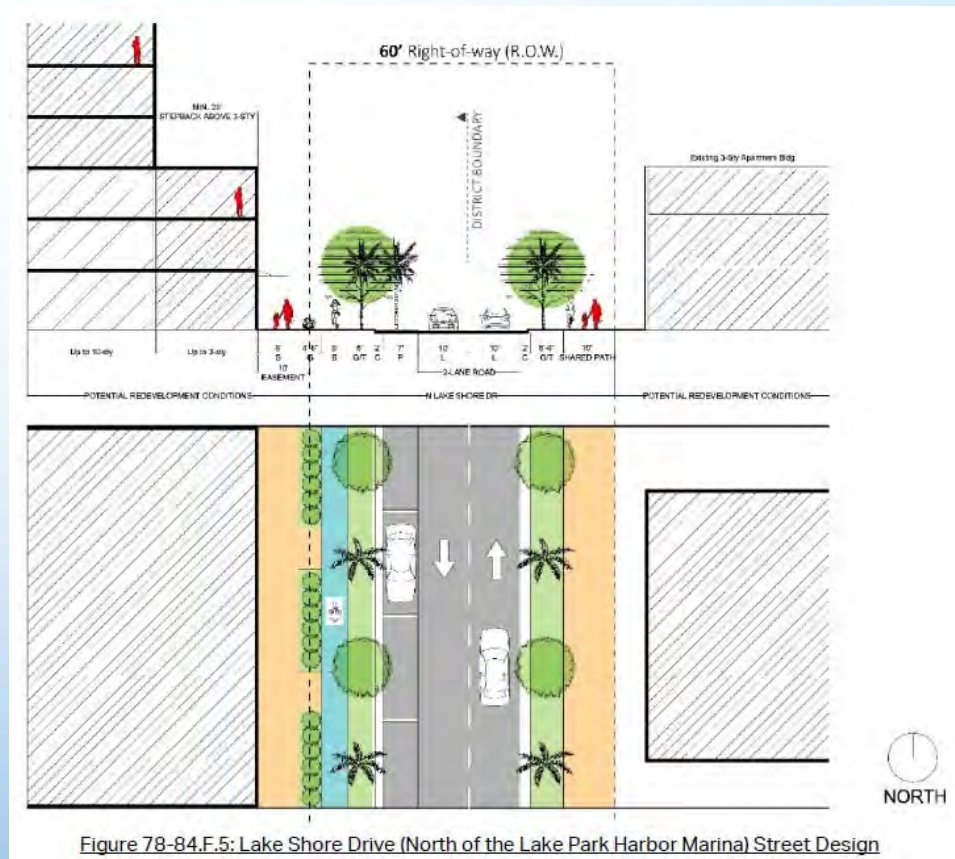


Figure 78-84.F.5: Lake Shore Drive (North of the Lake Park Harbor Marina) Street Design

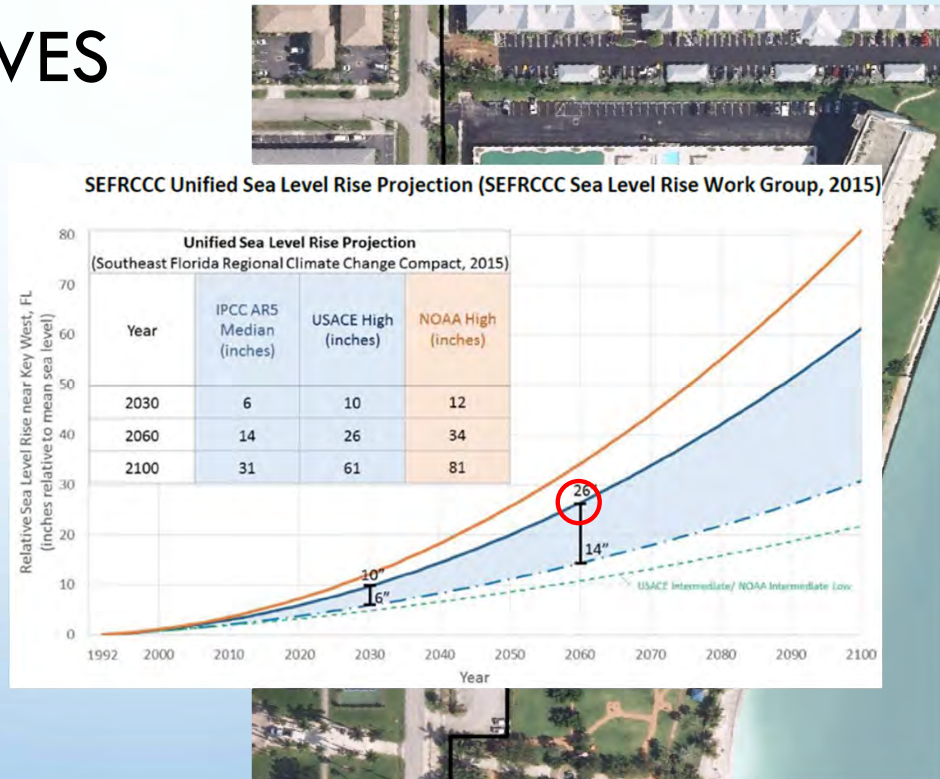
MODELING ALTERNATIVES

- CHECK VALVES AT PIPE OUTLETS
- RAISE ROAD ELEVATIONS
- PUMP STATION
- DETENTION BASIN
- COMBINATIONS OF THE ABOVE
- SEA LEVEL RISE ASSESSMENT



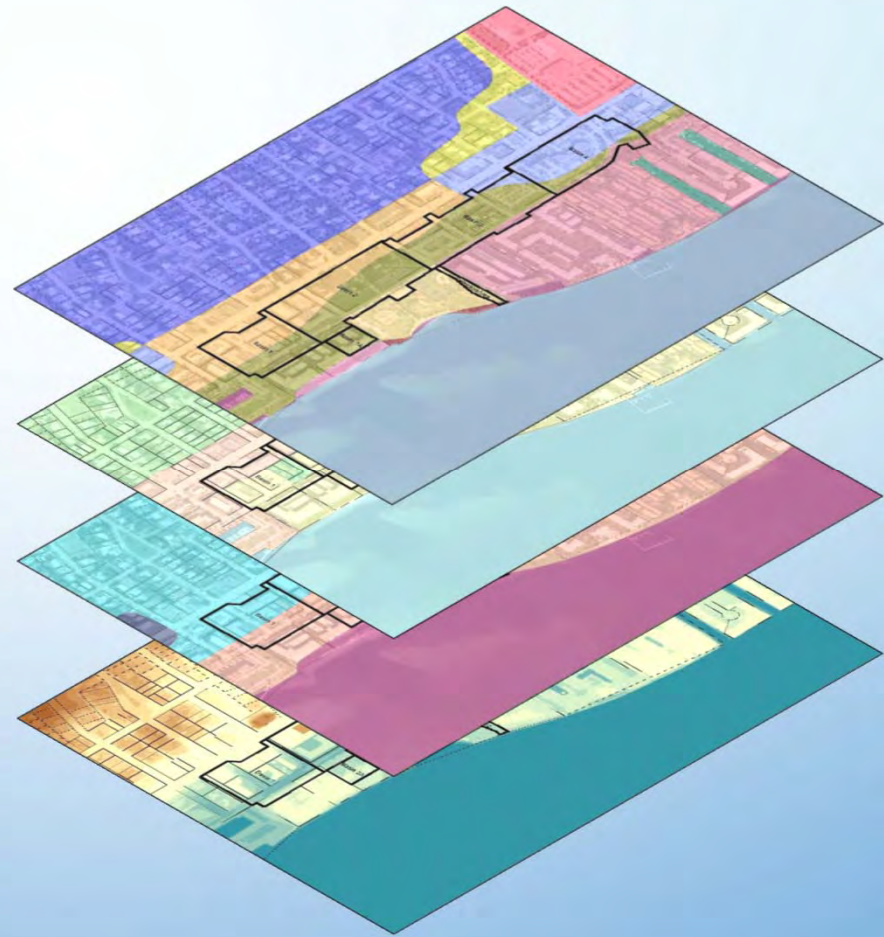
MODELING ALTERNATIVES

- CHECK VALVES AT PIPE OUTLETS
- RAISE ROAD ELEVATIONS
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- SEA LEVEL RISE ASSESSMENT



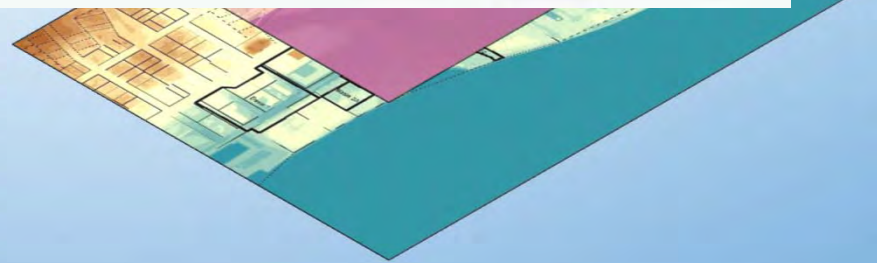
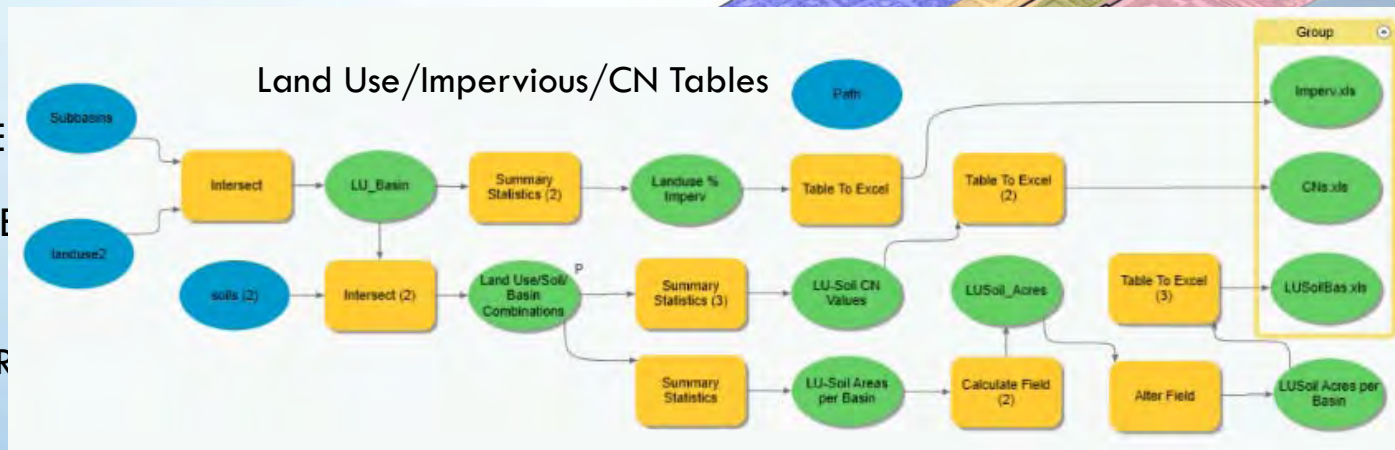
BUILDING A MODEL

- BASIN DELINEATION
- LAND USE AND SOILS
 - CN
 - IMPERVIOUS
 - TC
- INTER-CONNECTED POND ROUTING MODEL (ICPR4)



BUILDING A MODEL

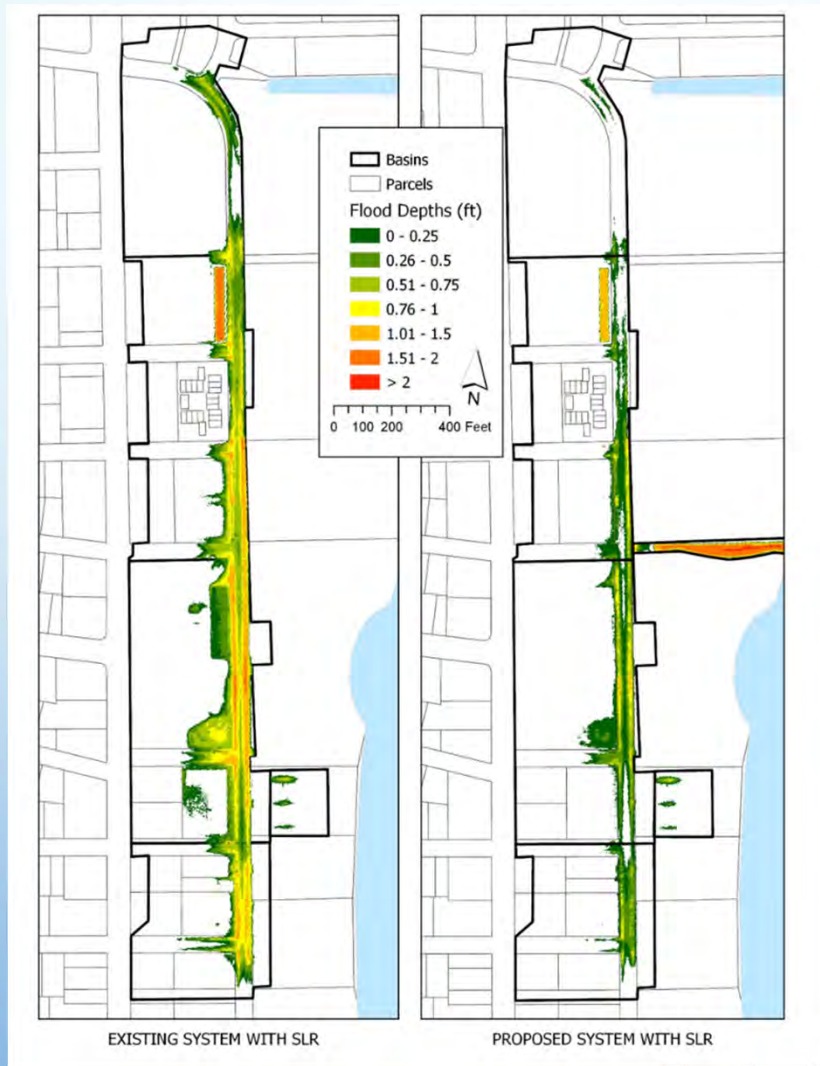
- BASIN DE
- LAND USE
 - CN
 - IMPER
 - TC
- INTER-CONNECTED POND ROUTING MODEL (ICPR4)



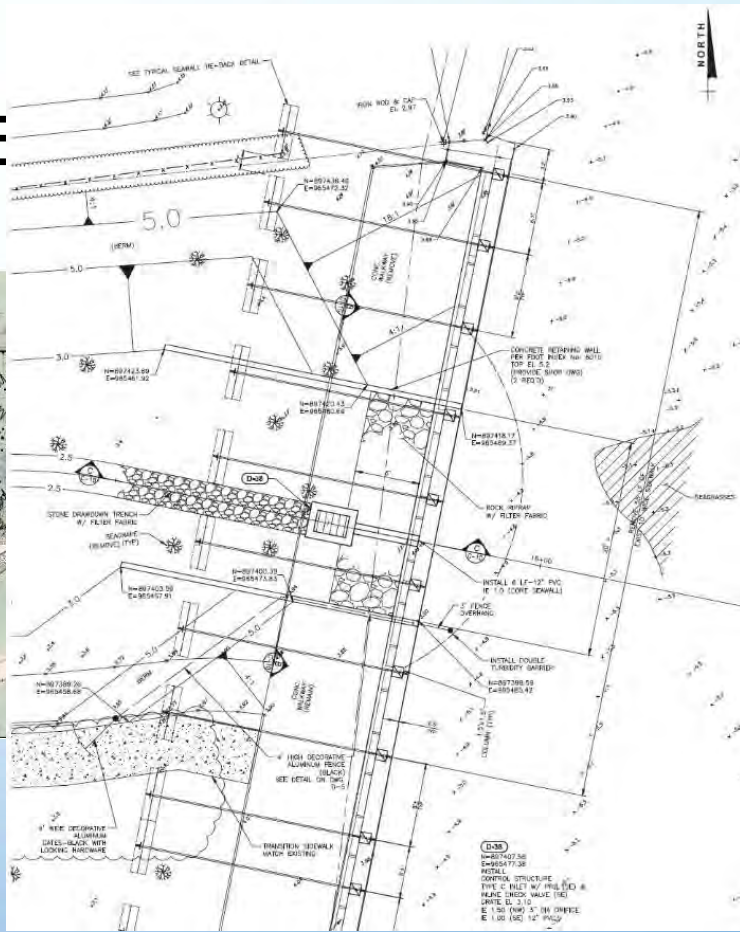
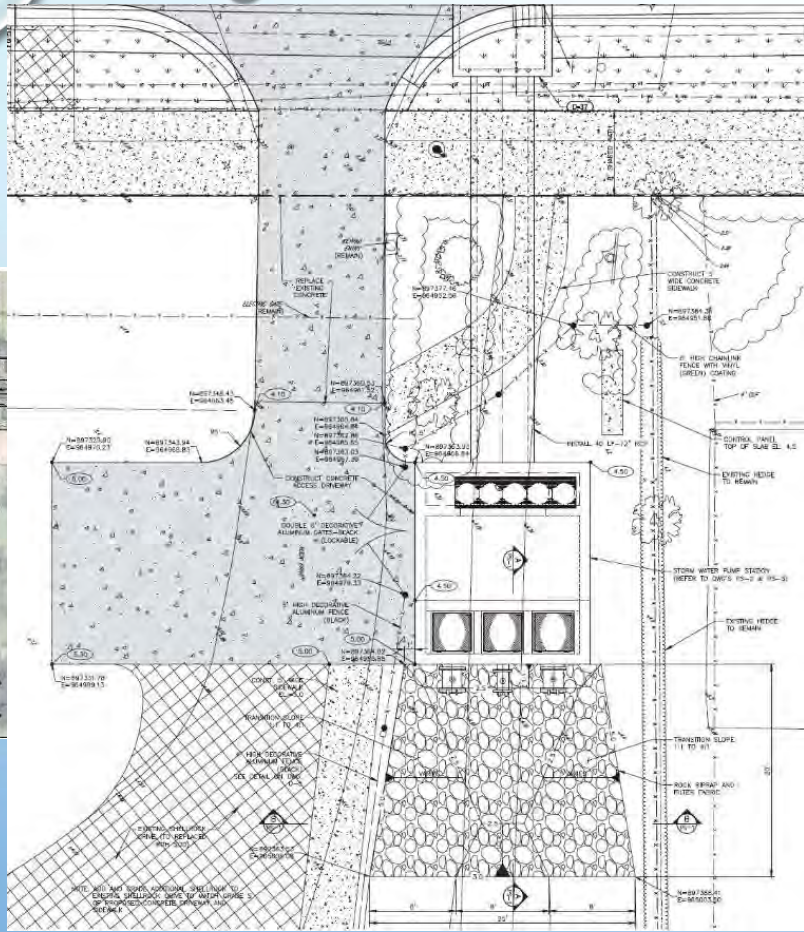
FLOOD ROUTING ANALYSIS

Subbasin	Storm	Existing	Existing w/SLR	Change	Valve Only w/SLR	Change	Pump & Detention w/SLR	Change	RaisedRd & Detention w/SLR	Change	RaisedRd & Det & Pump w/SLR	Change
LWL	3Y1D	1.00	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70
N1	3Y1D	2.85	3.36	0.51	3.36	0.51	2.73	-0.12	3.77	0.92	3.33	0.48
N2	3Y1D	2.85	3.36	0.51	3.36	0.51	2.67	-0.18	3.77	0.92	3.33	0.48
N2A	3Y1D	4.31	4.33	0.02	4.33	0.02	4.30	-0.01	4.37	0.06	4.30	-0.01
N3	3Y1D	2.84	3.36	0.52	3.36	0.52	2.66	-0.18	3.77	0.93	3.33	0.49
N4	3Y1D	2.84	3.36	0.52	3.36	0.52	2.69	-0.15	3.77	0.93	3.33	0.49
LWL	10Y1D	1.00	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70
N1	10Y1D	3.32	3.75	0.43	3.75	0.43	3.22	-0.10	4.06	0.74	3.92	0.60
N2	10Y1D	3.32	3.75	0.43	3.75	0.43	3.22	-0.10	4.06	0.74	3.91	0.59
N2A	10Y1D	4.64	4.67	0.03	4.67	0.03	4.63	-0.01	4.69	0.05	4.63	-0.01
N3	10Y1D	3.32	3.75	0.43	3.75	0.43	3.21	-0.11	4.06	0.74	3.91	0.59
N4	10Y1D	3.31	3.74	0.43	3.74	0.43	3.22	-0.09	4.06	0.75	3.92	0.61
LWL	25Y3D	1.00	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70	2.70	1.70
N1	25Y3D	3.40	3.81	0.41	3.81	0.41	3.31	-0.09	4.11	0.71	3.98	0.58
N2	25Y3D	3.40	3.81	0.41	3.81	0.41	3.31	-0.09	4.10	0.70	3.97	0.57
N2A	25Y3D	4.69	4.72	0.03	4.72	0.03	4.68	-0.01	4.74	0.05	4.68	-0.01
N3	25Y3D	3.40	3.81	0.41	3.81	0.41	3.31	-0.09	4.10	0.70	3.97	0.57
N4	25Y3D	3.39	3.81	0.42	3.81	0.42	3.31	-0.08	4.10	0.71	3.98	0.59





VALE



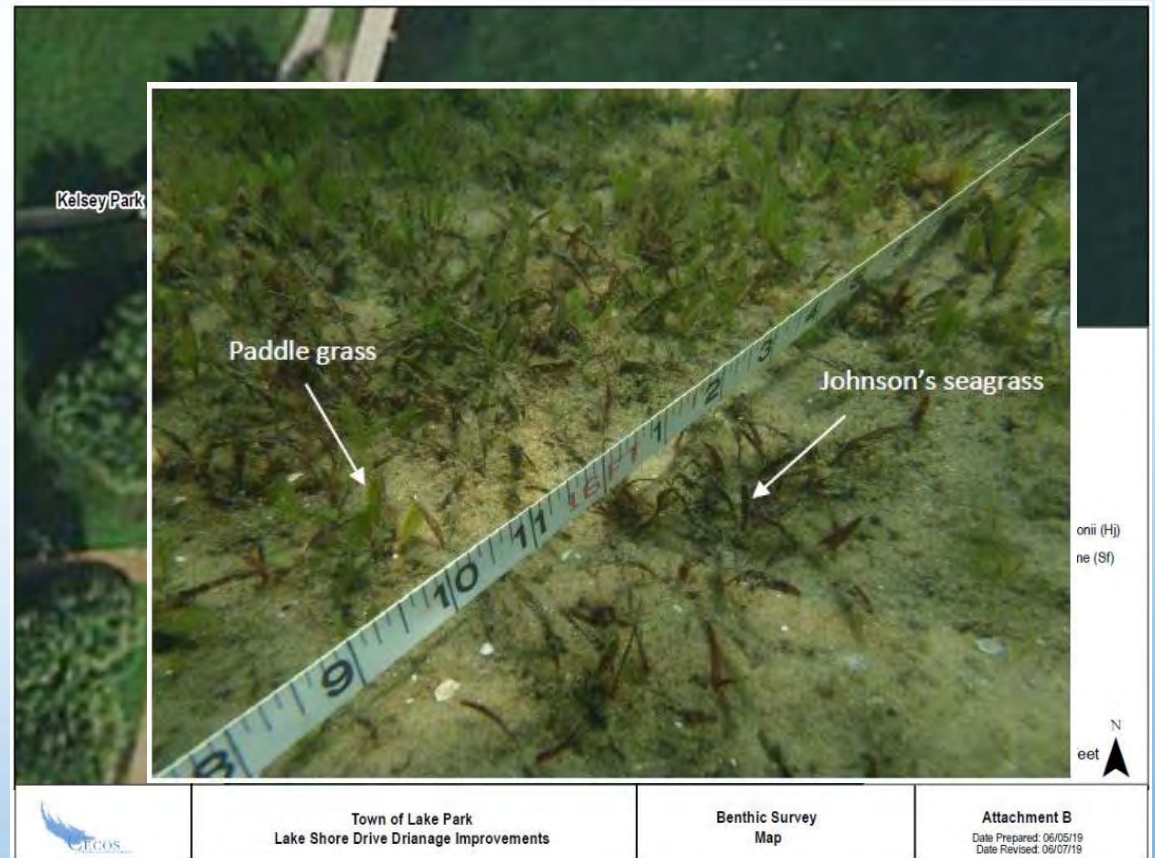
PERMITTING

- SFWMD
 - ERP
 - ALLOWABLE DISCHARGE
 - DEWATERING
 - SALTWATER INTRUSION
 - GROUNDWATER CONTAMINATION
- USACE
 - BENTHIC SURVEY
 - SCOUR CALCULATIONS



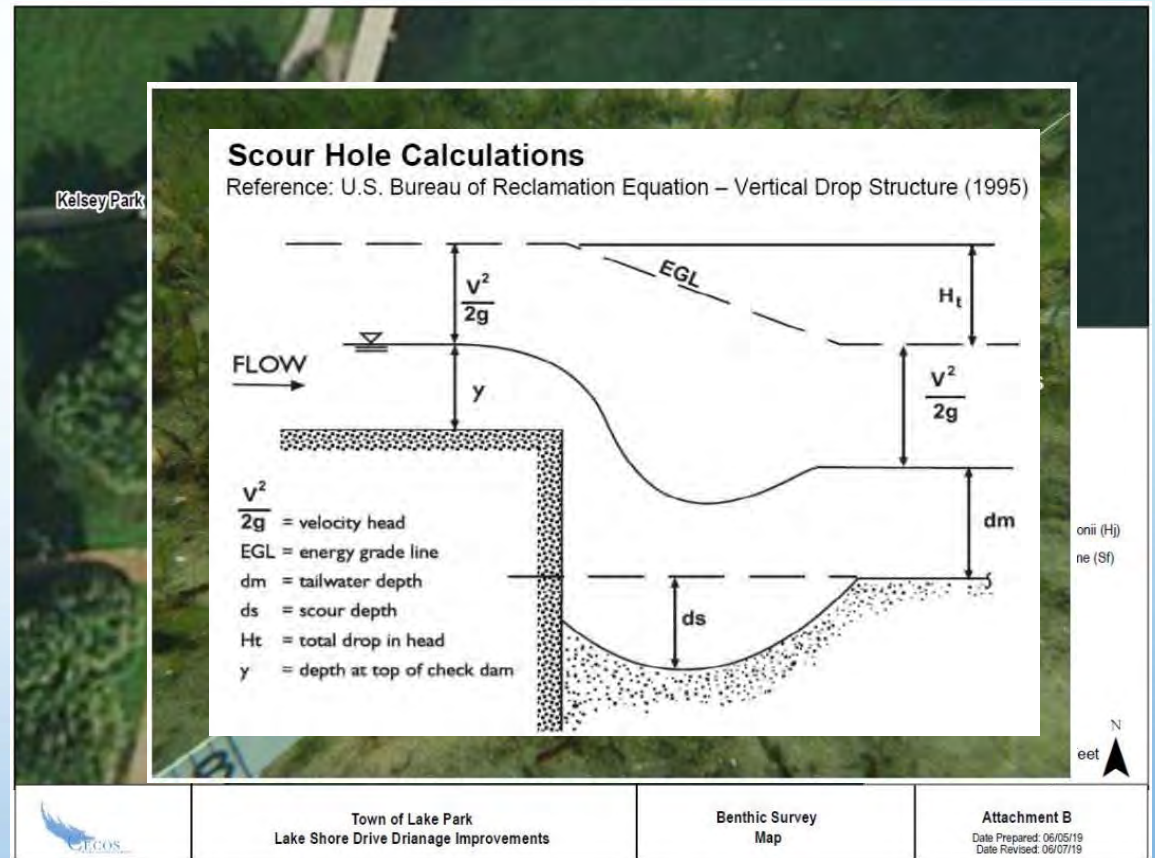
PERMITTING

- SFWMD
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PERMITTING

- SFWMD
 - ERP
 - ALLOWABLE DISCHARGE
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 - GROUNDWATER CONTAMINATION
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 - SCOUR CALCULATIONS



FUNDING

LAKE WORTH LAGOON INITIATIVE



- GAS TAX - \$2M
- LAKE WORTH LAGOON GRANT
 - \$700K APPROVED FOR TOWN
- SEACOAST UTILITIES – TBD
- HAZARD MITIGATION GRANT PROGRAM – \$3.5M



HAZARD MITIGATION GRANT CALCULATIONS

DAMAGES BEFORE MITIGATION

NODE	PROPERTY ADDRESS	No. Units	BUILDING REPLACEMENT VALUE (BRV)	FFE	H&H BEFORE MITIGATION RESULTS					DIFFERENCE					DDF BUILDING DAMAGE %					DDF CONTENT DAMAGE %					DDF BUILDING DAMAGE \$					DDF CONTENT DAMAGE \$					DISPLACEMENT (DAYS)					DISPLACEMENT (\$223)				
					H&H water elevation																																							
					3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr
N3	810 LAKE SHORE DR	46	\$ 2,804,500	4.00	3.33	3.71	3.78	4.48	4.51	-0.67	-0.29	-0.22	0.48	0.50	2.97	6.30	6.93	11.40	11.50	4.46	9.45	10.40	17.10	17.25	\$83,294	\$176,684	\$194,352	\$319,713	\$322,518	\$125,081	\$265,025	\$291,668	\$479,570	\$483,776	0.00	0.00	0.00	21.60	22.50	\$0	\$0	\$221,573	\$230,805	
N2	510 LAKE SHORE DR	36	\$ 2,087,000	3.60	3.33	3.71	3.78	4.47	4.53	-0.27	0.11	0.10	0.67	0.98	6.57	9.50	9.85	13.30	13.65	9.86	14.75	14.78	19.95	20.48	\$137,116	\$198,269	\$205,570	\$277,571	\$284,876	\$265,778	\$297,398	\$308,459	\$416,357	\$427,418	0.00	4.50	7.65	38.70	41.85	\$1,004	\$1,706	\$8,630	\$35,972	
N1	402 LAKE SHORE DR	20	\$ 1,192,348	4.30	3.33	3.70	3.78	4.45	4.54	-0.97	-0.60	-0.53	0.15	0.24	0.27	3.60	4.33	9.75	10.20	0.41	5.40	6.48	14.69	15.30	\$3,219	\$42,925	\$51,509	\$116,254	\$121,619	\$4,888	\$64,387	\$77,264	\$174,441	\$182,429	0.00	0.00	0.00	6.75	10.80	\$0	\$0	\$3,505	\$48,188	
N1	310 LAKE SHORE DR	20	\$ 1,064,641	5.20	3.33	3.70	3.78	4.45	4.55	-1.87	-1.50	-1.42	-0.75	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	\$0	\$0	\$0	\$23,954	\$32,578	\$0	\$0	\$0	\$35,985	\$48,867	0.00	0.00	0.00	0.00	0.00	\$0	\$0	\$0	\$0	
122																																												
TOTALS FOR BCA PURPOSES					\$223,629	\$417,873	\$451,431	\$737,492	\$761,591	\$335,748	\$626,810	\$677,391	\$1,106,351	\$1,142,490	0.00	4.50	7.65	67.05	75.15	\$0	\$1,004	\$1,706	\$231,708	\$614,945																				
Total of Building, Contents and Displacement Costs					\$559,376	\$1,045,686	\$1,130,527	\$2,075,552	\$2,519,025																																			

DAMAGES AFTER MITIGATION

NODE	PROPERTY ADDRESS	No. Units	BUILDING REPLACEMENT VALUE (BRV)	FFE	H&H AFTER MITIGATION RESULTS					DIFFERENCE					DDF BUILDING DAMAGE %					DDF CONTENT DAMAGE %					DDF BUILDING DAMAGE \$					DDF CONTENT DAMAGE \$					DISPLACEMENT (DAYS)					DISPLACEMENT (\$223)				
					H&H water elevation																																							
					3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr
N3	810 LAKE SHORE DR	46	\$ 2,804,500	4.00	2.72	3.18	3.28	4.09	4.13	-1.28	-0.82	-0.72	0.09	0.13	0.00	1.62	2.43	9.40	9.60	0.00	2.43	3.65	14.10	14.40	\$0	\$45,433	\$68,149	\$103,623	\$269,232	\$0	\$68,149	\$102,364	\$395,435	\$403,848	0.00	0.00	0.00	3.60	5.40	\$0	\$0	\$803	\$55,393	
N2	510 LAKE SHORE DR	36	\$ 2,087,000	3.60	2.70	3.18	3.28	4.09	4.14	-0.90	-0.42	-0.32	0.40	0.54	0.90	5.22	6.03	11.40	11.65	1.35	7.83	9.05	17.10	17.48	\$18,783	\$108,941	\$125,846	\$237,918	\$243,136	\$28,175	\$163,412	\$188,874	\$356,877	\$364,808	0.00	0.00	0.00	21.60	23.85	\$0	\$0	\$4,817	\$191,468	
N1	402 LAKE SHORE DR	20	\$ 1,192,348	4.30	2.72	3.18	3.28	4.09	4.15	-1.58	-1.12	-1.02	-0.21	-0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	\$0	\$0	\$0	\$84,776	\$91,215	\$0	\$0	\$0	\$127,224	\$136,882	0.00	0.00	0.00	0.00	0.00	\$0	\$0	\$0	\$0	
N1	310 LAKE SHORE DR	20	\$ 1,064,641	5.20	2.72	3.18	3.28	4.09	4.16	-2.48	-2.02	-1.92	-1.11	-1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0			
TOTALS FOR BCA PURPOSES					\$18,783	\$154,374	\$193,995	\$586,317	\$603,582	\$28,175	\$231,561	\$291,238	\$879,535	\$905,537	0.00	0.00	0.00	25.20	29.25	\$0	\$0	\$0	\$5,620	\$246,861																				
Total of Building, Contents and Displacement Costs					\$46,958	\$385,936	\$485,233	\$1,471,472	\$1,755,980																																			
Difference of Before and After					\$532,419	\$659,750	\$645,294	\$604,080	\$763,045																																			

HAZARD MITIGATION GRANT CALCULATIONS

NODE	PROPERTY ADDRESS	No. Units	BUILDING REPLACEMENT VALUE (BRV)	FFE	H&H BEFORE MITIGATION RESULTS					DIFFERENCE					DDF BUILDING DAMAGE				
					H&H water elevation														
					3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	
N3	810 LAKE SHORE DR	46	\$ 2,804,500	4.00	3.33	3.71	3.78	4.48	4.51	-0.67	-0.25	-0.22	0.48	0.50	2.97	6.30	6.93	11	
N2	810 LAKE SHORE DR	36	\$ 2,087,000	3.60	3.33	3.71	3.78	4.47	4.53	-0.27	0.11	0.10	0.67	0.68	6.57	9.50	9.85	13	
N1	402 LAKE SHORE DR	20	\$ 1,192,348	4.30	3.33	3.70	3.78	4.45	4.54	-0.97	-0.60	-0.53	0.15	0.24	0.27	3.60	4.33	9	
N1	810 LAKE SHORE DR	20	\$ 1,064,641	5.20	3.33	3.70	3.78	4.45	4.55	-1.87	-1.50	-1.42	-0.75	-0.65	0.00	0.00	0.00	2	

NODE	PROPERTY ADDRESS	No. Units	BUILDING REPLACEMENT VALUE (BRV)	FFE	H&H AFTER MITIGATION RESULTS					DIFFERENCE					DDF BUILDING DAMAGE				
					H&H water elevation														
					3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	100-yr	3-yr	10-yr	25-yr	50-yr	
N3	810 LAKE SHORE DR	46	\$ 2,804,500	4.00	2.72	3.18	3.28	4.09	4.13	-1.28	-0.82	-0.72	0.09	0.13	0.00	1.62	2.43	9	
N2	810 LAKE SHORE DR	36	\$ 2,087,000	3.60	2.70	3.18	3.28	4.09	4.14	-0.90	-0.42	-0.32	0.40	0.54	0.90	5.22	6.03	11	
N1	402 LAKE SHORE DR	20	\$ 1,192,348	4.30	2.72	3.18	3.28	4.09	4.15	-1.58	-1.12	-1.00	-0.21	-0.15	0.00	0.00	0.00	7	
N1	810 LAKE SHORE DR	20	\$ 1,064,641	5.20	2.72	3.18	3.28	4.09	4.16	-2.48	-2.02	-1.92	-1.11	-1.04	0.00	0.00	0.00	0	

BCA Tool Quick Start

The BCA Tool provides access to resources and automated functions needed to complete a successful Benefit-Cost Analysis for hazard mitigation grant programs.

The diagram to the left displays the process used to successfully complete a Benefit-Cost Analysis.

To begin your project, click on the functional icons in the process diagram to the left. Each icon provides quick access to that functional area from the home screen. The functionality within the menu on the top (aka ribbon) and the navigation tree in the left pane are available throughout the tool.

View the [Quick Start Tutorial Movie](#) for an overview of how to Create a Project. The video walks you through the process of creating a project in the tool. You can also click on the icon for a link to context-sensitive help, or the icon for a Flash-based movie tutorial.

IT (\$223)	50-yr	100-yr
\$0	\$221,570	\$230,805
706	\$8,630	\$335,972
\$0	\$3,500	\$48,168
\$0	\$0	\$0
706	\$231,708	\$614,945

IT (\$223)	50-yr	100-yr
\$0	\$800	\$55,390
\$0	\$4,817	\$191,468
\$0	\$0	\$0
\$0	\$0	\$0
\$0	\$5,620	\$246,861

SCHEDULE

- PERMITTING COMPLETED AUG 2019
- DESIGN COMPLETED OCT 2019
- HMGP GRANT RECEIVED JUN 2020
- BIDDING JUL 2020
- CONSTRUCTION SEPT 2020 – JUL 2021
 - PUBLIC OUTREACH
 - COORDINATION WITH RESIDENTS
 - MOT
- PUBLIC EDUCATION

