



Advancing the Sapphire Necklace Restoration Concept

FSA Winter Conference, December 2, 2022

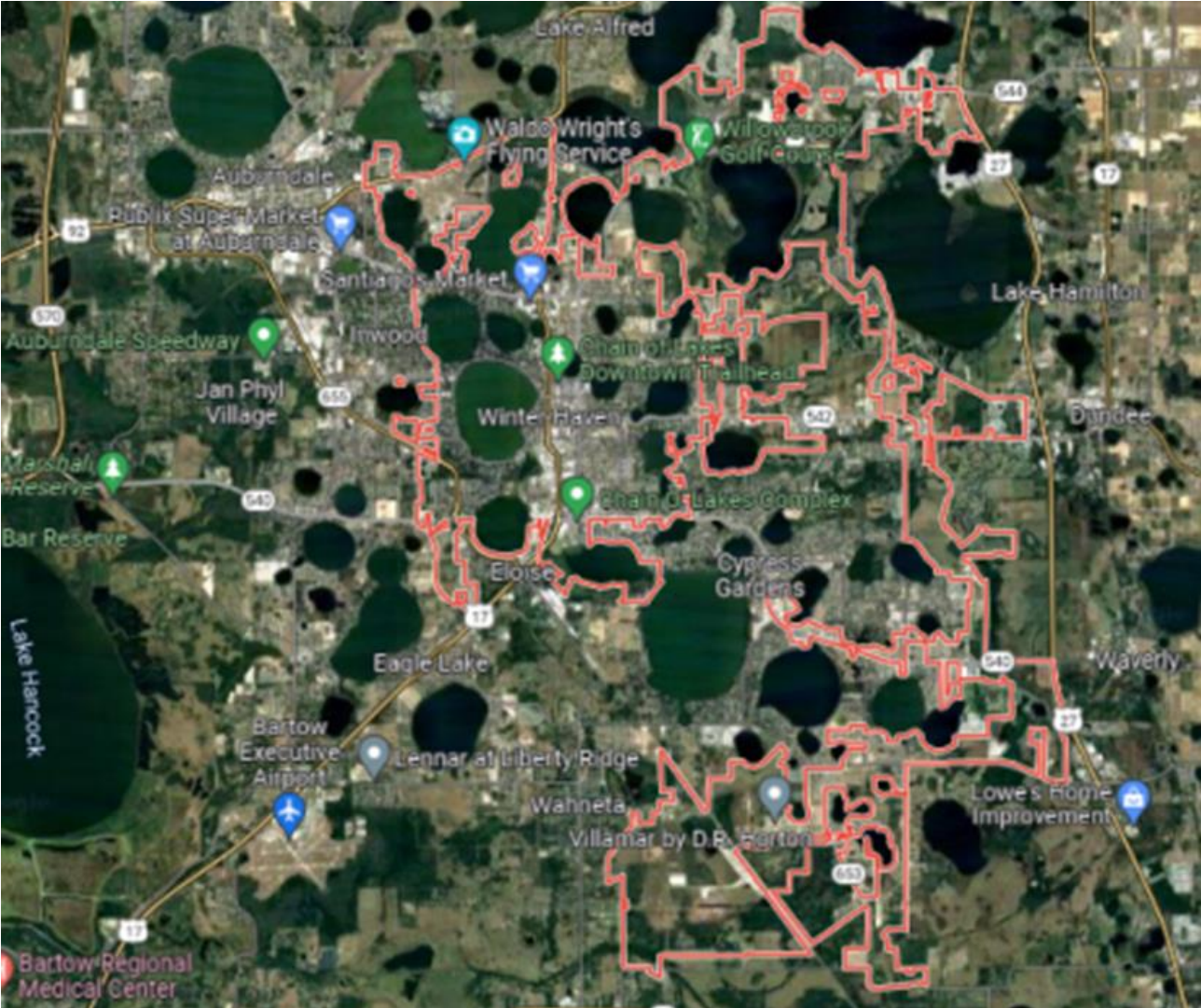
Jeff Herr, PE, Brown and Caldwell

Acknowledgements

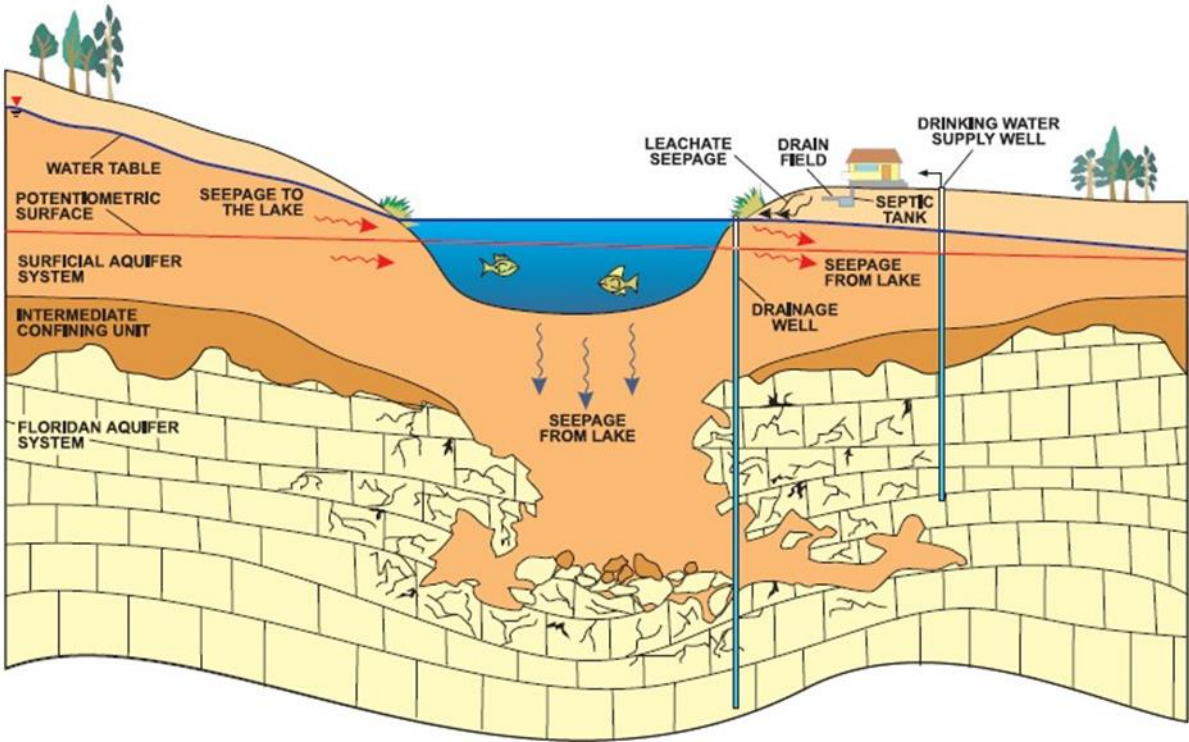
- City of Winter Haven
Mike Britt, Project Manager
- Black and Veatch
Jon Dinges, Project Manager
- Robert Gaylord, BC PM



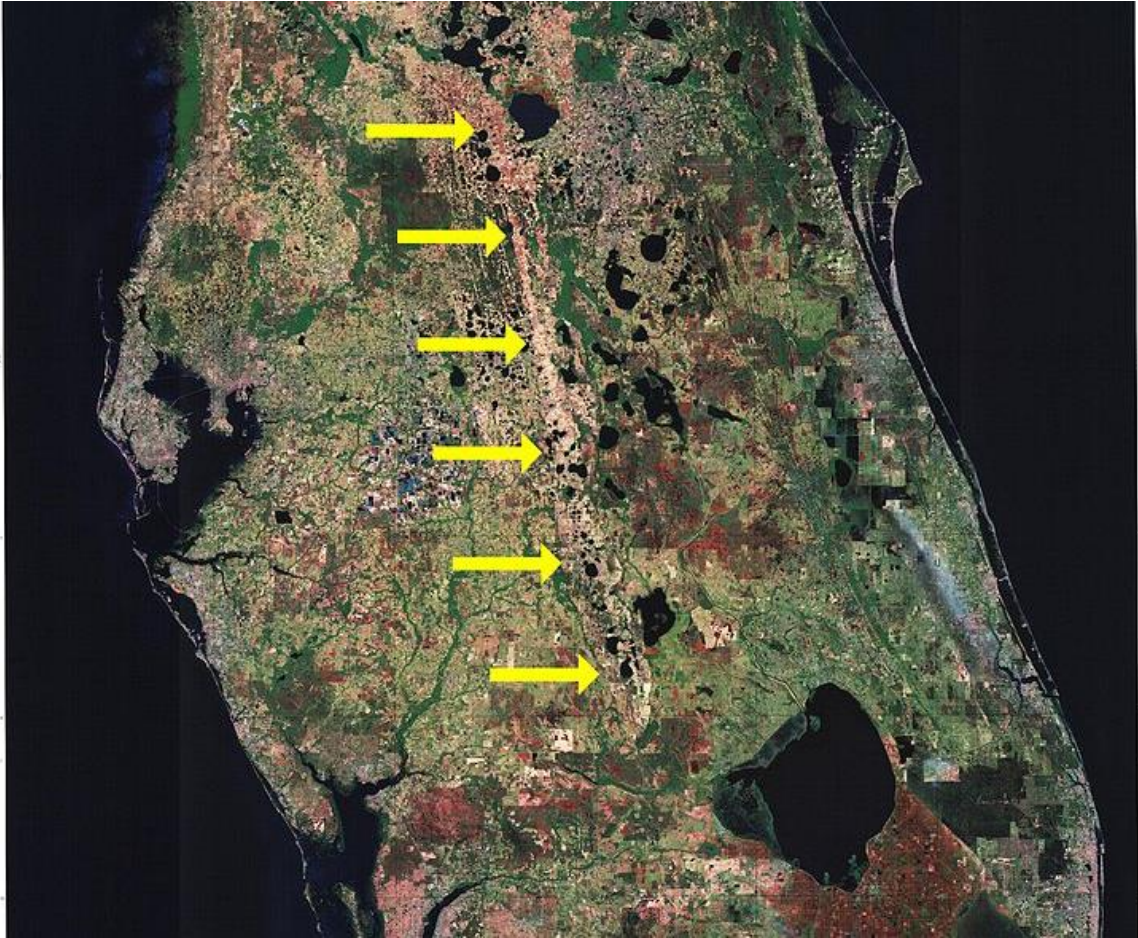
“Chain of Lakes City”



Lake Wales Ridge



Sometimes referred to as the Mid-Florida Ridge, is an ancient sand ridge running for about 150 miles south to north in Central Florida.





WE ARE A WATER-CENTRIC COMMUNITY

FROM WATER SKIING TO BLUEGILL FISHING, “THE CHAIN OF LAKES CITY” EMBODIES A CULTURE CONNECTED TO WATER.

Our community’s culture, economy, and way of life has been and will continue to be shaped by water. There are 50 lakes within or adjacent to Winter Haven’s City limits, and many other lakes in the local area. Our lakes are one of the most valuable social, economic, and environmental resources for the community. The lakes are a defining feature of Winter Haven and have shaped much of the local character and culture. A notable example is Cypress Gardens, which opened in the 1930s and was known as the “Water Ski Capital of the World” and depended on Lake Eloise to sustain its operations. To this day, Legoland Florida continues its successful business in that same location.

Our Chain of Lakes generates **\$120M** annually in economic impact to the area

The health of our lakes correlates with the quality of life, economic opportunity, and cultural identity of Winter Haven.

VOICES & VALUES OF ONE WATER



LEGACY LANDOWNER

VALUES FAMILY HERITAGE AND FAIR PRICE OF LAND

“My family have been stewards of this land for generations. My heirs are anxious to develop but I’m willing to have a conversation about the right project to ensure ongoing stewardship.”



BUILDER / DEVELOPER

VALUES TIME AND EFFICIENCY OF DEVELOPMENT

“I see that Winter Haven is growing and demand for housing is intense. I’m taking on costs and risks to meet demand and need project approval and construction to run smoothly.”



EXISTING RESIDENT

VALUES QUALITY OF LIFE AND LOW UTILITY RATES

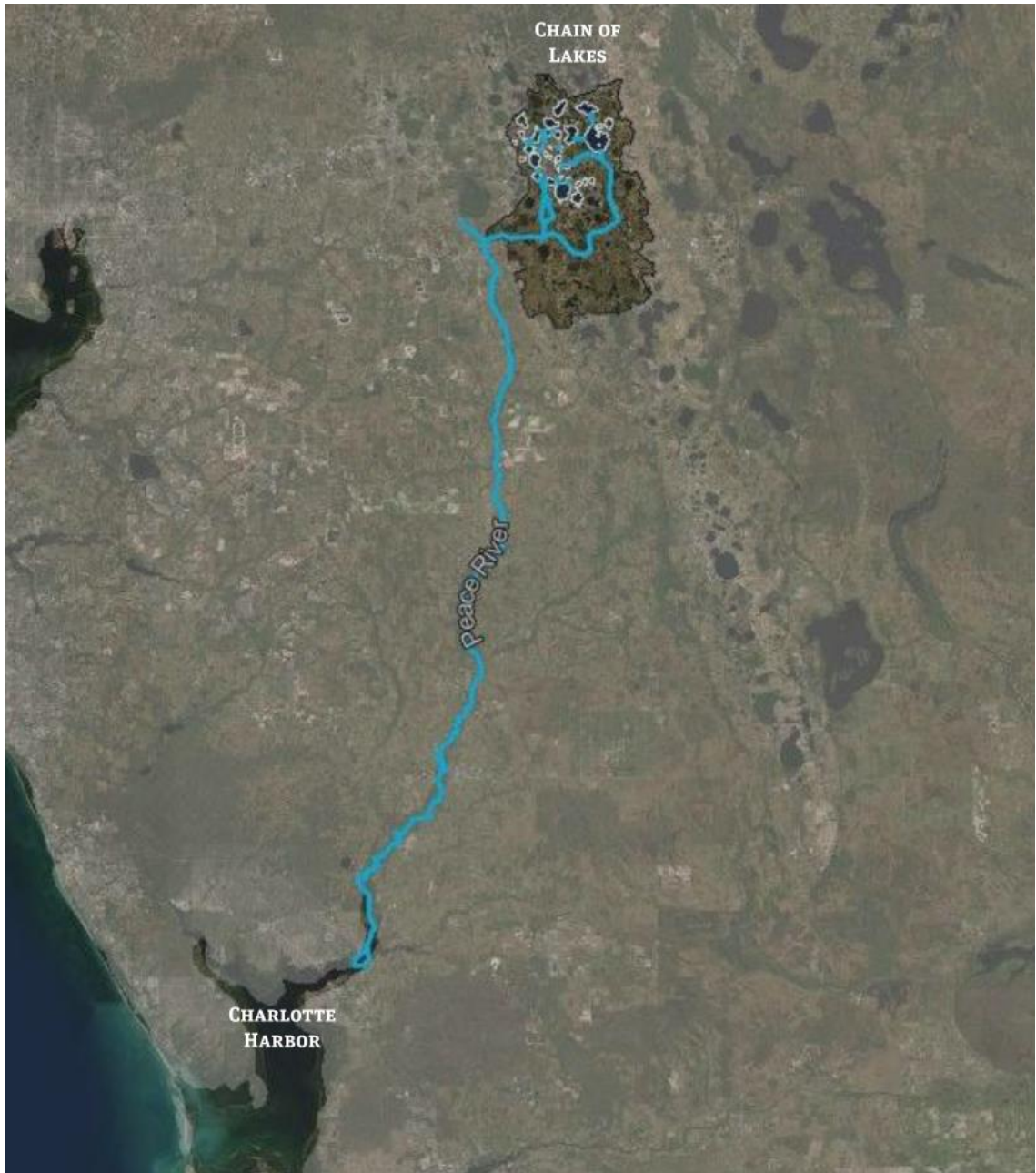
“Our family enjoys seeing wildlife, fishing, and sunset dinners with friends on a day out on the lakes - we love our Chain Life.”



FUTURE RESIDENT

VALUES QUALITY OF LIFE AND LOW UTILITY RATES

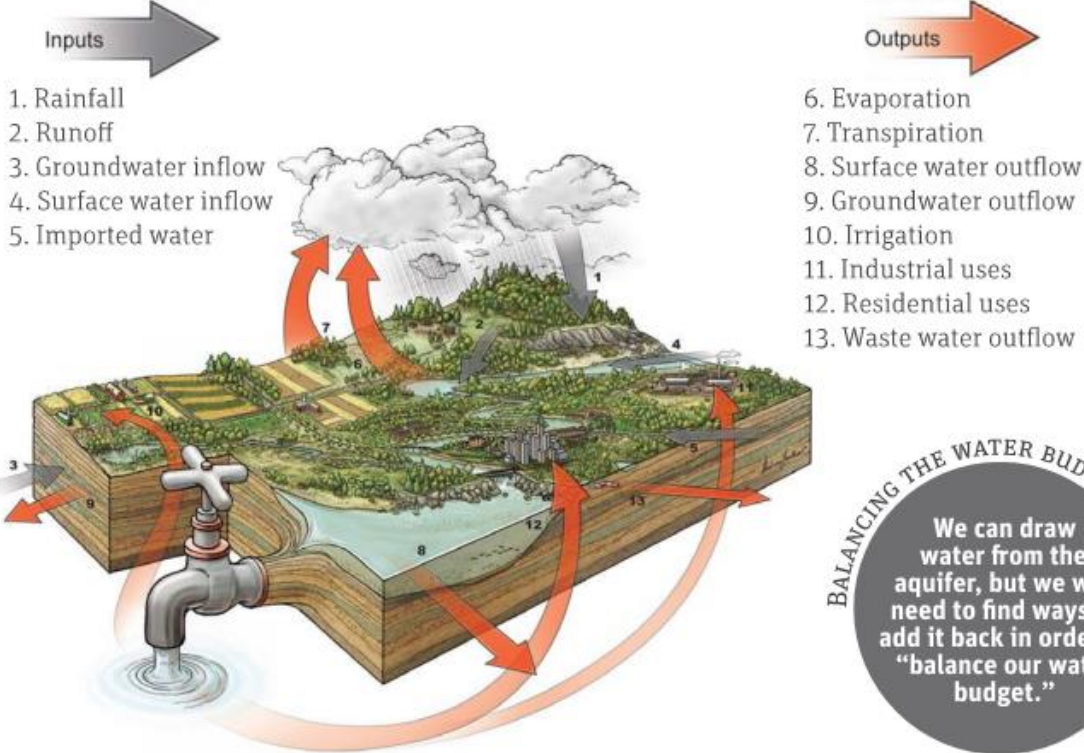
“My partner and I work from home and are looking for an affordable place to live that has great recreational amenities for our families to explore.”



WINTER HAVEN IS SITUATED AT THE HEADWATERS OF THE PEACE RIVER, IN THE PEACE CREEK WATERSHED,
and is a critical part of maintaining healthy flows of water to the Peace River and the Charlotte Harbor Estuary, an estuary of national significance. In addition, recharge to the Floridan Aquifer System, our primary source of drinking water, occurs in the Winter Haven area. The Floridan Aquifer system also sustains lakes, springs, and rivers throughout Florida and is essential to our quality of life.

PEACE CREEK'S WATER BUDGET

The total rainfall in the region is our water budget. We begin depleting our aquifer resource when we use more water than what is stored from rainfall.



Peace Creek Watershed lost
27
 billion gallons of water storage capacity over the last 100 years.

FACTORS STRESSING OUR WATER SUPPLY



POPULATION GROWTH
 Our growing population is consuming more water.



URBANIZATION
 Roads and buildings are preventing water from infiltrating the aquifer.



LAKE & WETLAND DEGRADATION
 Human activities are degrading the storage capacity of lakes and wetlands.



LIMITED NATURAL SUPPLY
 We are limited in the amount of water we can draw from the aquifer and natural systems.



AGING INFRASTRUCTURE
 Antiquated infrastructure increases cost and decreases efficient use of water resources.



CLIMATE CHANGE
 Variations in our climate impacts the frequency of rainfall, our primary source of water supply.

WHAT IS THE ONE WATER APPROACH?

One Water is a *SHIFT* in community water management: from managing water as waste to **MANAGING WATER AS RESOURCE**. Every drop matters for the health of our regional economy, communities, and environment.

FROM



TO



Restore

restoring lakes and wetlands that provide natural water storage.



Reclaim

modernizing wastewater reclamation technology.



Recharge

replenishing the natural aquifers using nature-based solutions.

Reuse

increasing the life cycle of water as a renewable resource in Winter Haven.



HOW WILL WE SUSTAIN OUR WATER SUPPLY?

WINTER HAVEN'S ONE WATER BLUEPRINT PROVIDES THE GOALS, STRATEGIES, AND TACTICS TO HELP SUSTAIN OUR WATER SUPPLY OVER THE NEXT GENERATION OF WINTER HAVEN'S GROWTH.



WINTER HAVEN'S ONE WATER GAME PLAN



VISION: THE SAPPHIRE NECKLACE

Winter Haven's Sapphire Necklace is the most significant for 'Nature-Based Solutions' in the Heartland Region, providing a strategy for restored water resources and added community value for a sustainable future.

This approach will help replenish much of the estimated 27 billion gallons of water lost from our area's wetlands and aquifers over the past century, yielding benefits locally and across a 13-county region.

FLAGSHIP PROJECTS

Nature-Based Solutions to Restore Peace Creek

Working with public agencies and future development to restore 5,000 acres of wetlands to store 4 billion gallons of water for local and regional benefits to lakes, streams, rivers, and aquifer systems.

Water Reuse to reduce future demand

Connecting thousands of septic tanks to public sewer systems to improve water quality of lakes and streams, and beneficially reuse the water.

Upper Floridan Aquifer Recharge Demonstration Project

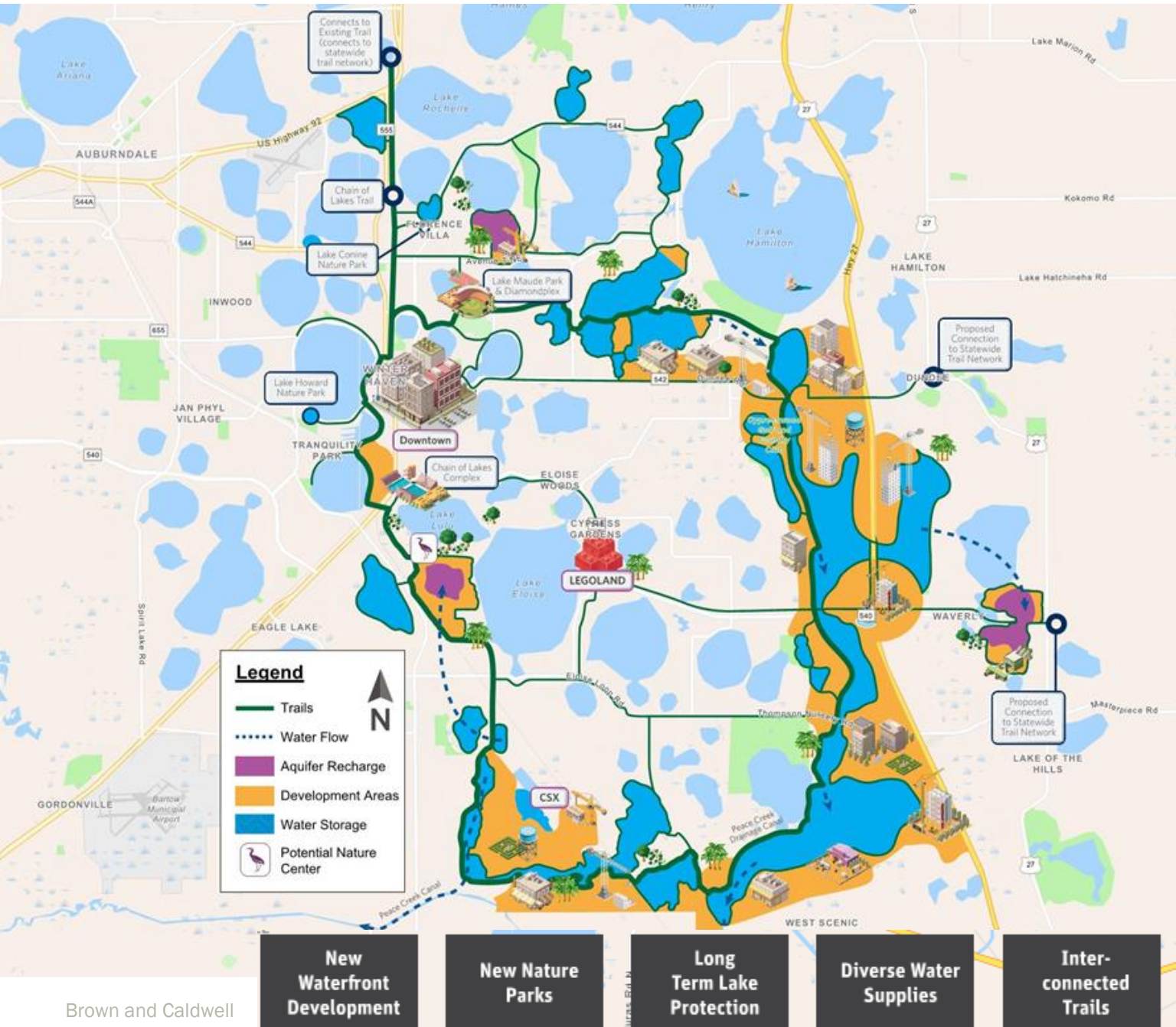
Implementing a nature-based solutions project by retrofitting a stormwater pond into a reclaimed water recharge park for recreational, groundwater, and lake-level benefits.

Reclaim the Lake Conine Wetland Park

Constructing the City's 4th wetland treatment nature park to improve water quality and reduce flooding, while adding trails and other recreational amenities in a disadvantaged neighborhood.

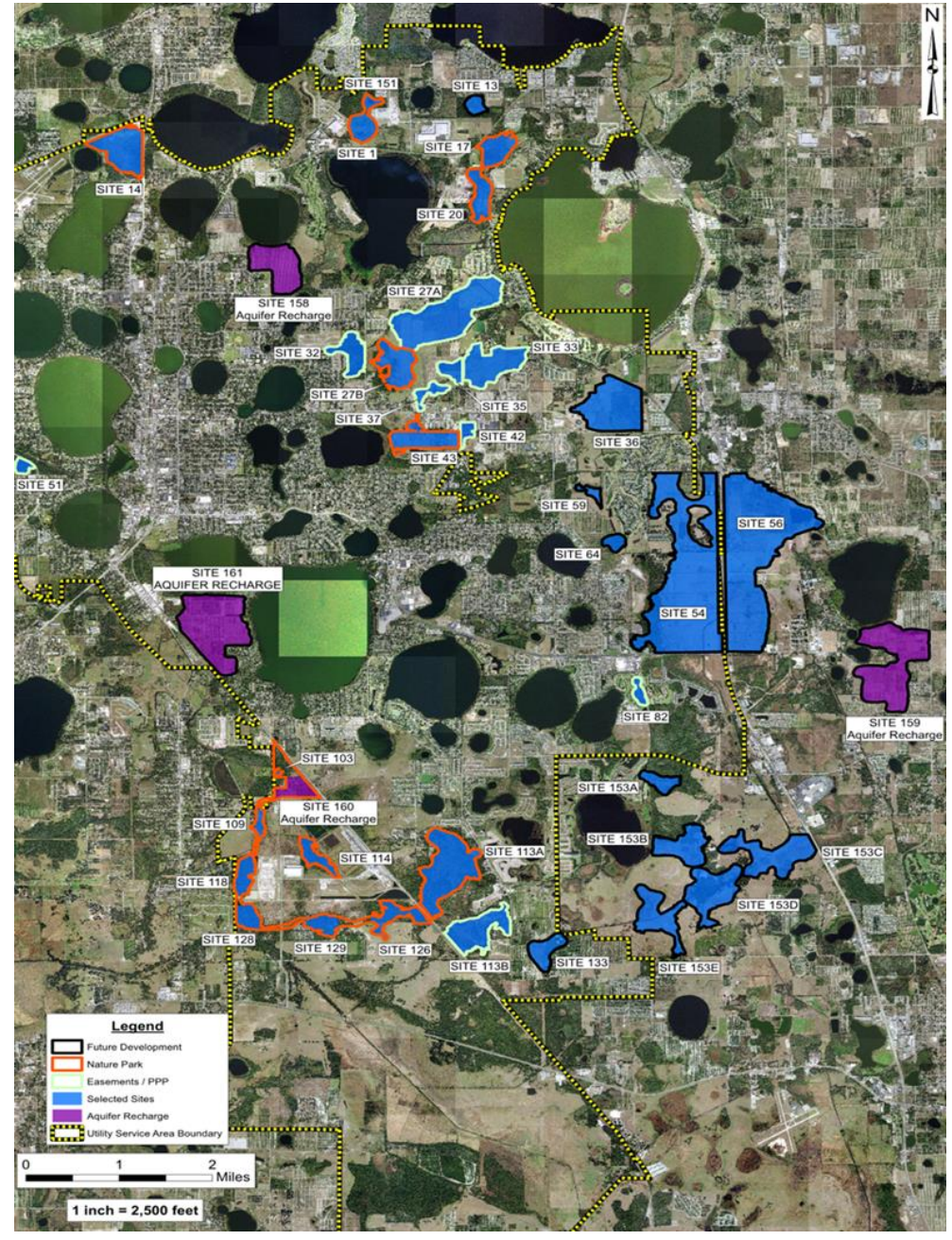
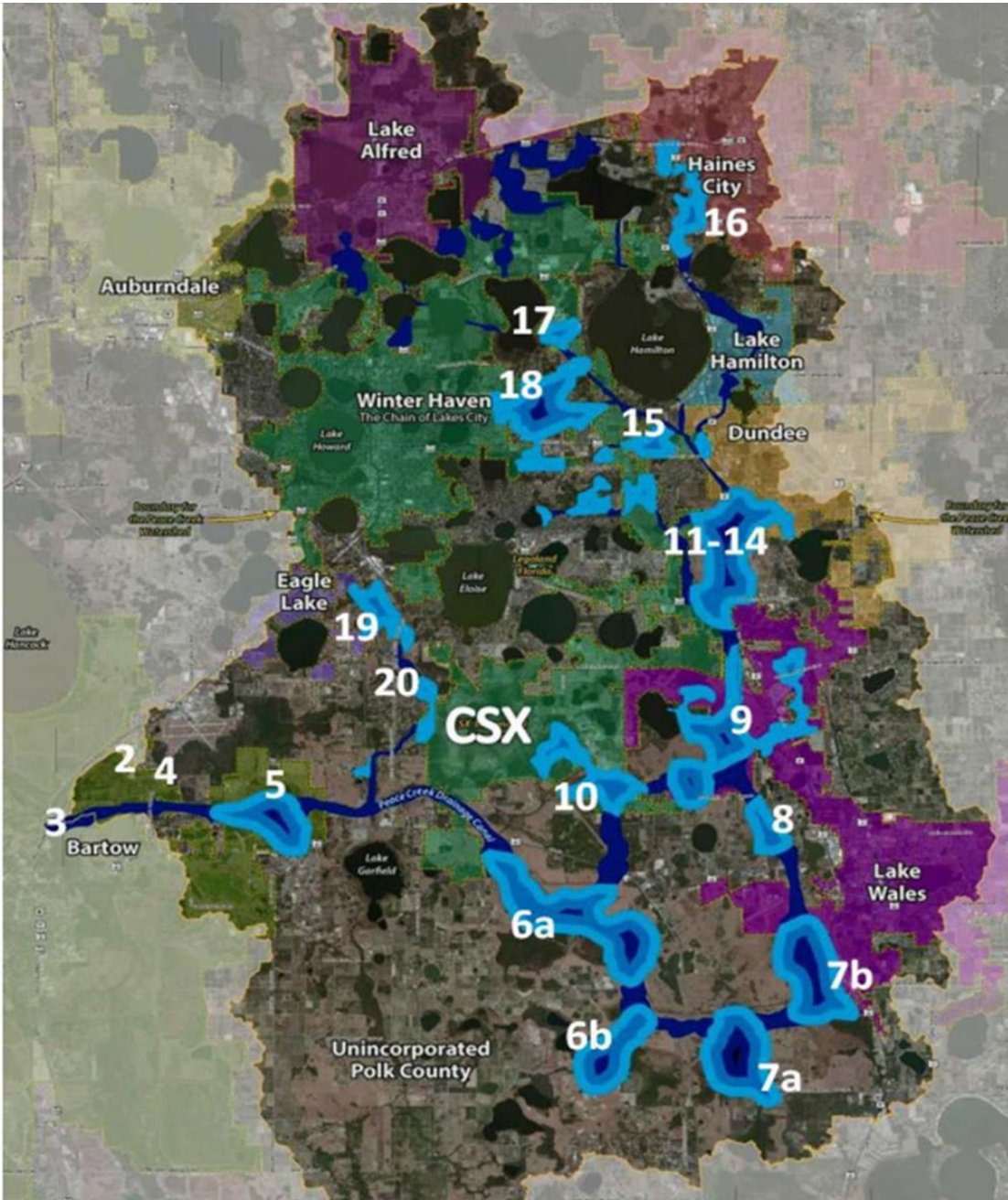
Sapphire Necklace Elements

- Natural systems restoration
- Surface water storage
- Surficial and Floridan aquifer recharge
- Water quality enhancement
- Interconnected greenway
- Recreational and educational amenities



Phase 2 Sapphire Necklace Evaluation Scope

- Data collection and analysis
- Analyze ~40 potential restoration sites
- Quantify primary benefits
- Develop conceptual land, capital, annual O&M, and life cycle costs
- Calculate cost effectiveness (Cost per unit of primary benefit)
- Prioritize based on cost effectiveness, location, connectivity with other sites and other qualitative site factors
- Group adjacent projects to phase implementation of segments
- Cost effectiveness tool provided for city analyses

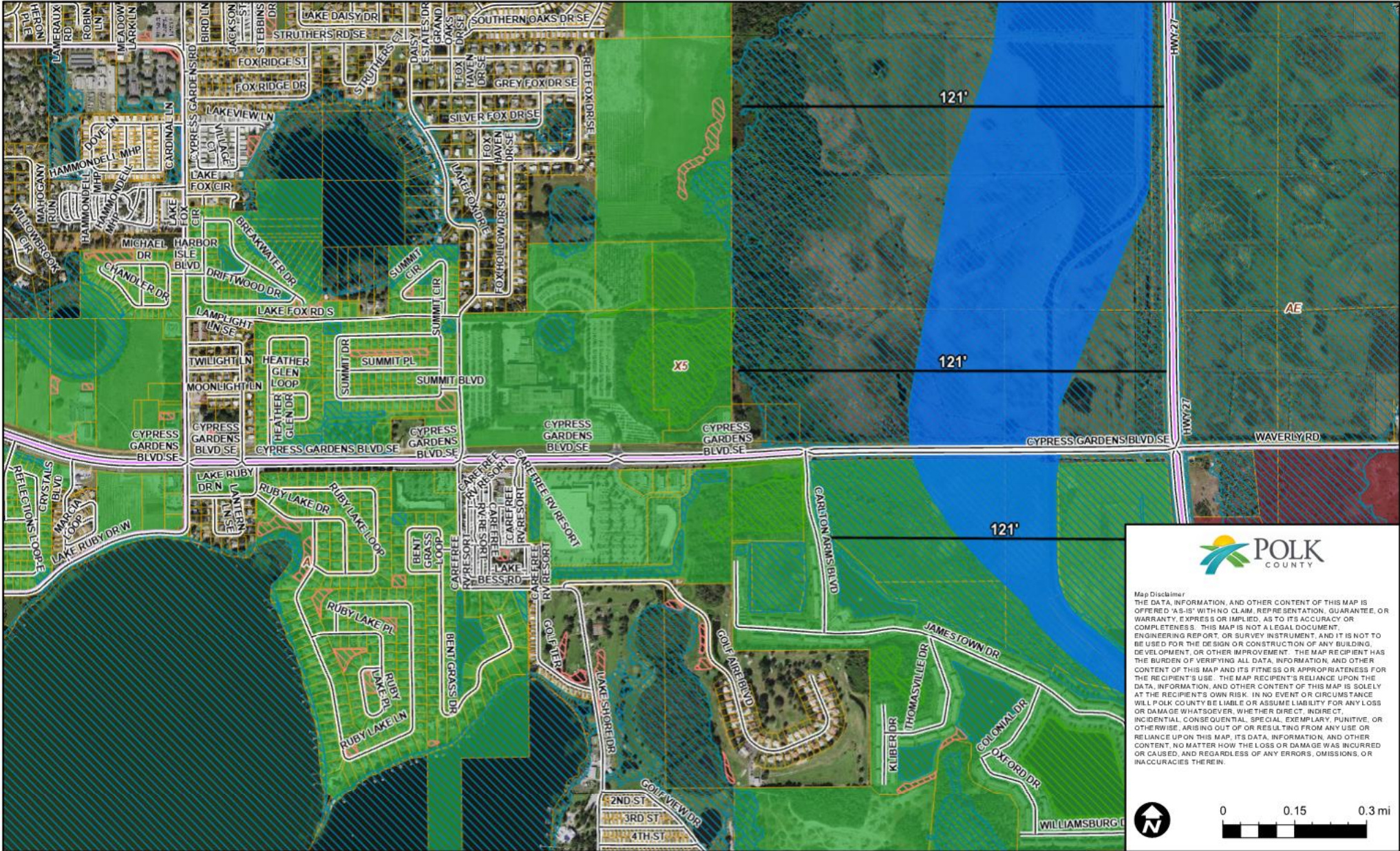


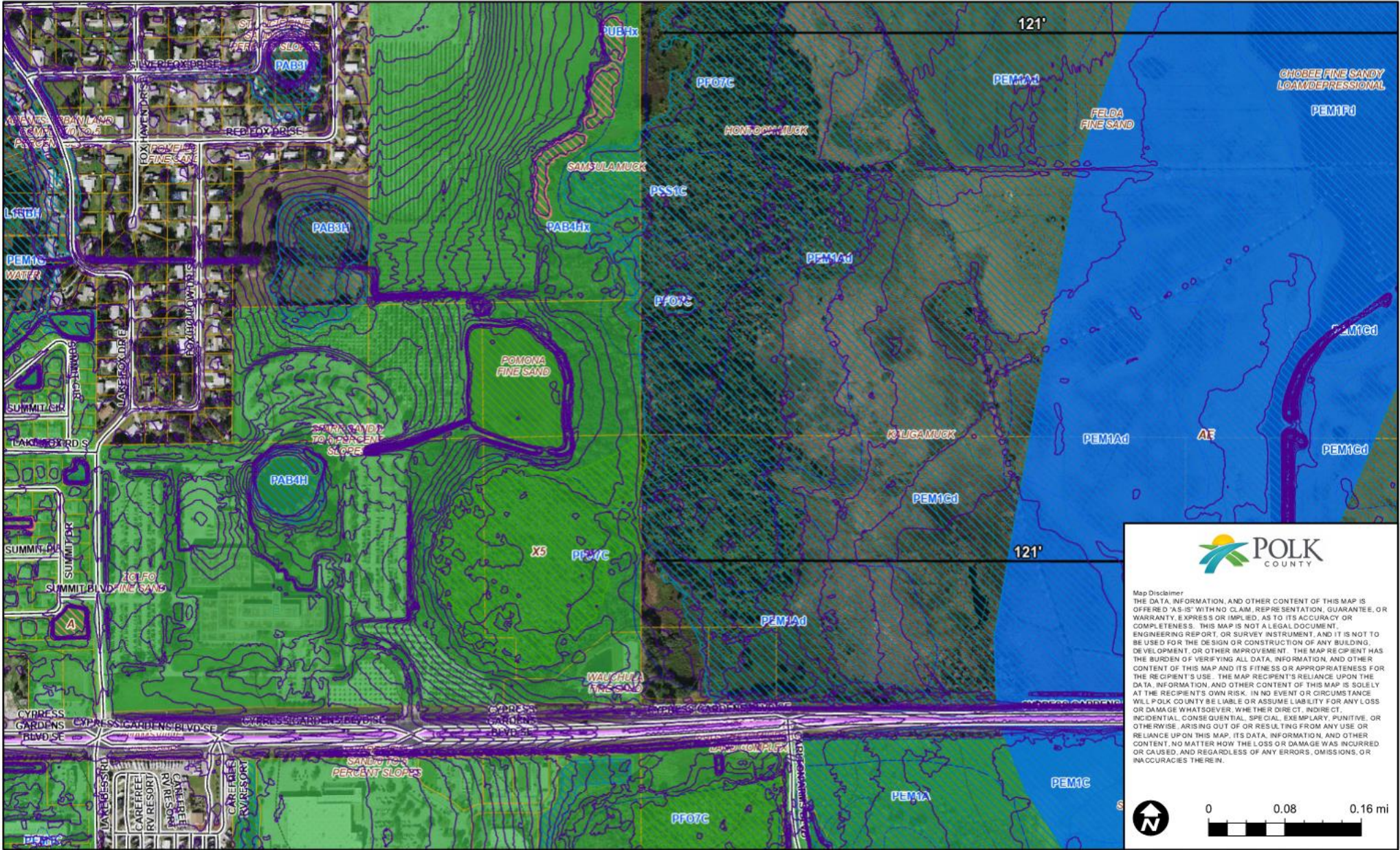
Specific Site Characteristics

- Site area (acres)
- Area of identified National Wetlands Inventory (NWI) wetland (acres)
- Area of hydric/muck soils (acres)
- Area of 100-year floodplain (acres)
- 100-year Base Flood Elevation (BFE, ft. NAVD88)
- Average site existing ground surface elevation (ft. NAVD88)
- Potential Upper Floridan Aquifer (UFA) recharge
- Connectivity and access
- Land cover, Pasture (P), Forested/Shrub (F/S), Emergent (E), and Open (O)

Quantified Benefits and Qualitative Factors

- Surface water storage volume
- Wetland restoration/creation
- Wetland enhancement
- UFA recharge with wells
- Adjacent to major drainage feature
- Provides greenway connectivity
- Direct R/W access
- Adjacent to public park
- Adjacent to lake





Summary Results for Sapphire Necklace Selected Sites

Initial Sites	2019 Site Number	Site Area (ac)	Identified Open Water/ NWI Wetland Area (ac)	Muck Soils Area (ac)	100-Year Floodplain in Area (ac)	Estimated Water Storage Depth (ft)	Potential Surface Water Storage (ac-ft)	Potential Wetland Restoration/ Creation (ac)	Potential Wetland Enhancement (ac)	Sum Wetland Area (ac)	Potential UFA Recharge with Wells (MGD)	Adjacent to Major Drainage Feature (1)	Provides Connectivity (1)	Direct R/W Access (2)	Adjacent to Park (3)	Adjacent to Lake (3)	Average Site Ground Elev. (ft NAVD88)	100 Yr BFE (ft NAVD88)	100 YR BFE - Average Site Ground Elev. (ft NAVD88)	Land Cover
# 1	27, 35, +	372	188	354	300	1.1	419	0	354	354	2.5	X	X	X	X		122.5	124	1.5	P, F/S, E
# 2	36	233	77	123	233	2.3	435	98	123	221	2.5	X		X			120	123	3	P, E, O
# 3	54, -	650	383	159	640	2.3	1,273	235	383	618	5	X	X	X			118	121	3	P, F/S, E, O
# 4	113A, +	512	261	217	325	1.5	768	225	261	486	5		X	X			117	119	2	F/S, E
# 5 (Mann)	59, 64, +	311	148	224	264	1.5	467	71	224	295	2.5	X	X	X			122	124	2	P, F/S, E, O
Kerr	14, +	142	132	125	140	1.5	213	3	132	135	2.5		X	X	X	X	128	130	2	F/S
Additional Sites																				
126	126	114	42	44	55	0.8	86	64	44	108	1		X	X			117	118	1	F/S
1 + 151	1 + 151	80	52	72	15	2.3	180	4	72	76	1		X	X		X	130	133	3	F/S
133, +	133, +	105	48	51	79	2.6	276	49	51	100	1	X	X				113.5	117	3.5	E, O
153A, +	153A, +	143	96	65	100	0.8	107	40	96	136	1.5		X	X			118	119	1	F/S
153B, +	153B, +	276	96	51	193	0.8	207	166	96	262	2.5	X	X			X	118	119	1	F/S, O
153C, +	153C, +	225	15	68	191	1.5	338	146	68	214	2.5	X		X			118	120	2	E, O
153D, +	153D, +	160	76	68	144	1.1	180	76	76	152	1.5	X	X				117	118.5	1.5	E, O
153E, +	153E, +	124	43	15	105	1.5	186	75	43	118	1	X	X				116	118	2	E, O
17, 20, +	17, 20, +	336	215	186	320	2.3	756	104	215	319	2.5	X	X	X		X	121	124	3	F/S, E
1A + 1B (5 sites)	27 A	216	48	145	195	3.0	648	60	145	205	2	X	X	X			120	124	4	F/S, E
33, +	33, +	278	28	250	245	2.3	626	14	250	264	2.5	X		X		X	121	124	3	E
42, 43, +	42, 43, +	225	150	180	185	1.1	253	34	180	214	2	X	X	X		X	124.5	126	1.5	E, O
4C (5 sites)	113 B	212	57	60	142	1.1	239	141	60	201	2.0		X	X			117.5	119	1.5	F/S, O
4D (5 sites)	133	64	31	31	45	1.5	96	30	31	61	1	X	X	X			114	116	2	F/S, E
56, 67	56, 67	919	484	351	890	3.8	3,446	389	484	873	7.5	X	X	X	X	X	116	121	5	E, O
New 1	na	257	154	160	240	1.5	386	84	160	244	2.5		X	X		X	128	130	2	F/S
New 2	na	63	44	16	58	1.5	95	16	44	60	1		X	X		X	125	127	2	F/S
New 3	na	364	173	252	350	1.5	546	94	252	346	2.5	X	X	X			122.5	124.5	2	F/S, E, O

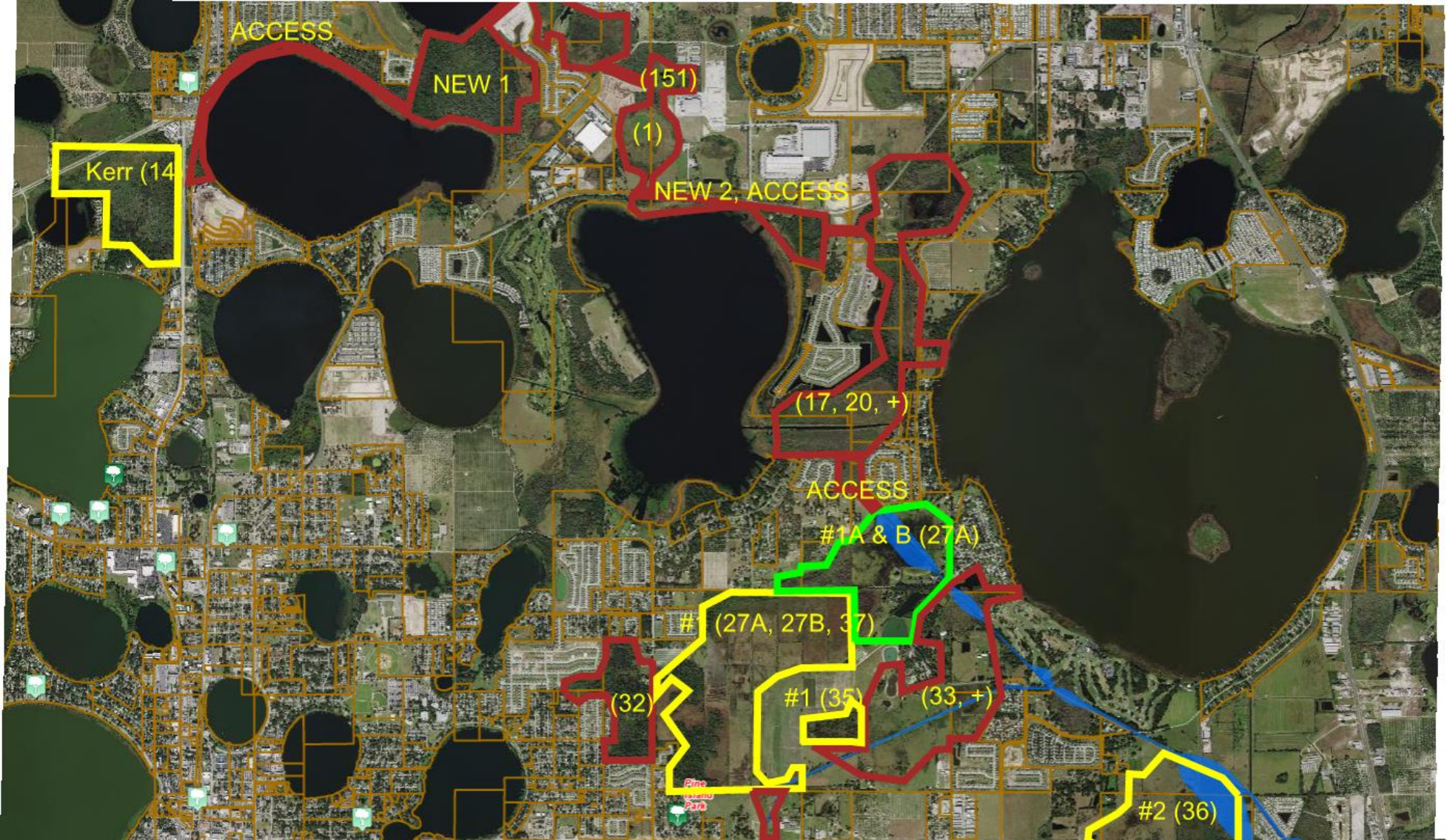
Estimated Conceptual Costs and Cost Effectiveness for Sapphire Necklace Selected Sites

All Sites	Chastain Skillman 2019 Site Number	Site Area (ac)	Estimated Land Cost (\$)	Hydrologic/ Wetland Restoration/ Creation Capital Cost (\$)	Hydrologic/ Wetland Enhancement Capital Cost (\$)	Recharge Well Capital Cost (\$)	Estimated Total Capital Cost (\$)	Estimated Total Capital Cost per ac-ft water storage (\$)	Estimated Total Capital Cost per acre wetland (\$)	Estimated Total Capital Cost per MGD Recharge (\$)
56, 67	56, 67	919	25,732,000	10,115,300	7,744,000	7,500,000	25,359,300	7,359	29,047	3,381,240
New 5		234	6,552,000	2,841,800	1,808,000	2,000,000	6,649,800	7,578	29,914	3,324,900
1A + 1B (5 sites)	27 A	216	6,048,000	1,565,200	2,320,000	2,000,000	5,885,200	9,082	28,680	2,942,600
New 6		463	12,964,000	2,674,100	5,392,000	5,000,000	13,066,100	9,407	29,706	2,613,220
33, +	33, +	278	7,784,000	366,600	4,000,000	2,500,000	6,866,600	10,978	26,000	2,746,640
133, +	133, +	105	2,940,000	1,267,500	816,000	1,000,000	3,083,500	11,187	30,912	3,083,500
17, 20, +	17, 20, +	336	9,408,000	2,709,200	3,440,000	2,500,000	8,649,200	11,441	27,096	3,459,680
1 + 151	1 + 151	80	2,240,000	104,000	1,152,000	1,000,000	2,256,000	12,533	29,684	2,256,000
# 3	54, -	650	18,200,000	6,097,000	6,128,000	5,000,000	17,225,000	13,531	27,895	3,445,000
# 2	36	233	6,524,000	2,557,100	1,968,000	2,500,000	7,025,100	16,150	31,738	2,810,040
New 3		364	10,192,000	2,438,800	4,032,000	2,500,000	8,970,800	16,430	25,942	3,588,320
New 7		207	5,796,000	276,900	2,976,000	2,000,000	5,252,900	16,918	26,712	2,626,450
# 5 (Mann)	59, 64, +	311	8,708,000	1,857,700	3,584,000	2,500,000	7,941,700	17,006	26,880	3,176,680
New 1		257	7,196,000	2,187,900	2,560,000	2,500,000	7,247,900	18,801	29,686	2,899,160
# 1	27, 35, -, +	372	10,416,000	0	5,664,000	2,500,000	8,164,000	19,508	23,062	3,265,600
153E, +	153E, +	124	3,472,000	1,944,800	688,000	1,000,000	3,632,800	19,531	30,839	3,632,800

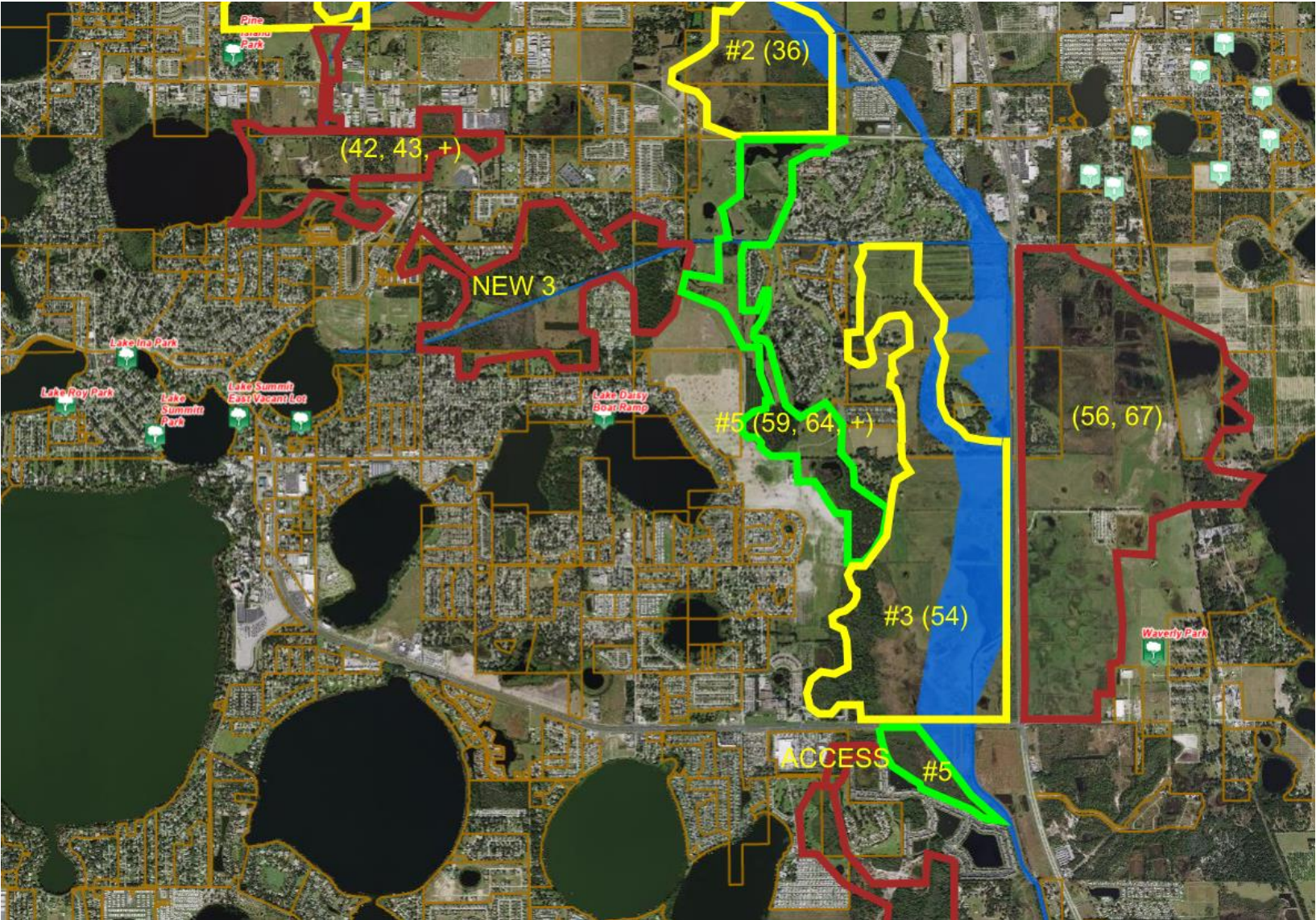
Potential Priority Grouping for Sapphire Necklace Selected Sites

Priority Group	All Sites	Site Area (ac)	Sum Wetlands (ac)	Potential UFA Recharge with Wells (MGD)	Estimated Total Capital Cost per ac-ft water storage (\$)	Estimated Total Capital Cost per acre wetland (\$)	Estimated Total Capital Cost per MGD Recharge (\$)	Adjacent to Major Drainage Feature (1)	Provides Connectivity (1)	Direct R/W Access (2)	Adjacent to Park (3)	Adjacent to Lake (3)
1	56, 67	919	873	7.5	7,359	29,047	3,381,240	X	X	X	X	X
1	1A + 1B (5 sites)	216	205	2	9,082	28,680	2,942,600	X	X	X		
1	New 3	364	346	2.5	16,430	25,942	3,588,320	X	X	X		
1	# 5 (Mann)	311	295	2.5	17,006	26,880	3,176,680	X	X	X		
1	# 1	372	354	2.5	19,508	23,062	3,265,600	X	X	X	X	
1	42, 43, +	225	214	2	22,746	26,936	2,878,750	X	X	X		X
1	# 3	650	618	5	13,531	27,895	3,445,000	X	X	X		
2	17, 20, +	336	319	2.5	11,441	27,096	3,459,680	X	X	X		X
2	1 + 151	80	76	1	12,533	29,684	2,256,000		X	X		X
2	# 2	233	221	2.5	16,150	31,738	2,810,040	X		X		
2	New 1	257	244	2.5	18,801	29,686	2,899,160		X	X		X
2	Kerr	142	135	2.5	22,007	34,747	1,874,960		X	X	X	X
2	New 2	63	60	1	22,393	35,357	2,116,100		X	X		X
3	New 5	234	222	2	7,578	29,914	3,324,900	X	X	X	X	
3	New 6	463	440	5	9,407	29,706	2,613,220	X	X	X	X	X
3	New 7	207	197	2	16,918	26,712	2,626,450	X	X	X	X	X
3	126	114	108	1	39,483	31,171	3,375,800		X	X		
3	103	32	Provides Connectivity						X			
3	129	59	Provides Connectivity						X			
3	128	66	Provides Connectivity						X			
3	118	91	Provides Connectivity						X			
3	109	23	Provides Connectivity						X			
4	133, +	105	100	1	11,187	30,912	3,083,500	X	X			
4	153E, +	124	118	1	19,531	30,839	3,632,800	X	X			
4	# 4	512	486	5	19,579	30,914	3,007,280		X	X		
4	4D (5 sites)	64	61	1	23,654	37,349	2,270,800	X	X	X		
4	153D, +	160	152	1.5	26,067	30,868	3,128,000	X	X			
4	New 4	223	212	2	26,141	30,956	3,279,050		X	X		X
4	4C (5 sites)	212	201	2.0	27,826	32,951	3,318,200		X	X		
4	153A, +	143	136	1.5	37,968	29,975	2,714,733		X	X		
4	153B, +	276	262	2.5	40,373	31,873	3,342,880	X	X			X

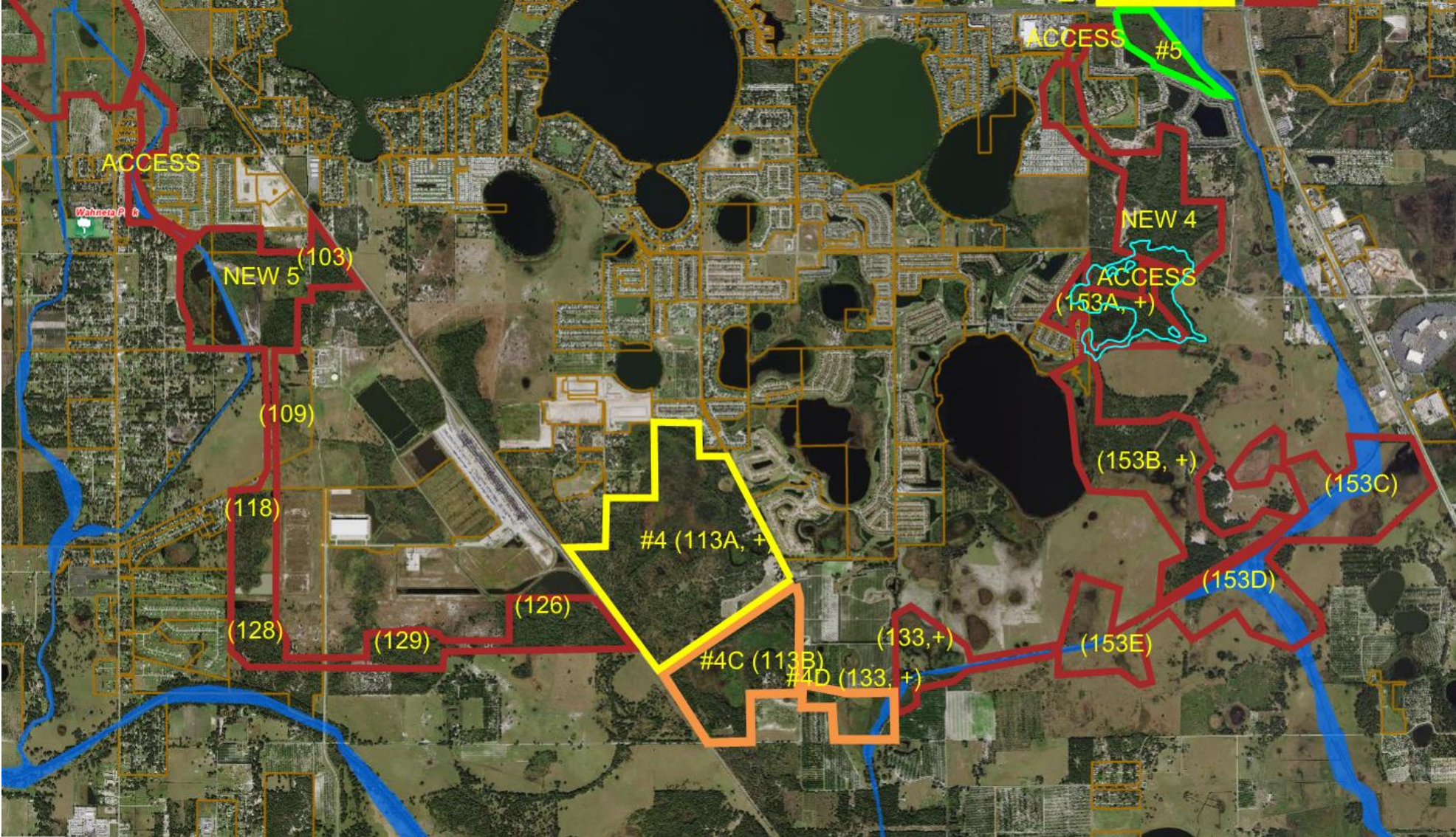
North Sapphire Necklace



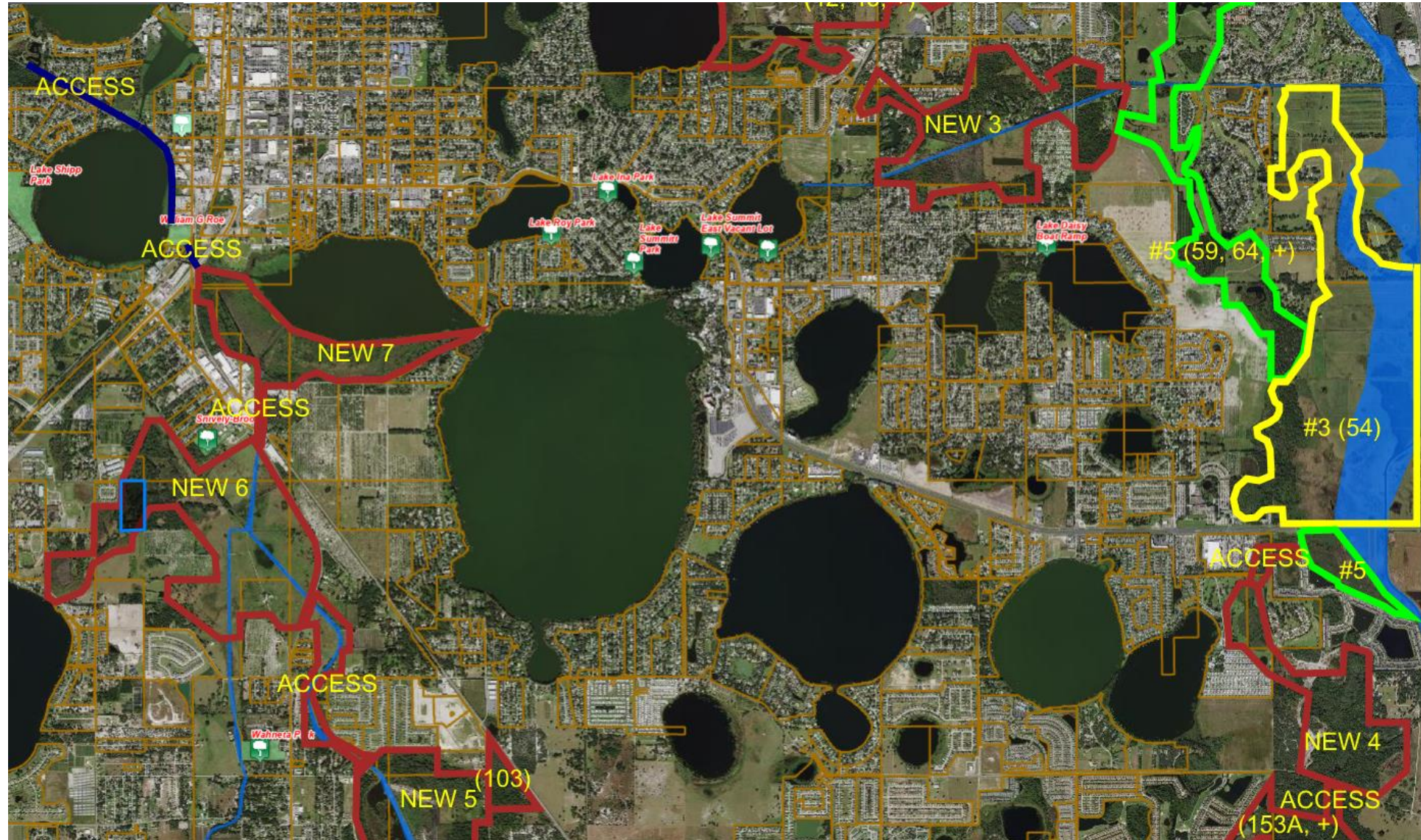
Northeast Sapphire Necklace



South Sapphire Necklace



Southeast Sapphire Necklace



Phase 3 Sapphire Necklace Draft Scope

- Advance select project sites, assess conservation easement area vs. developable property
- Estimate TN, TP, and TSS load reductions
- Refine cost effectiveness metrics
- Create 2-page summaries, concept designs, and color renderings
- Pursue public and private sector grants/funding/financing opportunities
- Develop project delivery strategy including alternative delivery
- Support conservation easement/property appraisal and acquisition
- Continue to develop interconnected trail/recreation/educational amenities, necessary easements and improvements

Questions

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