

An aerial photograph showing a large green field, likely a golf course, situated next to a large body of water. A road runs along the edge of the field, and there are some buildings and parking areas nearby. A white line is drawn on the image, pointing from the text overlay to a specific area on the golf course.

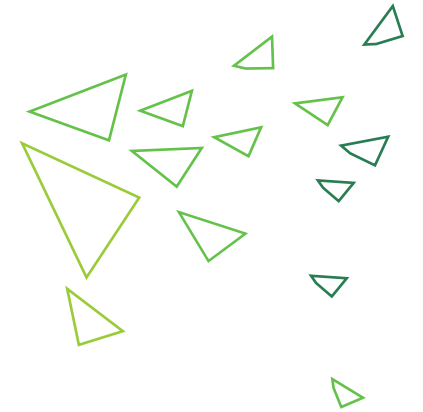
Accessibility of Urban Green Space in Virginia Beach



Agenda



- Background
- Study Area
- Data
- Analysis
- Results
- References



Background



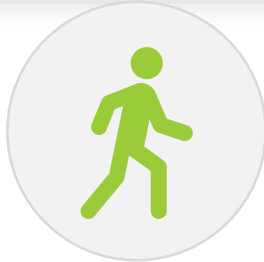
Impact on Health



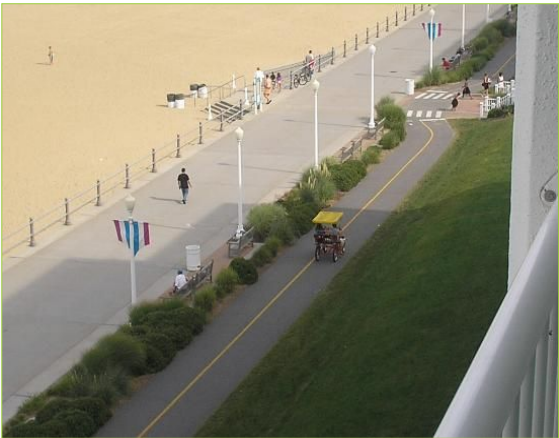
Urbanization / Urban Sprawl



Environmental Impact

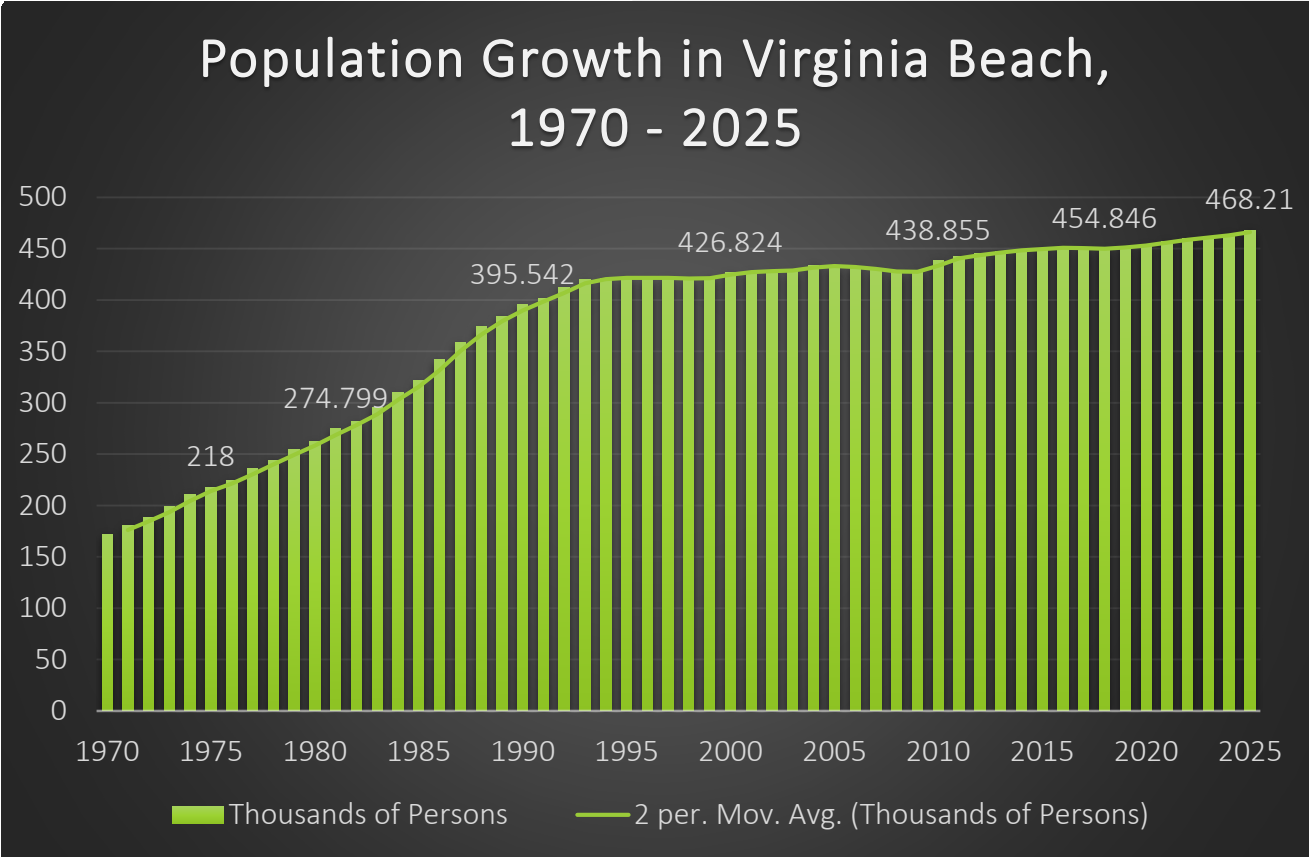


Accessibility



Population Growth

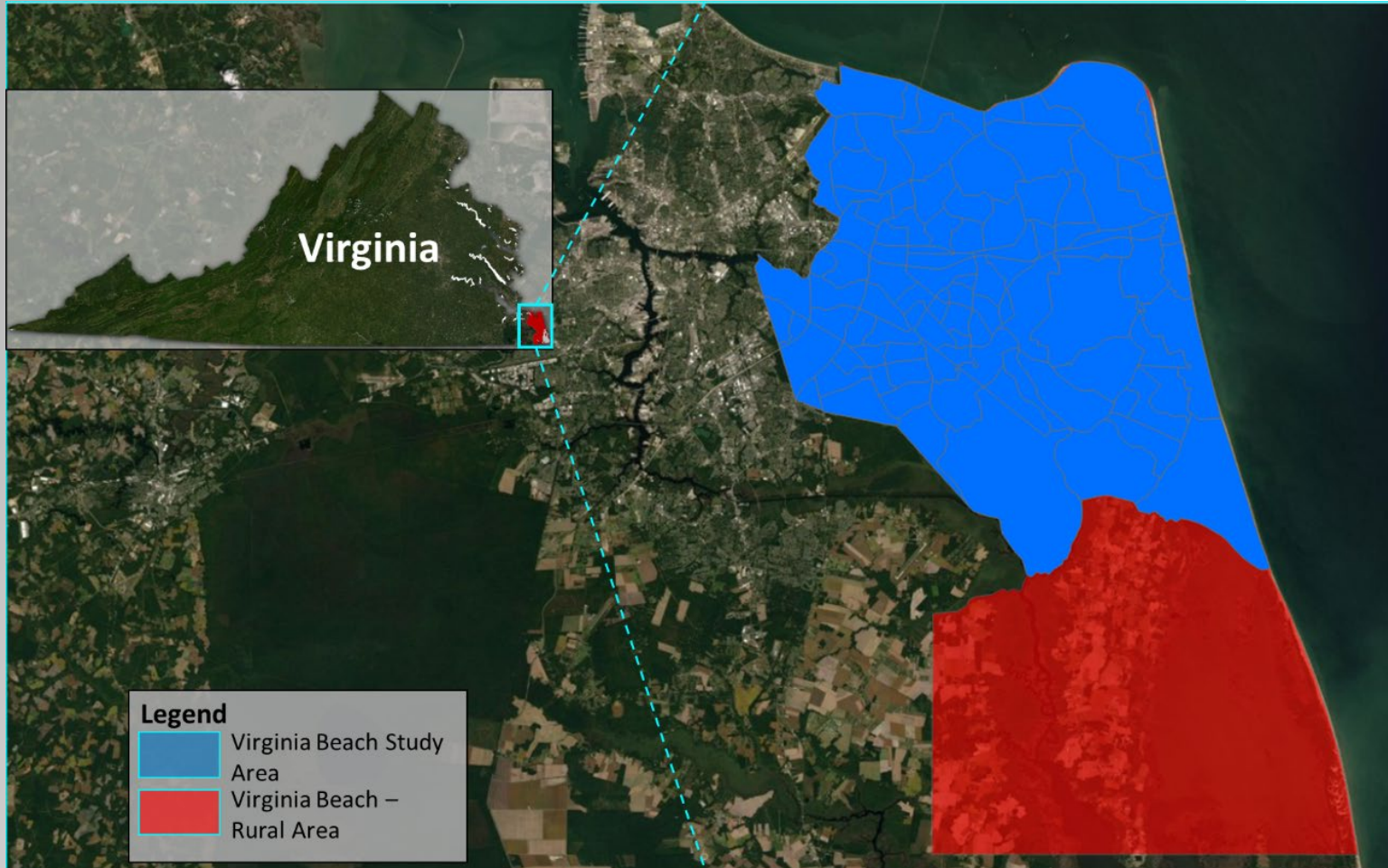
- Steady growth rate since 1970
- Estimated population of 483,913 by 2030
- Average of a 3.99% population growth from 2000-2010



U.S. Census Bureau, Resident Population in Virginia Beach city, VA [VAVIRG5POP], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/VAVIRG5POP>, October 26, 2019.

County	7/1/2010	7/1/2020	% Change	7/1/2030	% Change	Total Change from 2010-2030	Total % Change
Virginia Beach, VA	438,985	460,610	6.31	483,913	5.05	44,928	10.235

Study Area – City of Virginia Beach, VA



Population

- 454,846 residents
- 114 Census Tracts



Land Use

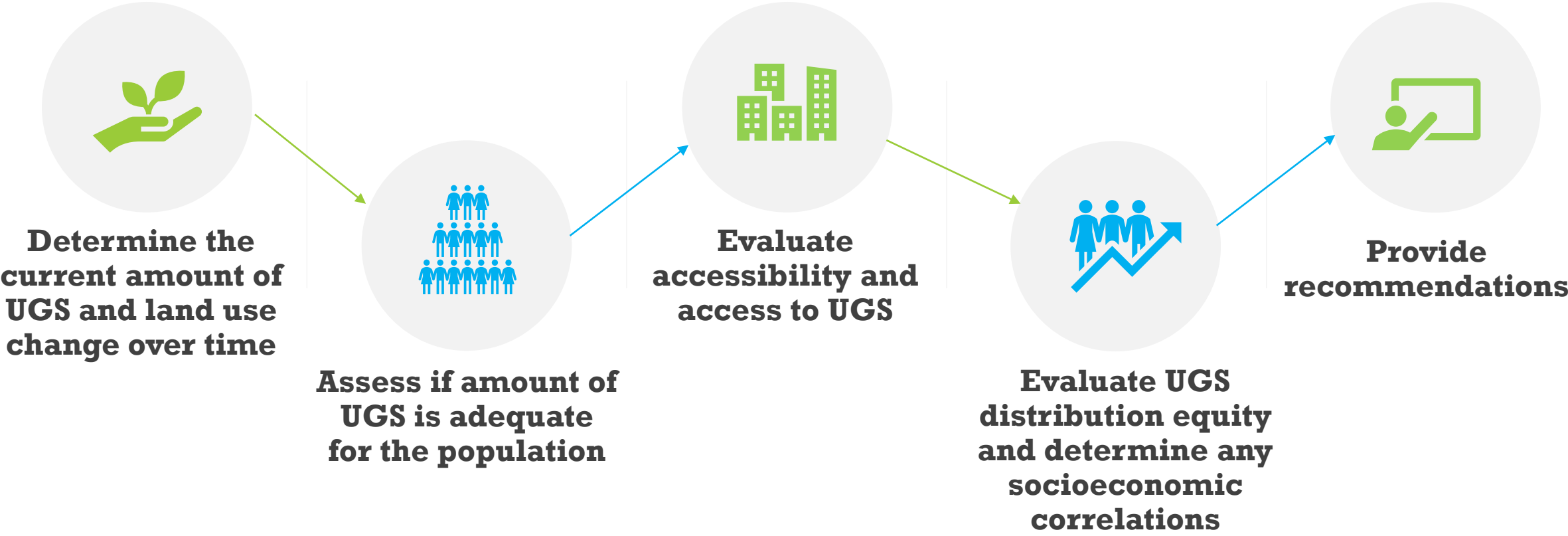
- Land area of 718 km²
- 33,640 acres of parkland



Features

- Large coastline
- Tourist destination

Methodology Overview

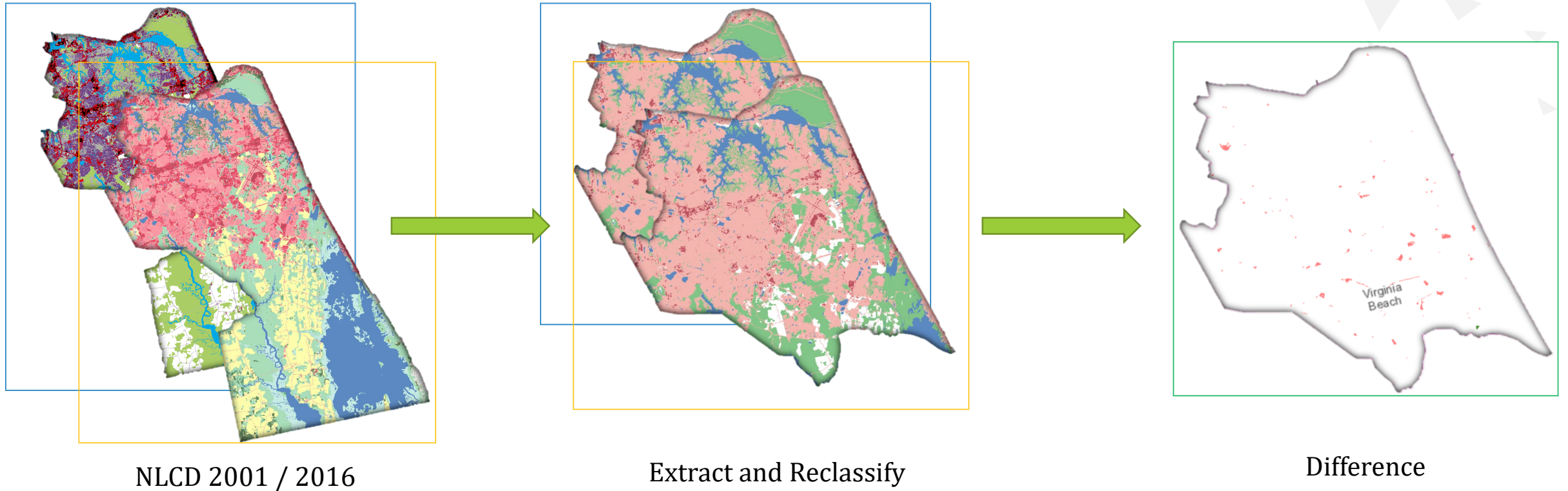


Data Sources



Data	Resolution	Year (year of last update)	Source
SF1/2/3 Census Block/Block Group	Census block group and tract	2000, 2010	US Census Bureau
American Community Survey (ACS)	Census block group and tract	2018	US Census Bureau
Parks and Recreation	City Wide	2019	City of Virginia Beach
Bikeways, Trails, Facility and Sidewalks Overview	City Wide	2019	City of Virginia Beach
Transportation Networks (Center line data)	State Wide	2019	Virginia Geographic Information Network
Virginia Address Points	State Wide	2019	Virginia Geographic Information Network
Virginia Statewide Land Cover Dataset (VSLCD)	1 Meter	2016	Virginia Geographic Information Network
National Land use/Land Cover (NLCD) – Land Cover	30 Meter	2001, 2016	United States Geological Survey

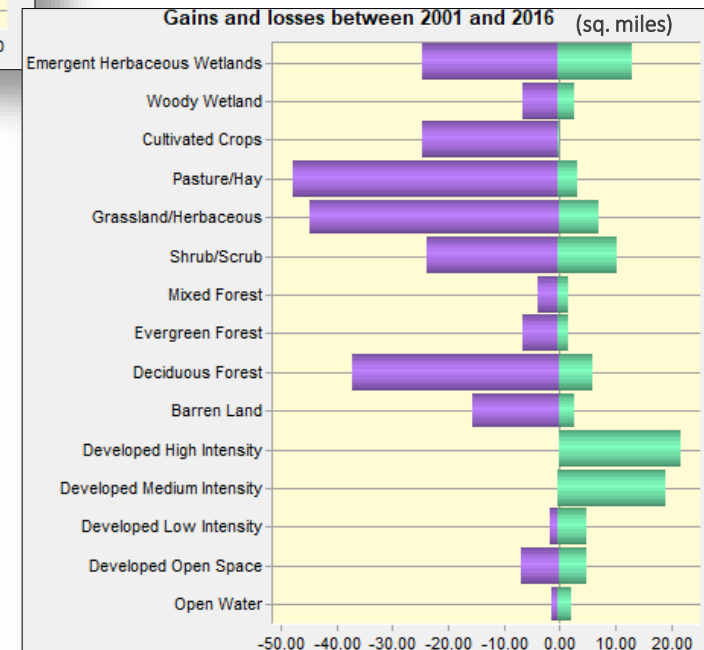
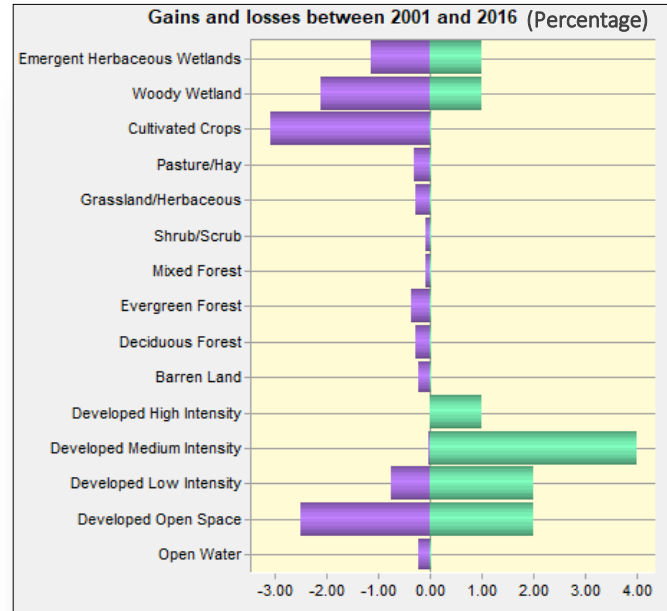
Step 1: Identify Land Cover and Land Cover Change



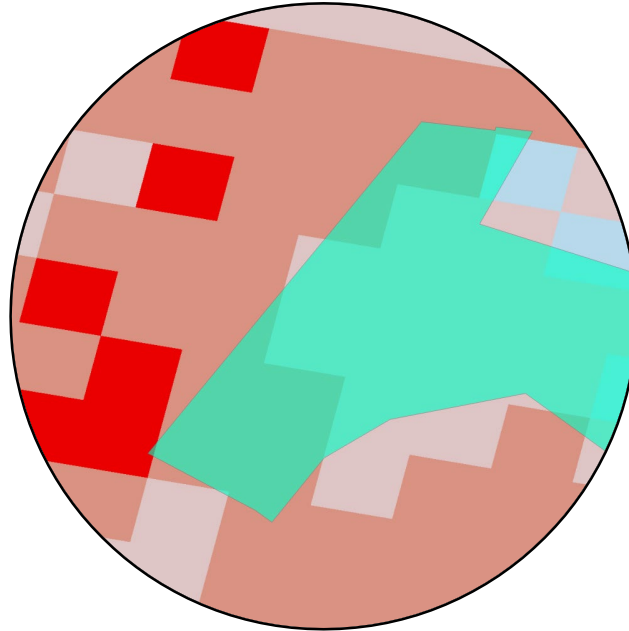
- Identify the change in land use , using National Land Cover Data (NLCD) from 2001 to 2016.

Step 1 Cont.: Identify Land Cover Change

- Calculate the % change in area for each individual classification type.
- Calculate the overall % change between all-classes of “DEVELOPED” vs. UGS.
- Observe and analyze how the % change in land use tracks with the % change in population growth.
 - Calculate the approximate “green” space per person in by NLCD 2001/2016 and VLCD



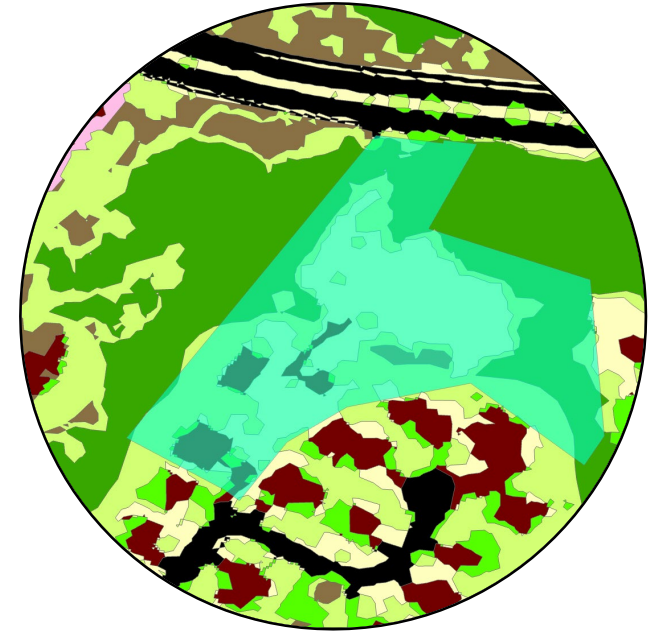
Land Cover Change and Comparison



National Land Cover Database

30-meter resolution

- Nationwide
- 5-year update cycle
- 20 Classifications
- 80% Accuracy*



Virginia Statewide Landcover Database

1-meter resolution

- Statewide
- 4-year update cycle
- 11 Classifications

Land Cover Change and Comparison by the Numbers

City of Virginia Beach – Population Change – Focus Area			
	2000	2010	2018 (ACS est.)
Total Population	420,735	433,265	445,249
Total Land Area (sq. mi.)	165.32	165.32	165.32
Population Density (sq. mi.)	2,546	2,620	2,693
Population Change	-	2.99%	2.76%

City of Virginia Beach – UGS Focus Area Change (NLCD)				
	2000	2010	2018	2020
Total Population	420,735	433,265	445,249	460,610
Total Land Area (sq. mi.)	165.32	165.32	165.32	165.32
Total Area UGS (sq. mi.)	66.59	42.45	31.67	29.65
UGS Density (sq. mi.)	.40	.25	.19	.14
Approximate “green space” per person (sq. meters)	409	254	184	167
UGS Change	-	-36.25%	-25.4%	-6.37%

VLCD Full City			
OBJECTID	gridcode	Class	SqMi
1	1	Impervious Road	14.60833
2	2	Impervious Non-Road	27.98269
3	3	Tree Canopy Non-Road	9.43573
4	4	Water	104.622
5	5	Tidal Wetlands	66.81597
6	6	Floodplain Wetlands	0.783255
7	7	Other Wetlands	3.290761
8	8	Forest	25.51495
9	9	Tree Canopy over Turf	23.23517
10	10	Mixed Open	17.07541
11	11	Fractional Turf - small	10.51539
12	12	Fractional Turf - med	0.231776
13	13	Fractional Turf - large	0.114315
14	15	Turf Grass	25.481
15	16	Cropland	20.96006
16	17	Pasture	1.622999
Total			352.2898
No Water			247.6678

Classification		
		9.43573
		66.81597
		0.783255
		3.290761
		25.51495
		23.23517
		17.07541
		10.51539
		0.231776
	14.60833	0.114315
	27.98269	25.481
Total	42.59102	182.4937
Percentage	17.20%	82.80%

VLCD Study Area			
OBJECTID	gridcode	Class	SUM SqMi
1	1	Impervious Road	14.137801
2	2	Impervious Non-Road	26.645375
3	3	Tree Canopy Non-Road	9.002679
4	4	Water	100.273135
5	5	Tidal Wetlands	28.833177
6	6	Floodplain Wetlands	0.644387
7	7	Other Wetlands	2.957991
8	8	Forest	13.905488
9	9	Tree Canopy over Turf	22.062158
10	10	Mixed Open	13.013888
11	11	Fractional Turf - small	9.905231
12	12	Fractional Turf - med	0.106287
13	13	Fractional Turf - large	0.072659
14	15	Turf Grass	21.315402
15	16	Cropland	1.212798
16	17	Pasture	0.450897
Total			264.539353

Classification		
		9
		2
		0
		2
		1
		2
		1
		9
		0
		0
	14.1378	0
	26.64538	1
Total	40.78318	1
Percentage	25.84%	

Step 1 Cont.: Identify Existing Public Green Spaces

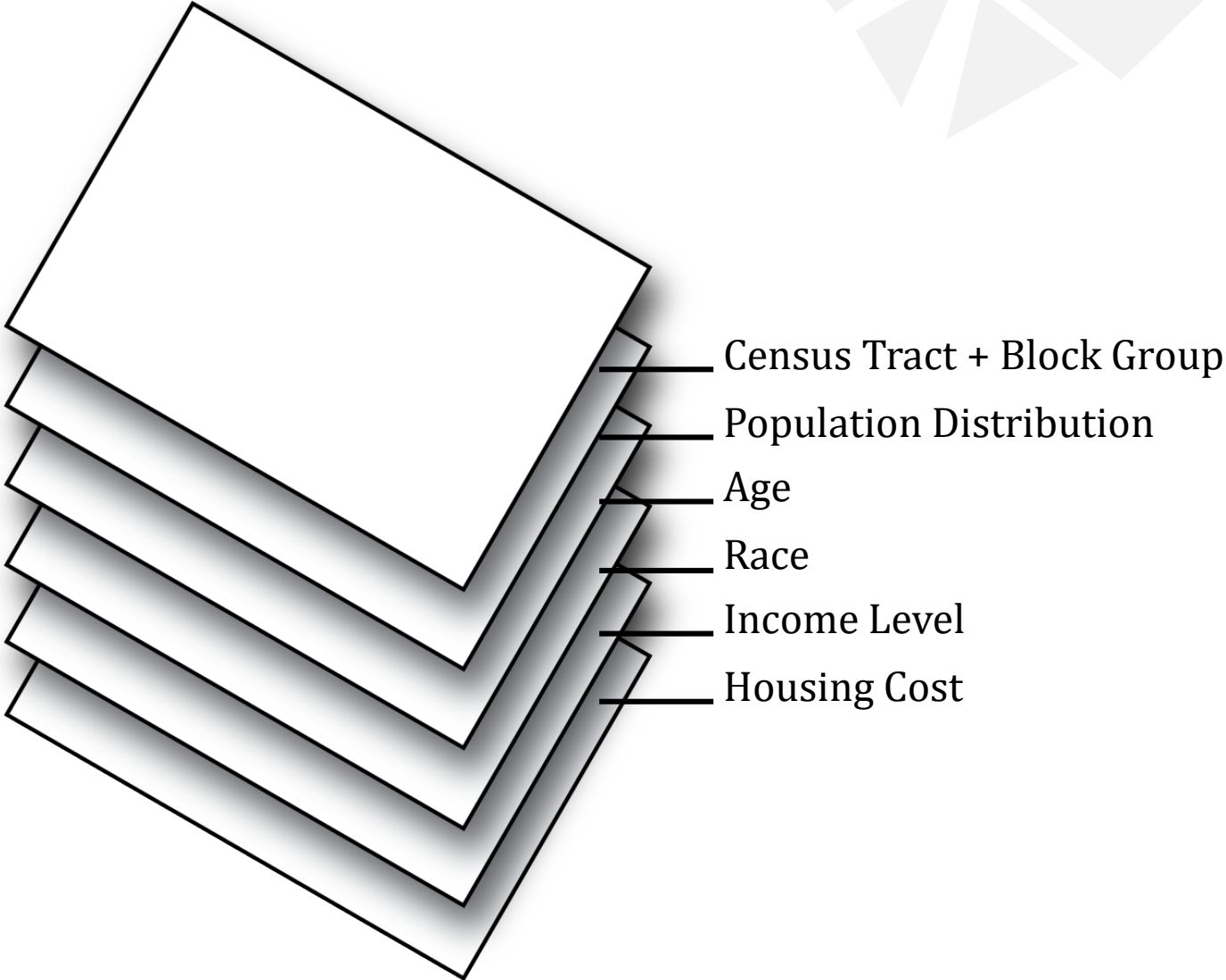
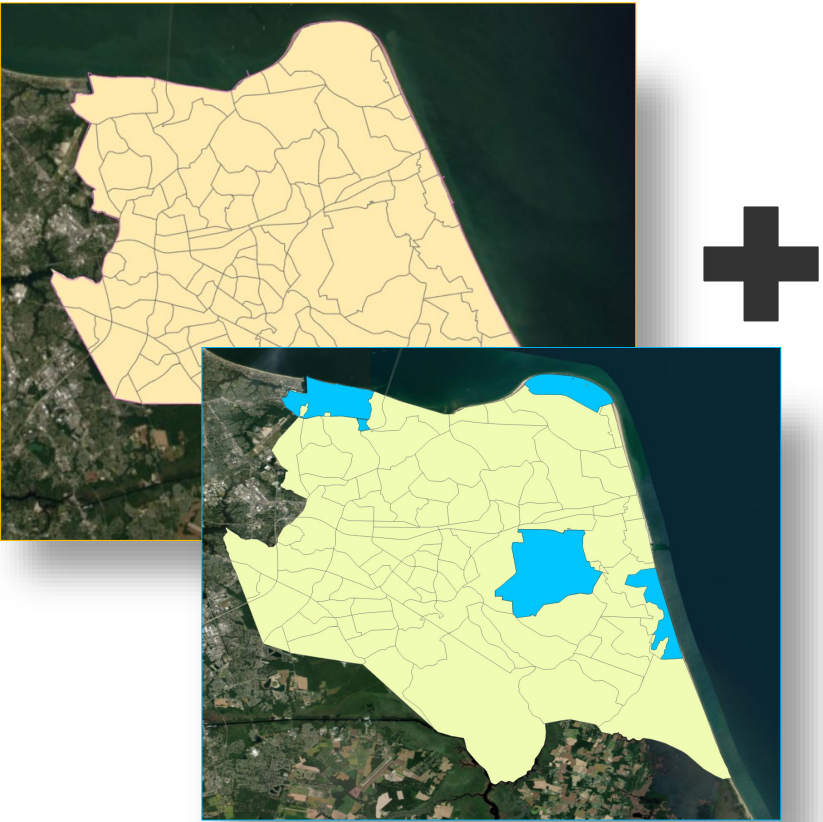
- Create a shapefile with the locations of all public green spaces in Virginia Beach. The information will include:

Public Green Space	Private/Limited Green Space
<ul style="list-style-type: none"> • Community Parks (CP) • Metro Parks (MP) • Neighborhood Parks (NP) • Signature Park (SP) • General Open Space (GOS) • Natural Resource Areas (NRA) • Open Space Preservation Area (OSPA) • Linear Parks / Linkages (LINK) 	<ul style="list-style-type: none"> • Special Use Areas (SU) <ol style="list-style-type: none"> a. Athletic Centers (SUAC) b. Golf Courses (SUGC) c. Recreational Centers (SURC) d. Water Areas (SUWA)
City of Virginia Beach – Focus Area Parks	
Number of Parks	370
Total Park Area (sq. mi.)	17.65
Total Land Used for Parks	10.67%

- Individual .shp files will be merged into one comprehensive data set.

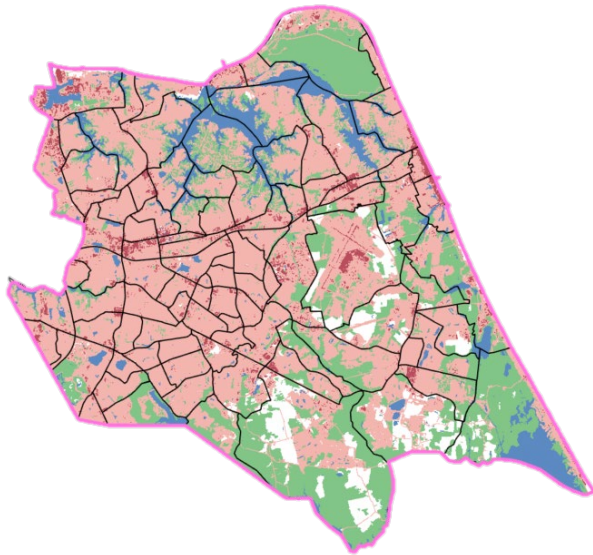
The screenshot displays a GIS application interface. At the top, there is a toolbar with icons for 'Add', 'Delete', 'Calculate', 'Selection', 'Zoom To', 'Switch', 'Clear', 'Delete', and 'Copy'. Below the toolbar is a data table with the following columns: FID, Shape, OBJECTID, FULL_NAME, ST_FROM, ST_TO, and TYPE. The table contains several rows of data, including 'ATLANTIC AVE', 'BACKBAY TRL', and 'BOARD WALK'. A second table is overlaid on the first, showing columns for OBJECTID, Shape, Join_Count, TARGET_FID, ParkID, SourceID, Park_Name, and Park_Designation. This second table lists specific parks like 'Bayville Park' and '31St Street Park'. In the background, a map of Virginia Beach is visible, with various green spaces highlighted in a bright green color.

Step 2: Establish Baseline Demographic Data

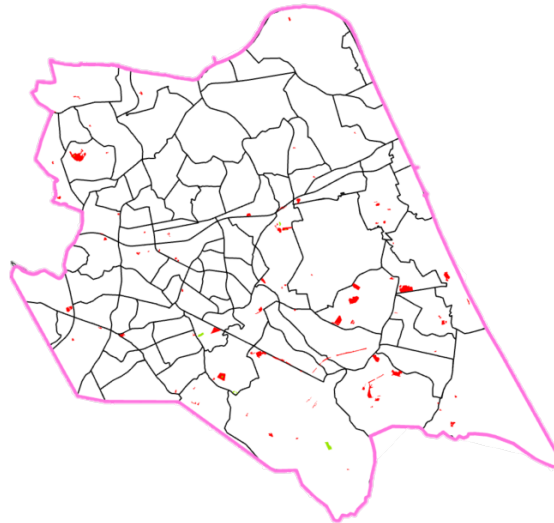


Step 3: Observe Patterns And Relationships

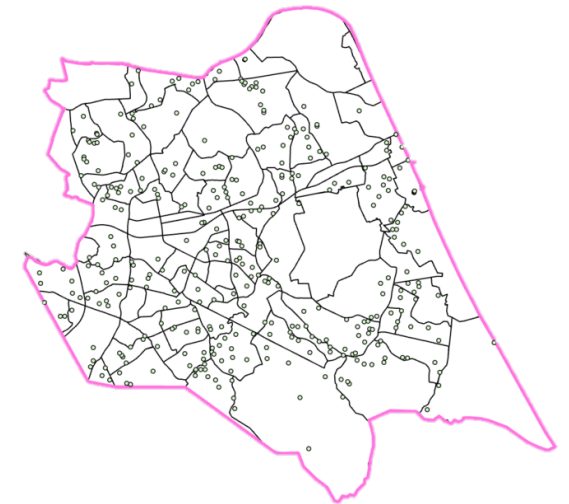
- Overlay land use change data with “official” data on public green spaces in Virginia Beach (parks, pools, rec fields, etc) to determine the difference between NLCD/VLCD-derived land use layer and designated public green space
 - Conduct **HOT SPOT** analysis to observe trends in green space distribution within the area of interest.



Land Use



Land Use Change



Existing Public Green Space

Step 4: Accessibility



Euclidean (Straight Line Distance)



Network based Distance

Step 4 cont.: Euclidean Access by Address



134,860 addresses within 0m-400m of a City Park with 69.66 sq mi. of Access



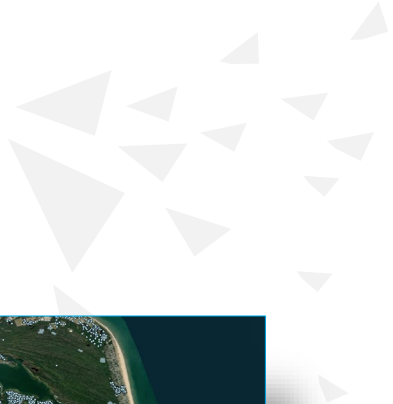
57,052 addresses within 401m-800m of a City Park with 40.48 sq mi. of Access



15,169 addresses within 801m+ of a City Park with 119.65 sq mi. of Access

	Address Points			
	400m	800m	1000m+	Total
Euclidean Access	134,860	57,052	15,169	207,081
Network Access	59,916	71,769	75,396	207,081
Difference	76.954	22.849	133.003	

Step 4 cont.: Network Access by Address



59,916 Addresses within 0m-400m of a City Park with 29.42 Sq mi. of Access



71,769 Addresses within 401m-800m of a City Park with 35.16 sq mi. of Access

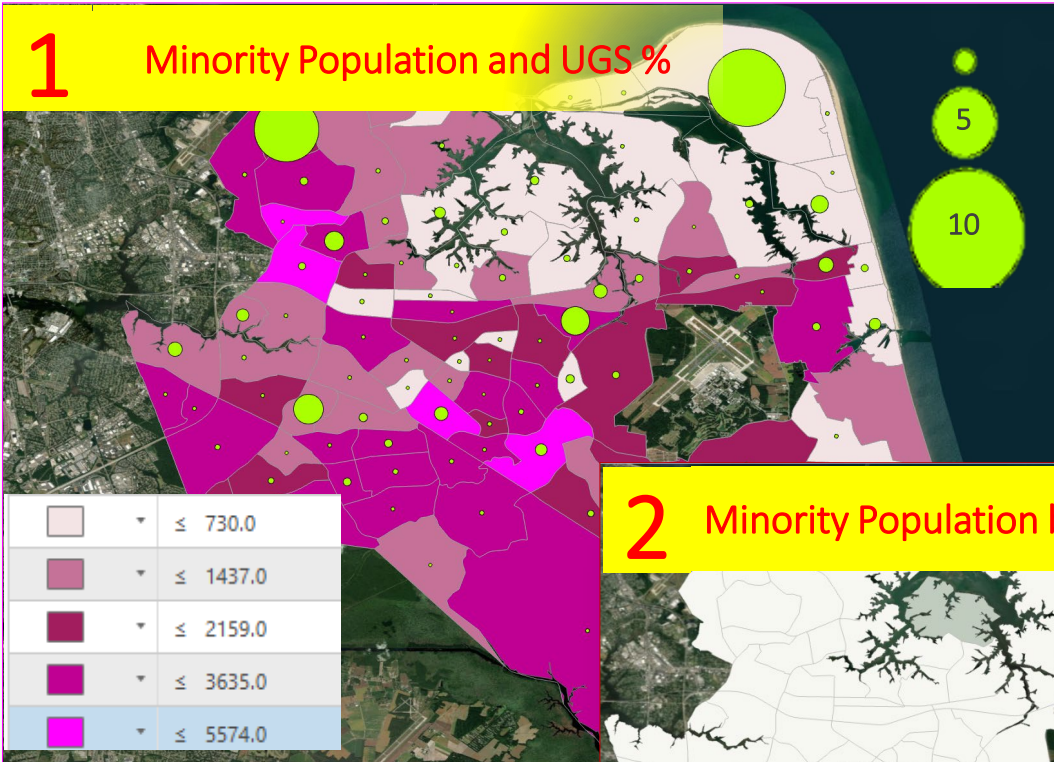


75,397 Addresses within 801m+ of a City Park with 12.78 sq mi. of Access

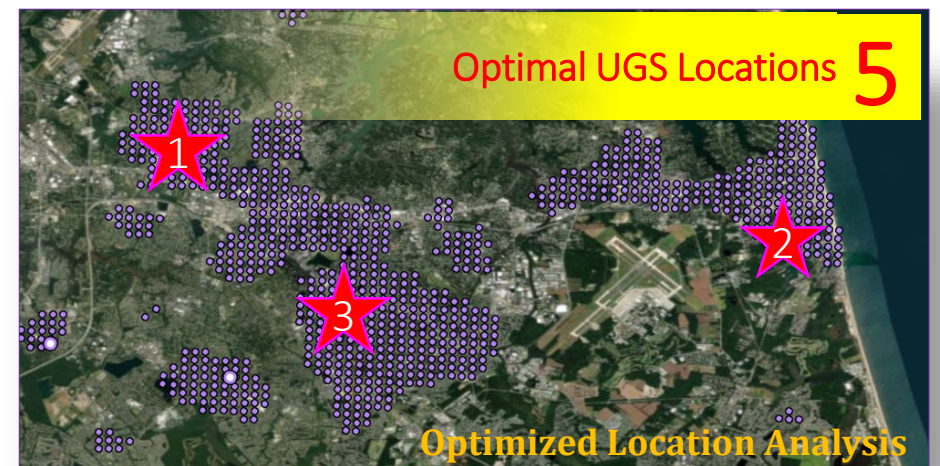
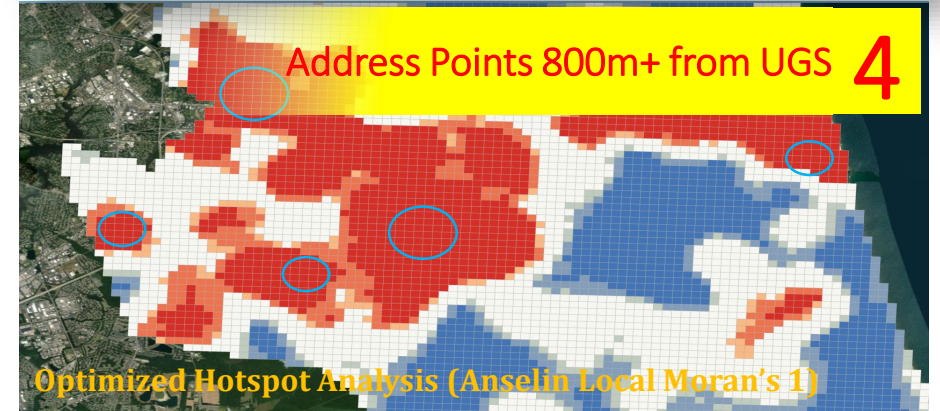
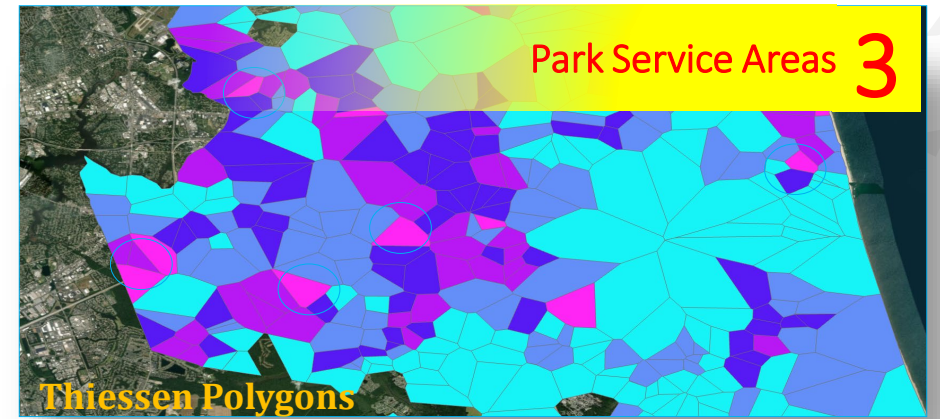
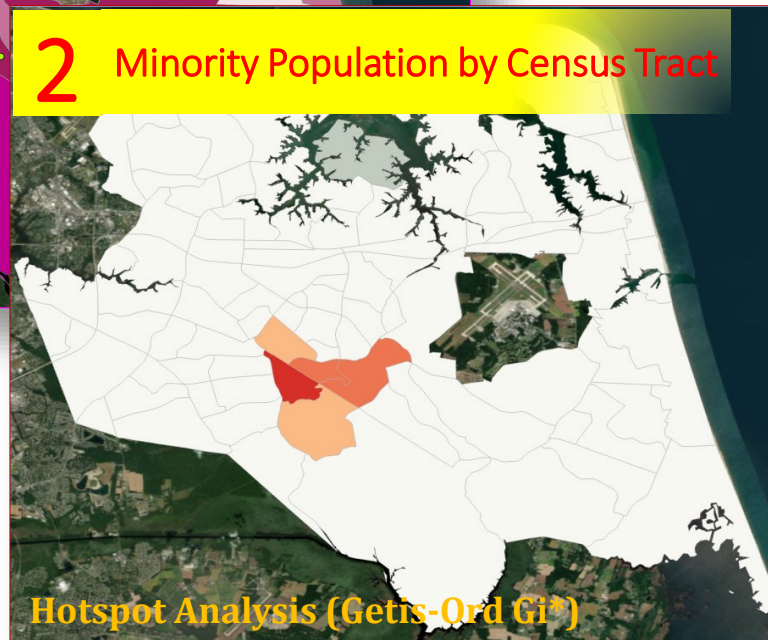
	Address Points			Total
	400m	800m	1000m+	
Euclidean Access	134,860	57,052	15,169	207,081
Network Access	59,916	71,769	75,396	207,081
Difference	76.954	22.849	133.003	

Step 5: Recommendations

1 Minority Population and UGS %



2 Minority Population by Census Tract



ANTICIPATED RESULTS



- The development of public green space has not kept pace with the increase in population and the increase in development.
 - The rate of UGS change is not proportional to the rate of increase in population
- Urban Green Space is a “fluid” concept with no official standard to hold
- The distribution of public green spaces has a positive correlation with income-levels.
 - In lower-income areas, there are less public green spaces
 - In higher-income areas, there are more public green spaces

PROJECTED TIMELINE

JAN – MAR 2020

- Develop proposal
- Conduct lit review
- Explore available data

MAR – MAY 2020

- Refine objectives based off peer review
- Obtain and download data
- Finalize research methodology
- Begin analysis

MAY – JUL 2020

- Complete analysis
- Address any outstanding issues
- Synthesize results
- Report on findings

KEY DATES:

☐ **July – August 2020**

Anticipated presentation date at Theater Special Operations Command - Europe

An aerial photograph of a coastal area. On the left, there is a paved parking lot with several cars parked. A road curves through the area, leading to a small building with a red roof. The beach is sandy and stretches along the coastline. To the right, the water is a vibrant turquoise color, and the shoreline is marked by large, light-colored rocks. The text "Thank You" is overlaid in the center of the image.

Thank You