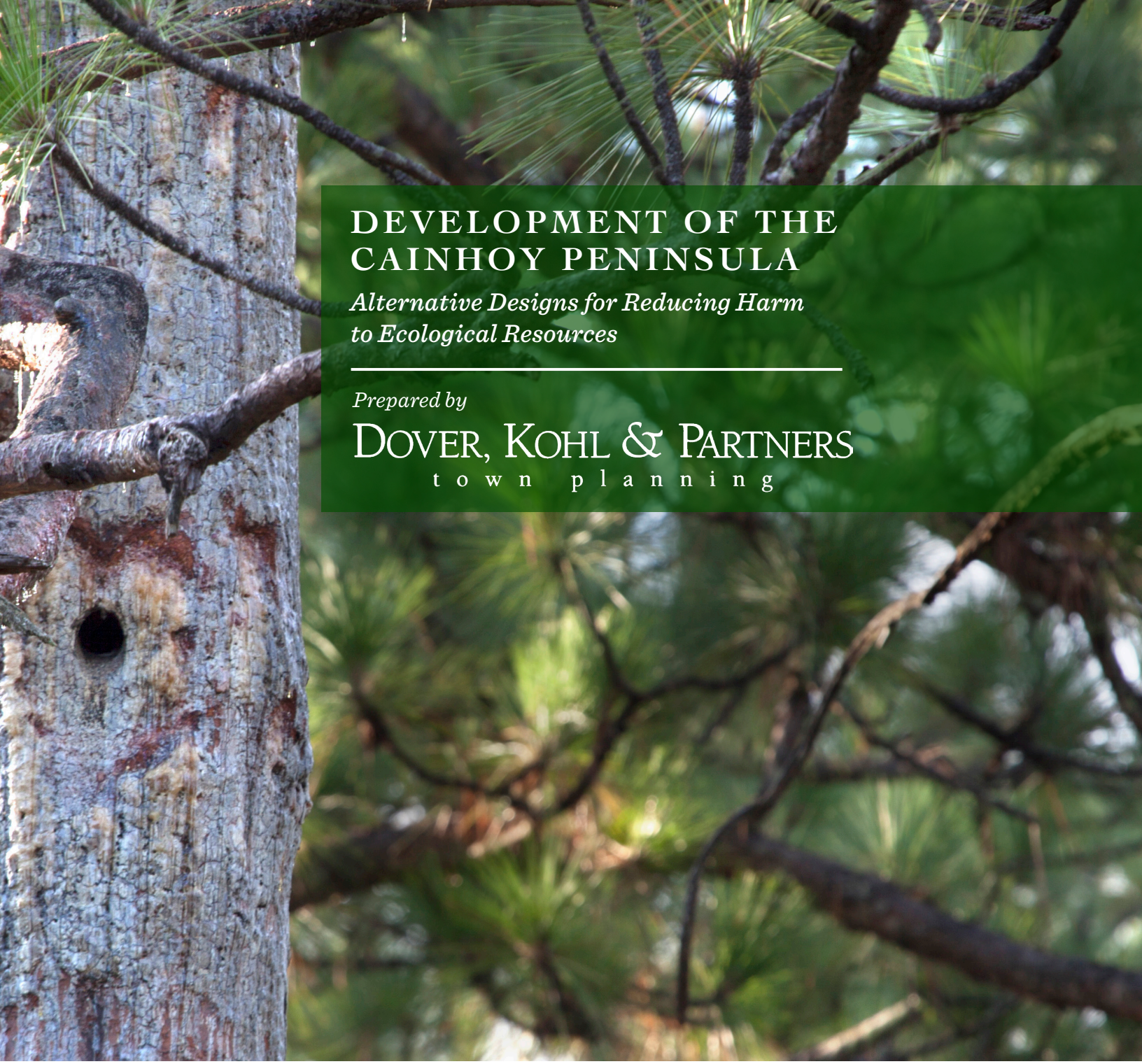


DEVELOPMENT OF THE CAINHOY PENINSULA

Alternative Designs for Reducing Harm to Ecological Resources

Prepared by

DOVER, KOHL & PARTNERS
town planning

CONTENTS

CAINHOY REPORT EXECUTIVE SUMMARY

Developers propose building approximately 9,000 residential units on a 9,000-acre property called Cainhoy Development, which is located in the City of Charleston within Berkeley County. The developers' plans include streets, stormwater systems, open spaces, mixed-use buildings and other civic features typically associated with new, large neighborhoods.

However, as currently proposed, developers will fill more than 180 acres of wetlands and site a substantial number of new homes in a floodplain where the risk for water damage is considerable. Wetlands in the Charleston region are natural and critical flooding defenses for an area that now experiences chronic inundation. Because wetlands provide valuable flood storage, protecting these systems and maintaining natural land cover helps to reduce flood damages.[1]

A simple re-imagining of the Cainhoy proposal reveals that all, or nearly all, of what developers seek can be accomplished without substantial wetlands destruction, and without siting so many homes in flood hazard areas.

This report lays out three alternative versions of the development that:

- Maintain the developers' goal of 9,000 units
- Disturb fewer than 14 acres of wetlands
- Avoid all cavity trees for federally-protected Red-cockaded woodpeckers and significantly increase the size of buffers around these trees
- Place 90 percent of homes outside of the 100- and 500-year floodplains

A fourth alternative in the report eliminates all wetlands impacts by reducing the number of housing units to 6,000. Notably, this 6,000-unit plan is only illustrative of what could be achieved on the Cainhoy site with zero wetland impacts; the number of residential units is malleable and could be increased by increasing the density of housing units and/or expanding the development footprint to other upland areas, while still impacting no wetlands.

It is important to note that this report is not an endorsement of the development of Cainhoy. A case can be made that Cainhoy should be left as it is to conserve its unique Lowcountry beauty and cultural resources, provide a buffer to the Francis Marion National Forest, and maintain the critical wetlands and wildlife habitat at the site.

However, we understand the development pressures facing the Charleston area. This report is meant to bring alternatives into public discussion that facilitate a desire for growth and expansion while avoiding and minimizing negative impacts–to the greatest extent possible–to the wetlands and floodplains integral to this region's flood defenses, and minimizing the number of our future neighbors placed into vulnerable tracts.

[1] Brody, S., R. Blessing, A. Sebastian, & P. Bedient. 2014. Examining the Impact of Land Use/Land Cover Characteristics on Flood Losses. Journal of Environmental Planning and Management 57(8): 1252-1265.)

BACKGROUND

The Cainhoy Development is a 9,000-acre timber tract located within the City of Charleston in Berkeley County in the State of South Carolina. The property contains approximately 5,800 acres of upland and 3,200 acres of wetlands and marshes with significant ecological and historical assets.

The approximately 4,500 acres north of Clements Ferry Road are primarily freshwater wetlands and Longleaf pine forests, while the portion south of Clements Ferry Road is primarily uplands with young stands of loblolly pines and saltwater wetlands. The entire property has over 10 linear miles of marsh and wetland frontage on the Cooper and Wando Rivers and Beresford and Flagg Creeks.

As proposed, the project would concentrate development on the southern portion of the property, much of which falls within the 100-year floodplain. Development within the floodplain is highly vulnerable to flooding, sea level rise, and storm surge.

In addition, the Cainhoy Development shares a two-mile border with the 250,000-acre Francis Marion National Forest (FMNF), which is home to nine endangered and threatened animal species, and 43 sensitive plant species. A broad plateau of old-growth Longleaf pine forest, some 40 feet in elevation, stretches from the FMNF across the northern portion of the Cainhoy property, providing habitat for 16 endangered Red-cockaded Woodpecker (RCW) colonies, along with populations of Gopher Frogs and Flatwoods Salamanders.

HISTORY OF THE PROJECT

In 2014, the owners of the Cainhoy property received approval from the City of Charleston for a rezoning, in the form of a Planned Unit Development (PUD), of the entire 9,000 acres consistent with a proposed Master Plan allowing for the construction of 18,000 residential units and industrial units on the property. The School District of Berkeley County completed construction of a high school and elementary/middle school on the southern portion of Cainhoy in 2016. Approximately 60 acres of the property on the south side of Clements Ferry Road have already been developed near the road, with additional parcels on the south side also in varying stages of permitting by the City of Charleston.

The prospective developers of the Cainhoy property applied to the U.S. Army Corps of Engineers (Corps) for a Clean Water Act Section 404 permit to fill wetlands and to the South Carolina Department of Health and Environmental Control (DHEC) for a Section 401 Water Quality Certification and Coastal Zone Consistency Determination. The initial Joint Public Notice for the application was issued by the Corps and DHEC for public comment on March 21, 2018. The project proposed to discharge fill material into 187.9 acres of wetlands. Since that time, the Cainhoy property owners have sold a portion of the overall project and revised the project boundary. Accordingly, a revised application was submitted in August 2019 with minimal revisions; the revised project now proposes to impact 181.9 acres of wetlands. It is our understanding that the prospective developers intend to construct 9,000 residential units on the property (Fig. 1).

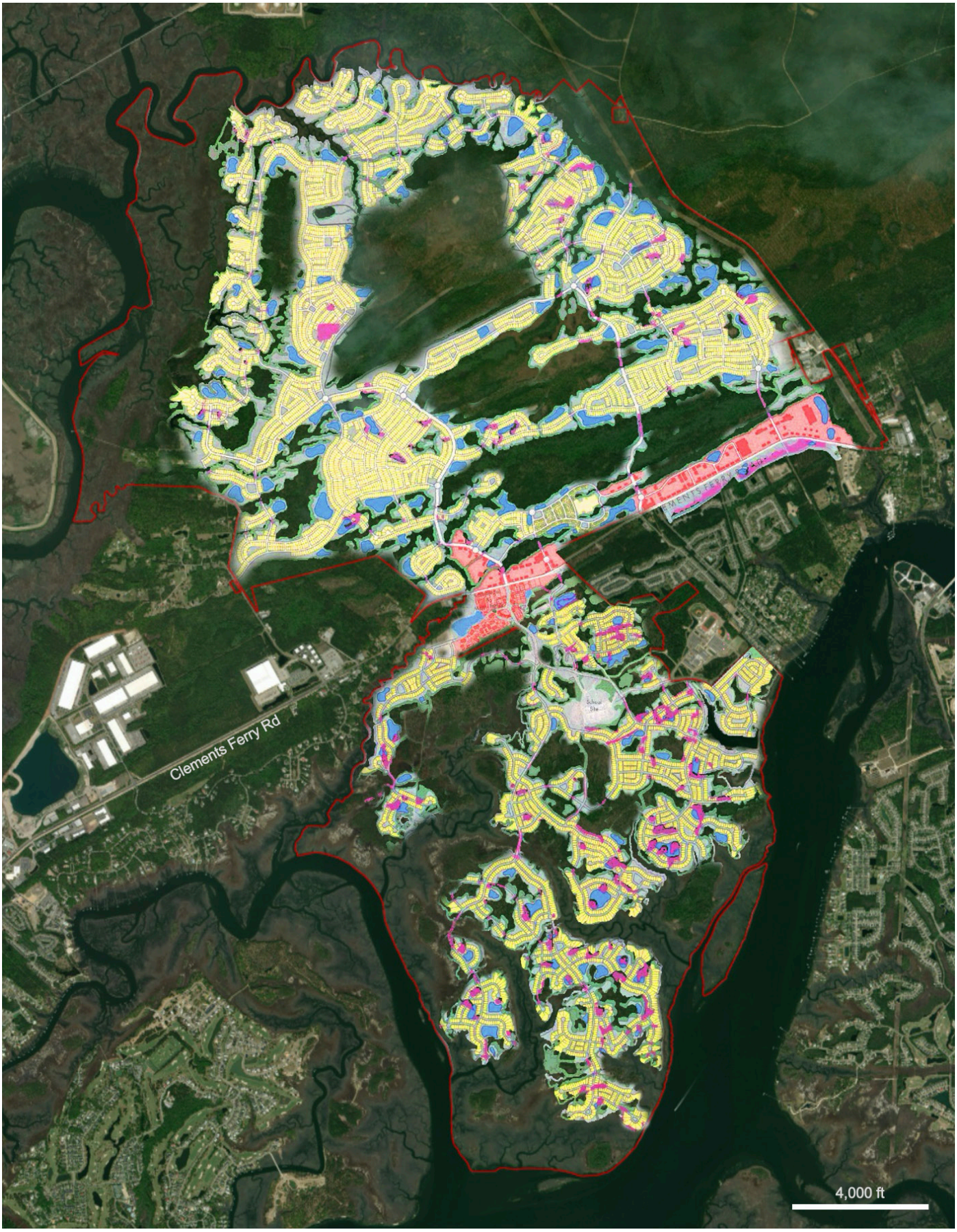


Fig. 1 *Cainhoy Site as Proposed by Developer*

Fig. 2 *Cainhoy Aerial with Project Boundary in Red*

OUR REVIEW OF THE PROJECT

The Southern Environmental Law Center (SELC) and the Coastal Conservation League (Conservation League) commissioned Dover, Kohl & Partners to review this proposed project in 2019 (Appendix A. Firm Profile). Founded in 1987, Dover, Kohl & Partners is a town planning firm whose work seeks to balance livability, economic prosperity, and environmental concerns in furtherance of smart, sustainable growth. The firm has produced and facilitated over 200 charrettes during the last decade and has received numerous awards for its projects, including a national Congress for the New Urbanism Charter Award for the I'On development in Mount Pleasant.

SELC and the Conservation League asked us to conduct an analysis of the Cainhoy property and determine whether the projected 9,000 residential units, and a commensurate quantity of commercial and workplace uses, could be accommodated on the Cainhoy site in a way that minimizes impacts on wetlands and protects habitat for the federally-protected Red-cockaded woodpecker. We based our analysis on a Suitability Map of the property provided by SELC and the Conservation League, as described in more detail below.

We have produced our findings in the form of a conceptual site plan for the property, discussed herein.

DOVER, KOHL & PARTNERS METHODOLOGY

The following is a step-by-step description of the methodology employed for the study, followed by a series of resulting draft plans accompanied by rough yield calculations and estimated quantification of impacts.

The Cainhoy site, bounded in red (Fig. 2), is located on both the north and south sides of Clements Ferry Road, approximately 8 miles northeast of the Charleston peninsula. The site is comprised of diverse natural conditions, and development opportunities are affected in numerous locations by a variety of wetland systems and sensitive habitat areas.

In preparation for the design process, the diverse environmental conditions on the Cainhoy site were graphically categorized, mapped and compiled. The various portions of the site were rated through this process for their relative suitability for development. On the resulting Suitability Map (Fig. 3), greener colors indicate areas more suitable for development and redder colors indicate areas less suitable for development.

The degree to which various areas of the Cainhoy site were considered suitable for development was largely governed by the wetland pattern. Where possible, development should avoid these wetland areas to comply with Section 404 of the Clean Water Act and protect the flood-storing capacity of these systems (Fig. 4). In addition to wetlands, the Suitability Map identifies areas occupied by endangered species and uses floodplain, storm surge, sea level rise inundation risk, and rainfall flooding data to delineate areas prone to present day and future flooding. Avoidance of these areas is necessary to maintain both community and ecologic protections.

As a starting point in the design process, non-wetland areas were identified (Fig. 5).

A "blur test" was then applied to these non-wetland areas to find the most contiguous areas of the site (Fig. 6). In the resulting diagram, the lighter areas feature larger contiguous non-wetland areas, whereas the darker areas feature less contiguous non-wetland areas. In striving to build a well-connected walkable neighborhood fabric, the priority is to locate development in areas with greater non-wetland contiguity.

The areas of the Cainhoy site with the greatest non-wetland contiguity were then further analyzed to identify those portions with the readiest access to existing regional transportation infrastructure. Non-wetland sites with high contiguity within one mile of Clements Ferry Road were thus selected and prioritized for development.

The areas prioritized for development (non-wetland sites, with high contiguity, within one mile of Clements Ferry Road) were then mapped with greater precision and distinguished from non-wetland areas that were to be set aside and excluded from development (Fig. 7).

Four alternative development scenario versions were then established:

- Version 1 occupies all of the identified non-wetland sites featuring high contiguity within 1 mile of Clements Ferry Road. As Version 1 features the largest amount of development area of the four scenarios, its relative development character intensity is the lowest.
- Version 2 constrains the developable area somewhat further. As the development area was reduced, the intensity of development character was increased to achieve the same yield of uses.
- Version 3 further constrains the area to be developed compared to Version 2, and features the highest relative intensity of development character to achieve the same yield of uses.
- Version 4 further modifies and constrains the development footprint as needed to eliminate all wetland impacts. This version maintains the same proportional mix of residential lots and units as Version 3, and the residential unit count in this version has been reduced to facilitate constraining and modifying the development footprint to avoid all wetland impacts.
  The number of residential units in Version 4 could be increased, however, by increasing the density of housing units and/or expanding the development footprint to other upland areas while still avoiding impacts to all wetlands.

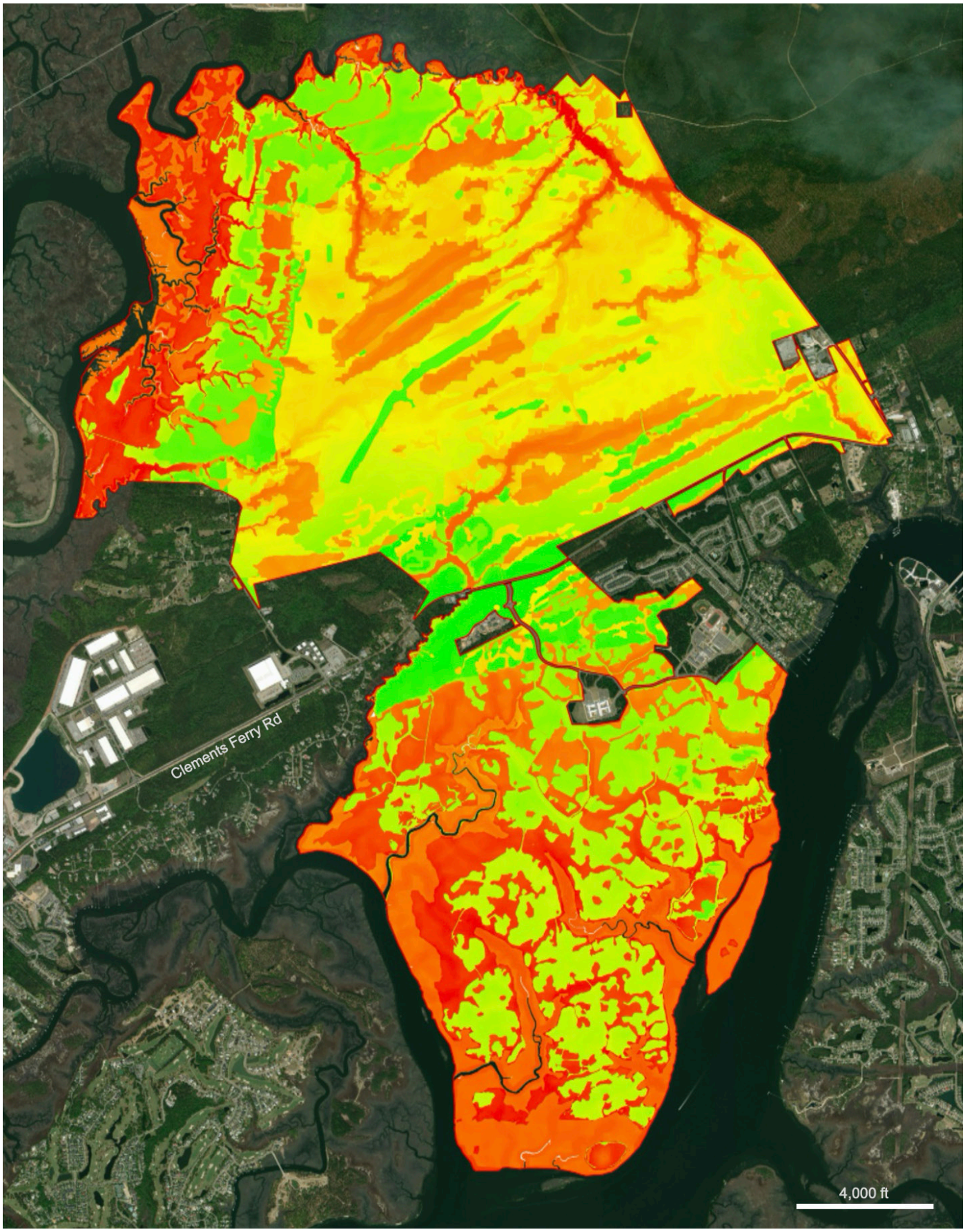
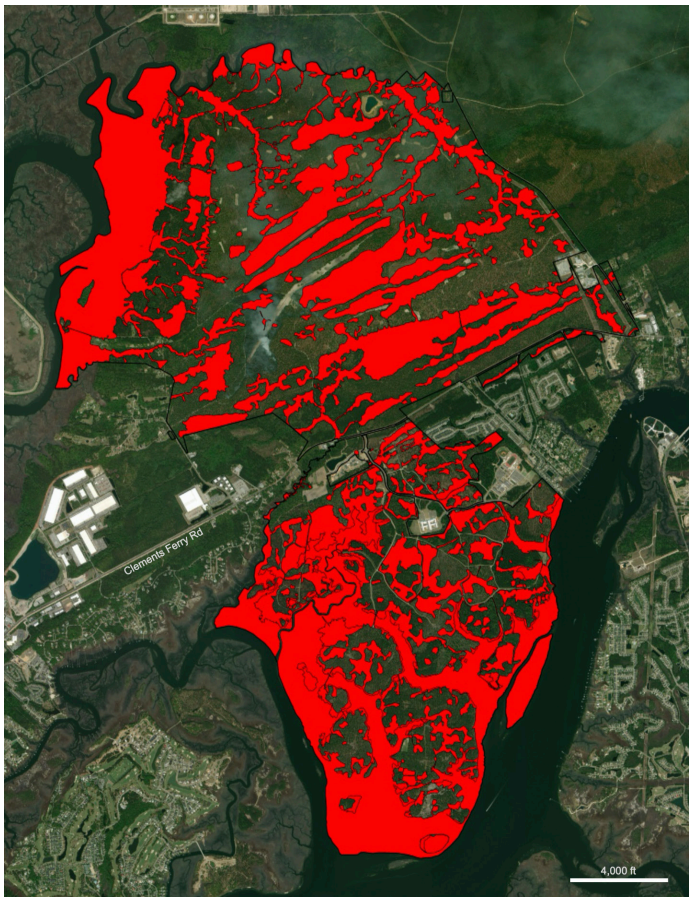
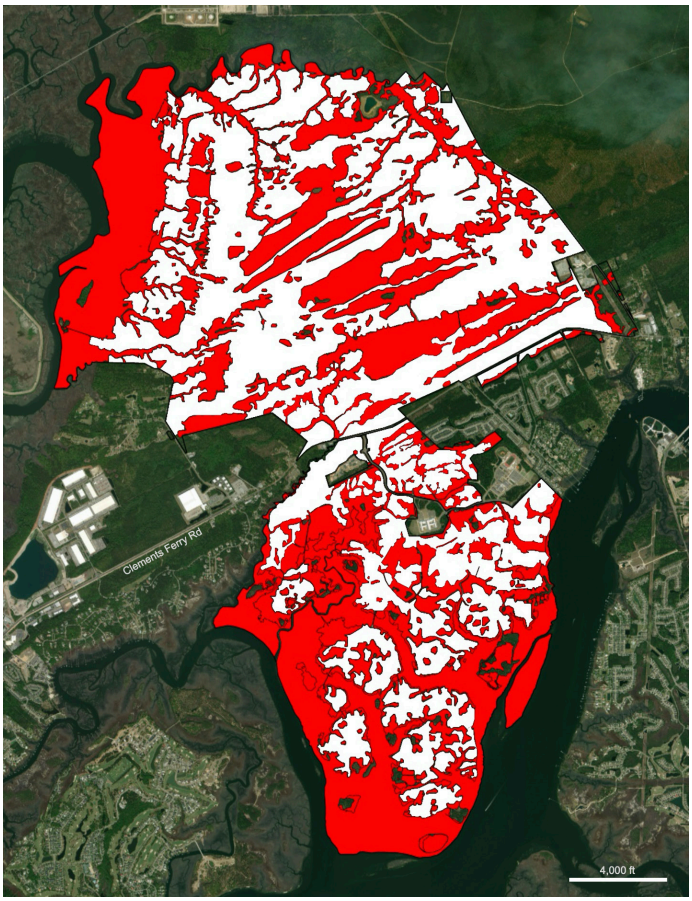
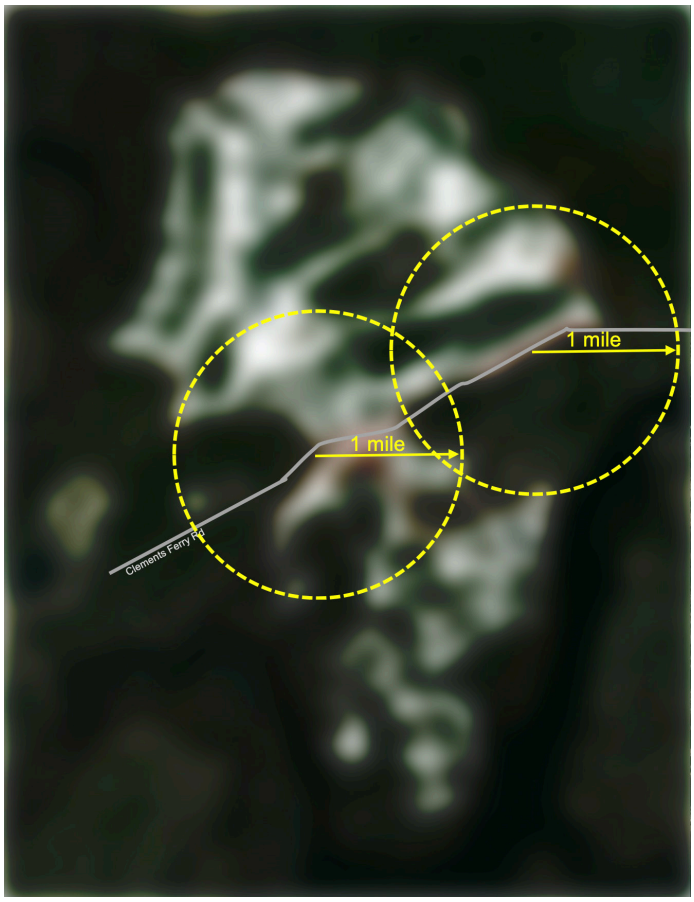
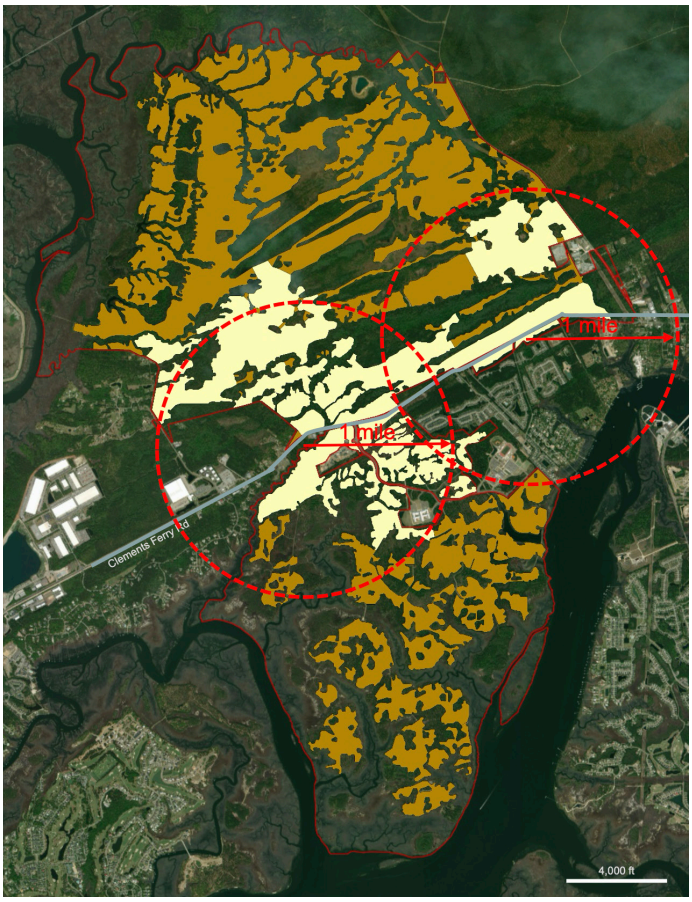


Fig. 3 *Cainhoy Overall Suitability Map with Green Indicating Most Suitable for Development and Red Indicating Least Suitable for Development*

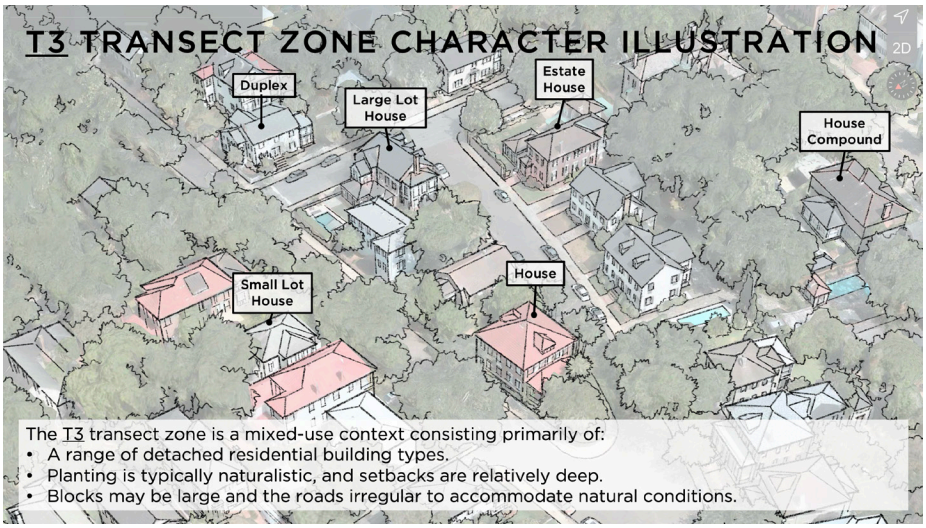


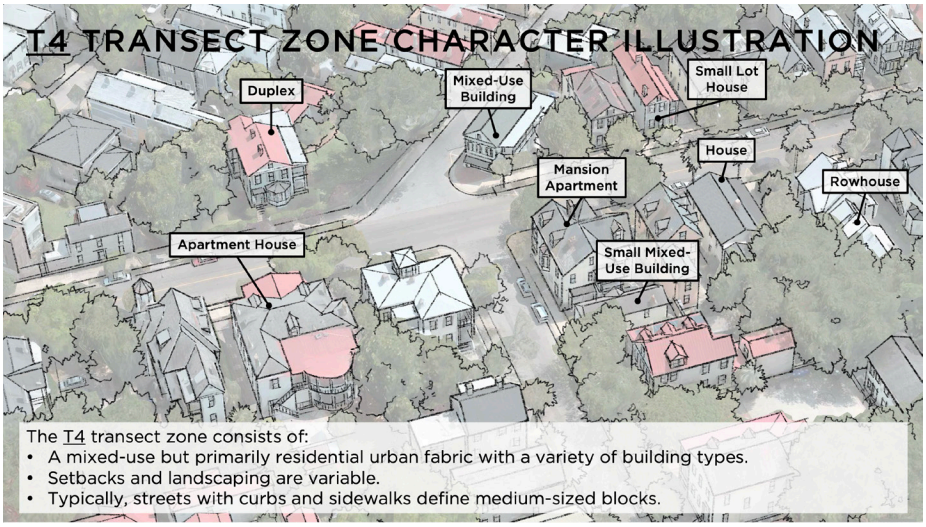


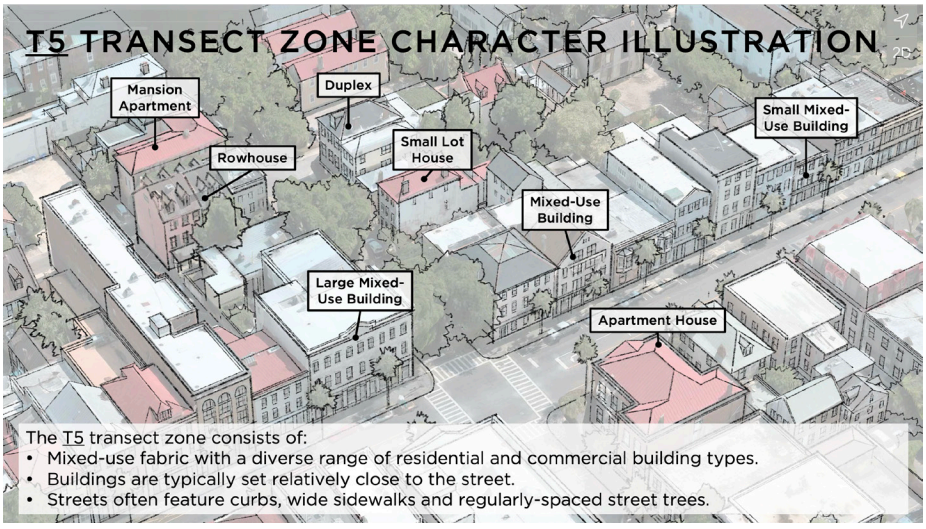




Top Left: **Fig. 4** *Cainhoy Wetlands Identified in Red;* Top Right: **Fig. 5** *Cainhoy Uplands Identified in White and Wetlands Identified in Red;* Bottom Left: **Fig. 6** *Cainhoy Blur Test Identifying Connectivity of Uplands;* Bottom Right: **Fig. 7** *Most Suitable Development Areas Identified in Lighter Cream Color with a One-Mile Radius from Clements Ferry Road Identified in Dotted Red Circles*







Top to bottom: **Fig. 8** *T3 Transect Zone;* **Fig. 9** *T4 Transect Zone;* **Fig. 10** *T5 Transect Zone*

SITE PLAN DESIGN APPROACH

The Rural-to-Urban Transect

Expression of development character in this analysis utilized the planning concept of the rural-to-urban Transect. This tool illustrates that the increased densities and compactness utilized in the four test versions are part of the normal physical urban grammar of the region and are both feasible to construct and proven to be highly attractive to homebuyers.

As described by the Congress for the New Urbanism, "[t]he Transect is a powerful tool New Urbanists can use to analyze and understand urban places — and ultimately to design new settlements that will possess qualities associated with the best old urbanism."

"The rural-to-urban Transect is a system that places all of the elements of the built environment in useful order, from most rural to most urban. For example, a street is more urban than a road, a curb more urban than a swale, a brick wall more urban than a wooden one, and greater density is more urban than less density. If all of the built elements are in sync, the place can be described as 'immersive.' The elements are symbiotic.

The rural-to-urban Transect is divided into six zones (referred to as T-Zones): natural (T1), rural (T2), sub-urban (T3) (Fig. 8), general urban (T4) (Fig. 9), center (T5) (Fig. 10), and core (T6). The remaining category, Special District, applies to parts of the built environmental with specialty uses that do not fit into neighborhoods."

NEIGHBORHOOD DESIGN APPROACH

The Neighborhood is the fundamental unit of walkable design and is defined by The Lexicon of the New Urbanism (DPZ 2014) as follows:

"The Neighborhood is a mixed-use, mixed-income urban sector whose limit is defined by walking distance instead of population density (Fig. 11). The neighborhood fulfills most ordinary human needs, including those of transportation. A network of thoroughfares variously detailed for character and capacity serves the neighborhood as a public realm suitable for both pedestrian and vehicular usage".

The typical Standard Neighborhood is approximately a 5-minute (1/4 mile) walk from center to edge.

This analysis assumed that a typical neighborhood is composed of roughly:

- 50% of land area devoted to Lots
- 30% of land area devoted to Thoroughfares
- 20% of land area devoted to Civic/Stormwater/Open Space

The walkable neighborhood has a long history in American planning, and its characteristics were articulated by Clarence Perry in his classic diagram of the Neighborhood Unit in 1930 (Fig.12). While this diagram of the Neighborhood Unit has been refined and updated many times by others since, it retains its core characteristics including:

- A clear center and edge
- A walkable size
- An interconnected network of walkable streets
- A mix of uses
- Special sites reserved for civic uses

The fundamental characteristics of the Neighborhood Unit can be applied to a diverse array of site shapes and constraints.

When there is one neighborhood standing alone among the farms, along the shore, or in the woods or the wilderness, that's a Village (Fig. 13).

When growth leads to several of these neighborhoods positioned tightly together, they become a Town (Fig. 14).

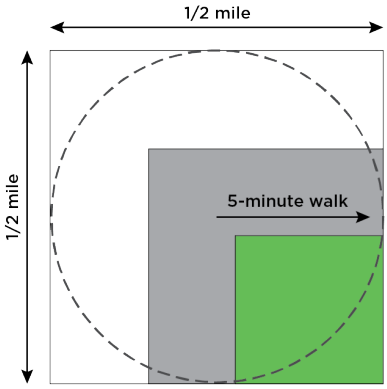
Neighborhoods forming a town should be connected with a logical and legible primary street network armature.

This primary street network should then be further refined to include a fine-grained, interconnected network of blocks and streets that are walkable in size and scale.

The resulting urban structure can then be programmed for diverse development types, with certain areas assigned greater intensity of development character (higher transect zones) and others assigned lower intensity of development character (lower transect zones).

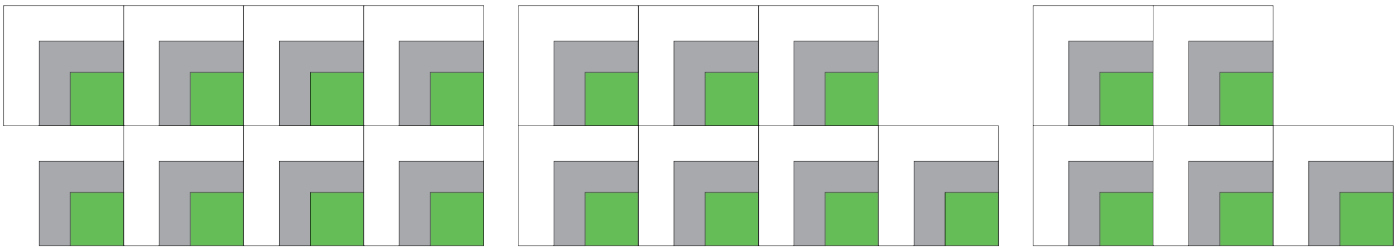
The concept of the Neighborhood Unit was applied to the area of the Cainhoy site occupied by the four test development scenario versions.

THE NEIGHBORHOOD UNIT



+/- 160 acres

50% of land area devoted to Lots
30% of land area devoted to Thoroughfares
20% of land area devoted to Civic/Stormwater/Open Space



VERSION 1

4,085 Lots
9,000 Units
1,240 Gross Acres
(=7.8 Standard Neighborhoods)

VERSION 2

3,805 Lots
9,000 Units
1,046 Gross Acres
(=6.5 Standard Neighborhoods)

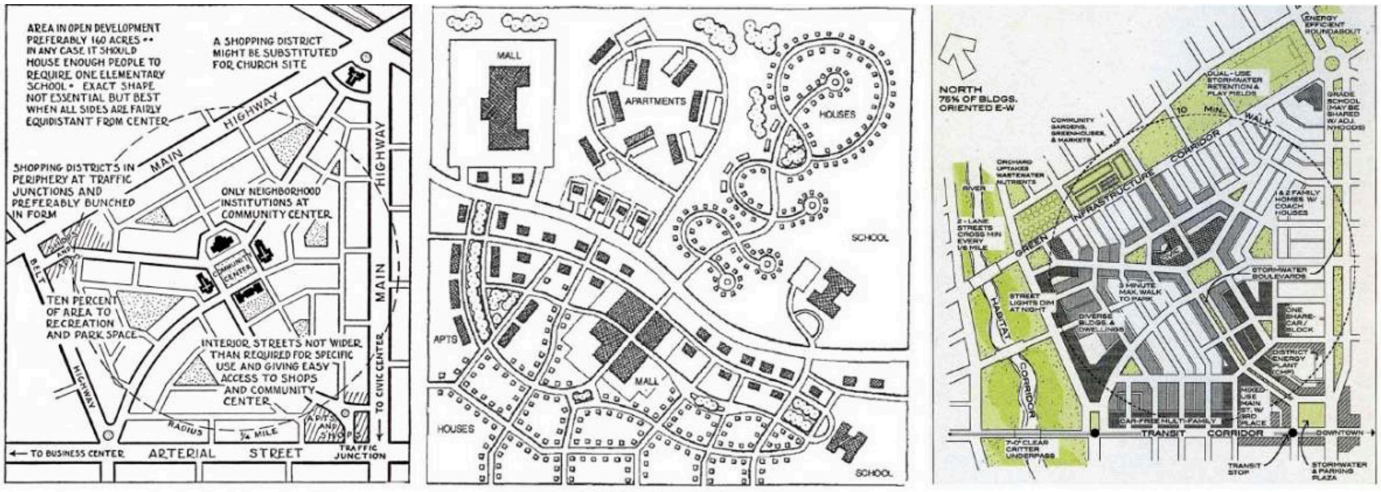
VERSION 3

3,335 Lots
9,000 Units
735 Gross Acres
(=4.6 Neighborhoods)

+ Workplace District (114 Gross Acres)

NEIGHBORHOOD ORGANIZATION

Suburban Sprawl



Traditional Neighborhood

1930 1980 2008

Top to bottom: **Fig. 11** *The Neighborhood Unit*; **Fig. 12** *Neighborhood Organization*

VILLAGE

TOWN

Top to bottom: **Fig. 13** *Village;* **Fig. 14** *Town*

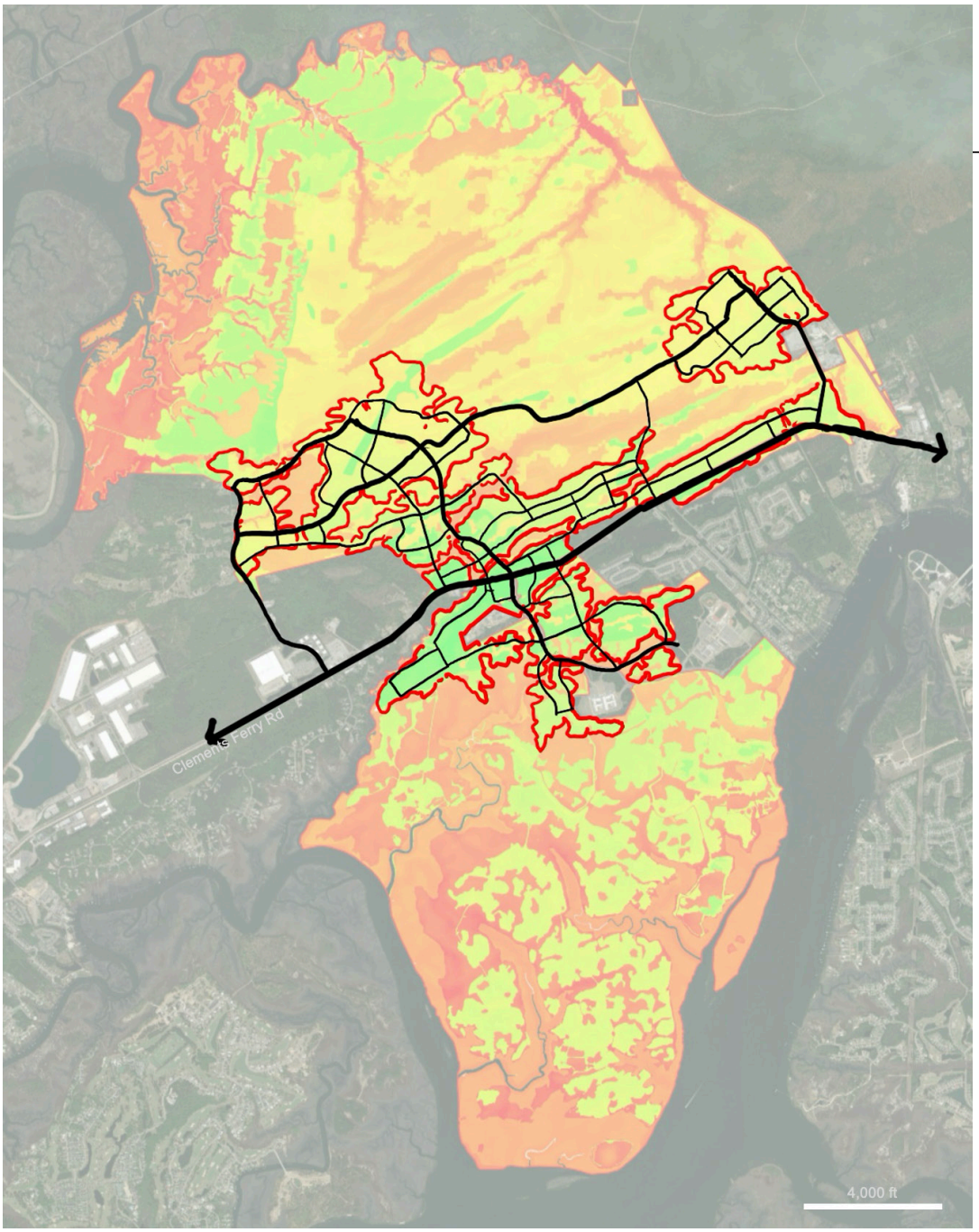


Fig. 19 *Cainhoy Overall Suitability wtih potential road and neighborhood framework*

STREET NETWORK DESIGN APPROACH

Once neighborhood boundaries (shown in red) were identified (Fig. 15), these neighborhoods were then linked via a primary street connection armature (Fig. 16). The primary street connection armature was reinforced and enhanced with a secondary street connection armature (Fig. 17). Finally, the street armature was further refined to include a fine-grained interconnected network of blocks, streets and public spaces that are walkable in size and scale (Fig. 18).

The goal was to retain a legible and orderly geometry, while achieving a high degree of street connectivity and multiple parallel routes wherever possible in order to improve circulation and to better distribute trips across transportation modes.

The pattern of neighborhoods and the armature of streets were superimposed on the Suitability Map to assess its responsiveness to environmental constraints (Fig. 19).

Top Left: **Fig. 15** *Cainhoy Area Most Suitable for Development;* Top Right: **Fig. 16** *Primary Street Link Between Suitable Development Areas;* Bottom Left: **Fig. 17** *Secondary Street Network Within Suitable Development Areas;* Bottom Right: **Fig. 18** *Fine-grain Interconnected Network of Blocks Within Suitable Development Areas*

SITE PLAN ALTERNATIVES

The detailed urban framework with a fine-grained interconnected network of blocks, streets and public spaces that are walkable in size and scale was then applied to the footprints of the four test development scenario versions.

A draft development program was also devised to fit the available land area for each of the four site plan alternative scenario versions. Each of the first three development scenario versions were configured to accommodate 9,000 residential units with commensurate space to accommodate roads, stormwater, and civic space, an associated quantity of commercial, and 114 gross acres of Workplace District. The fourth development scenario version is configured similarly except that it avoids all wetland impacts while accommodating 6,000 residential units.

The amount of land area required for each of the four development scenario versions was then calculated and represented graphically at the same scale as the site. The land area required for each of the four test development scenario versions was then configured on the site within the boundaries of the previously identified contiguous non-wetland sites within one mile of Clements Ferry Road. The land area required for each of the four test development scenario versions was expressed not just in gross acres, but also in Standard Neighborhoods.

To gain a sense of the three-dimensional character of the four test development scenario versions, it is instructive to compare each with known local examples of walkable urbanism. Scale comparisons were made to the historic districts of Charleston, SC and Savannah, GA that includes a roughly similar amount of residential, civic, retail and business uses that correspond with each of the first three test development scenario versions (Fig. 20). Each development scenario includes a breakdown of land use acreage for all four versions (see Figs. 22, 27, 32, 37).

Outlined in red on the maps of Charleston and Savannah is an area containing approximately 9,000 dwelling units plus other uses.

CHARLESTON

SAVANNAH

	Charleston	Savannah
Sample Area (acres)	1,240	1,882
Dwelling Units	8,837	9,028
Building Areas (SF)		
Retail	847,169	1,020,373
Restaurant	840,671	1,481,037
Accommodations	2,877,744	1,757,662
Arts & Entertainment	258,950	124,356
Other Retail	493,619	362,329
Office	1,209,233	1,974,701
Public Administration	1,809,737	481,486
Education	3,966,839	833,888
Medical Services	234,992	530,458
Transportation	112,602	218,323
Wholesale	82,817	122,384

Fig. 20 *Scale Comparisons of Charleston, SC and Savannah, GA*

SITE PLAN ALTERNATIVE
VERSION 1

Version 1 utilizes the largest available land area, impacting 1,354 gross acres of land on both sides of Clements Ferry Road. Due to the larger developed area, it accommodates the greatest proportion of single-family detached residences, relative to single-family attached and multi-family residences (Fig. 21).

This version includes 3,200 single family detached units, 1,200 single family attached units, and 4,600 multi-family attached units across 4,085 residential lots (Fig. 22).

The residential component of this version utilizes 620 total acres of land, while 372 acres are utilized for thoroughfares, and 248 acres of land are dedicated to civic space, open space, and stormwater management areas.

Development scenario Version 1 was compared to the Charleston and Savannah examples at the same scale referenced in Figure 20. The 9,000 units of Version 1 occupy slightly more land area than 9,000 units in Charleston and somewhat less than 9,000 units in Savannah.

The documented RCW locations on the Cainhoy property were then overlaid onto the site plan alternative to analyze potential impacts (Fig. 23). Potential impacts were determined by identifying cavity trees known to house RCWs. Clusters of trees were grouped together with a polygon drawn around each cluster to encompass all of the trees together. A 200-foot buffer was then applied to each cluster polygon. Buffers were expanded where needed to achieve a minimum 10-acre area for each cluster.

Version 1 has minimal impacts to RCW locations overall, though some potential impacts within the 200-foot buffer may occur in the northeastern area. Due to potential encroachment on RCW buffers, additional detailed inspection of buffer shape and plan geometry would be recommended to determine whether any minor plan refinements are needed to completely avoid buffered areas.

The design of Version 1 was also configured to avoid and minimize the impacts to wetlands on the property (Fig. 24). Version 1 impacts approximately 13.2 acres of freshwater wetlands, and these impacts are limited to road crossings. No wetlands are impacted by building lots or stormwater systems. Further, 1,232 acres, or 91% of the gross area for Version 1, are within the FEMA designated X Flood Zone, which is outside of the 500-year and 100-year floodplains and has a relatively minimal flood hazard. Only 122 acres, or 9% of the gross area for Version 1, are within the FEMA designated AE Flood Zone, also known as the 100-year floodplain (Fig. 25).

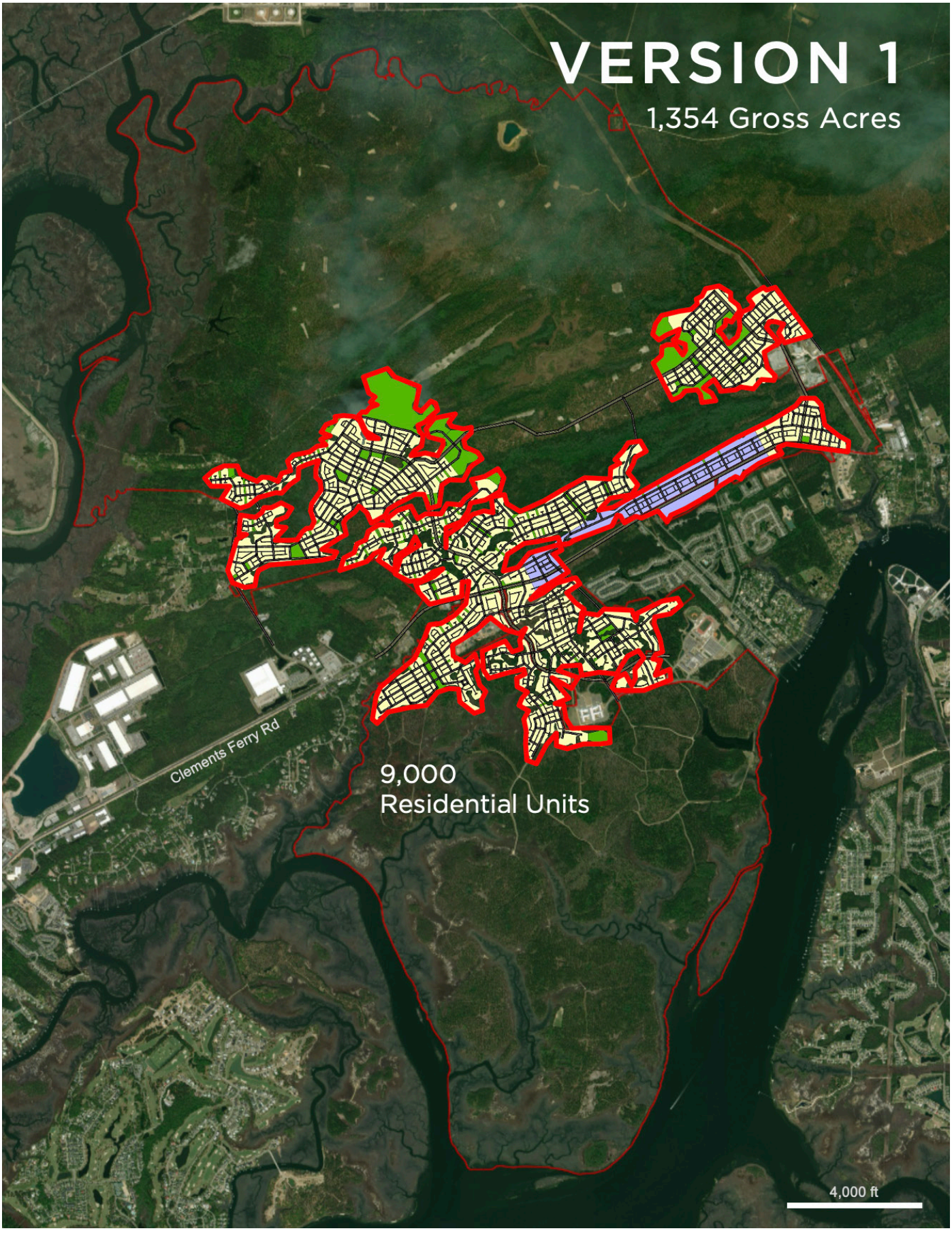


Fig. 21 *Version 1 Site Plan with Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

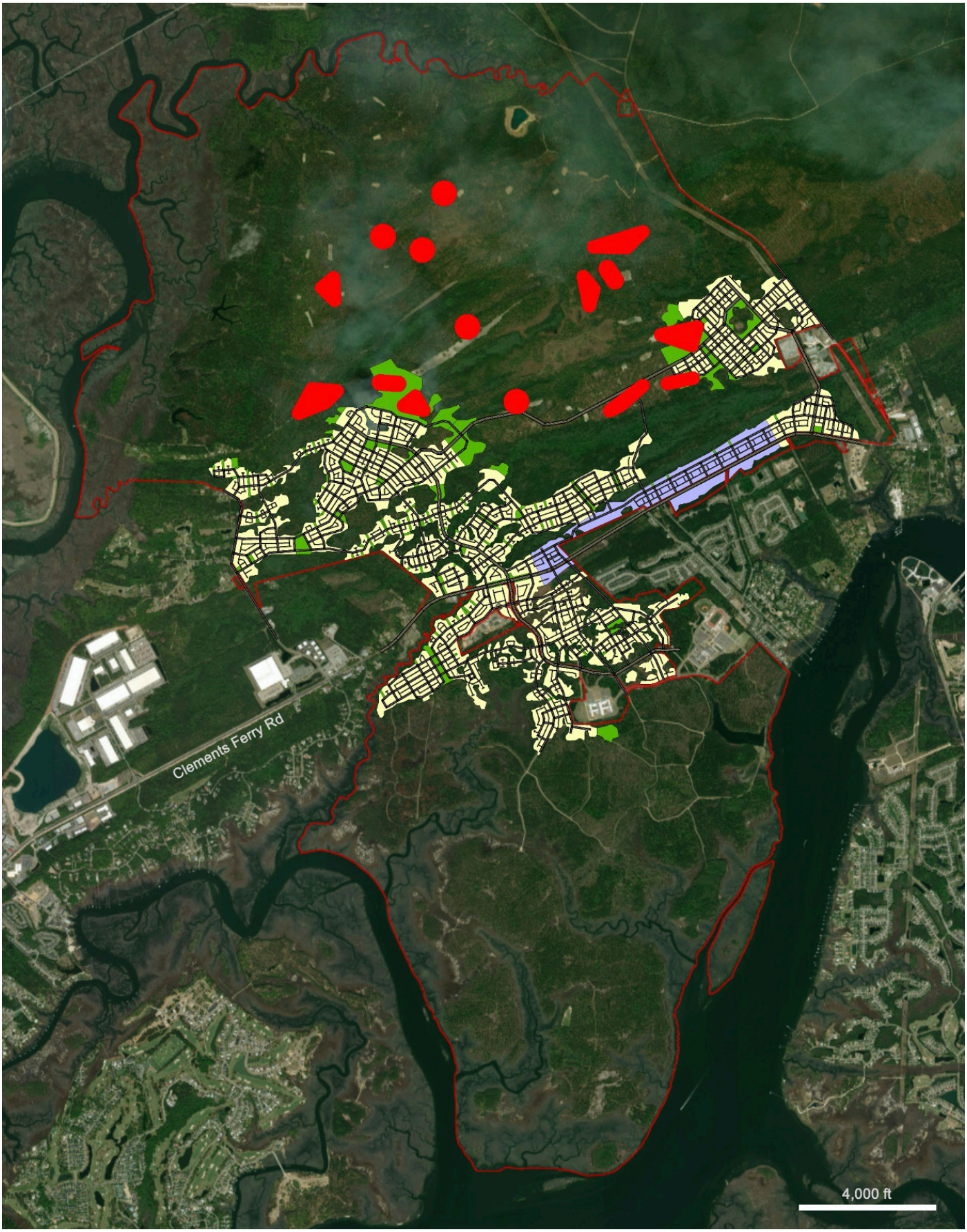


Fig. 23 *Version 1 Site Plan Identifying RCW Locations with Buffers Indicated in Red, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

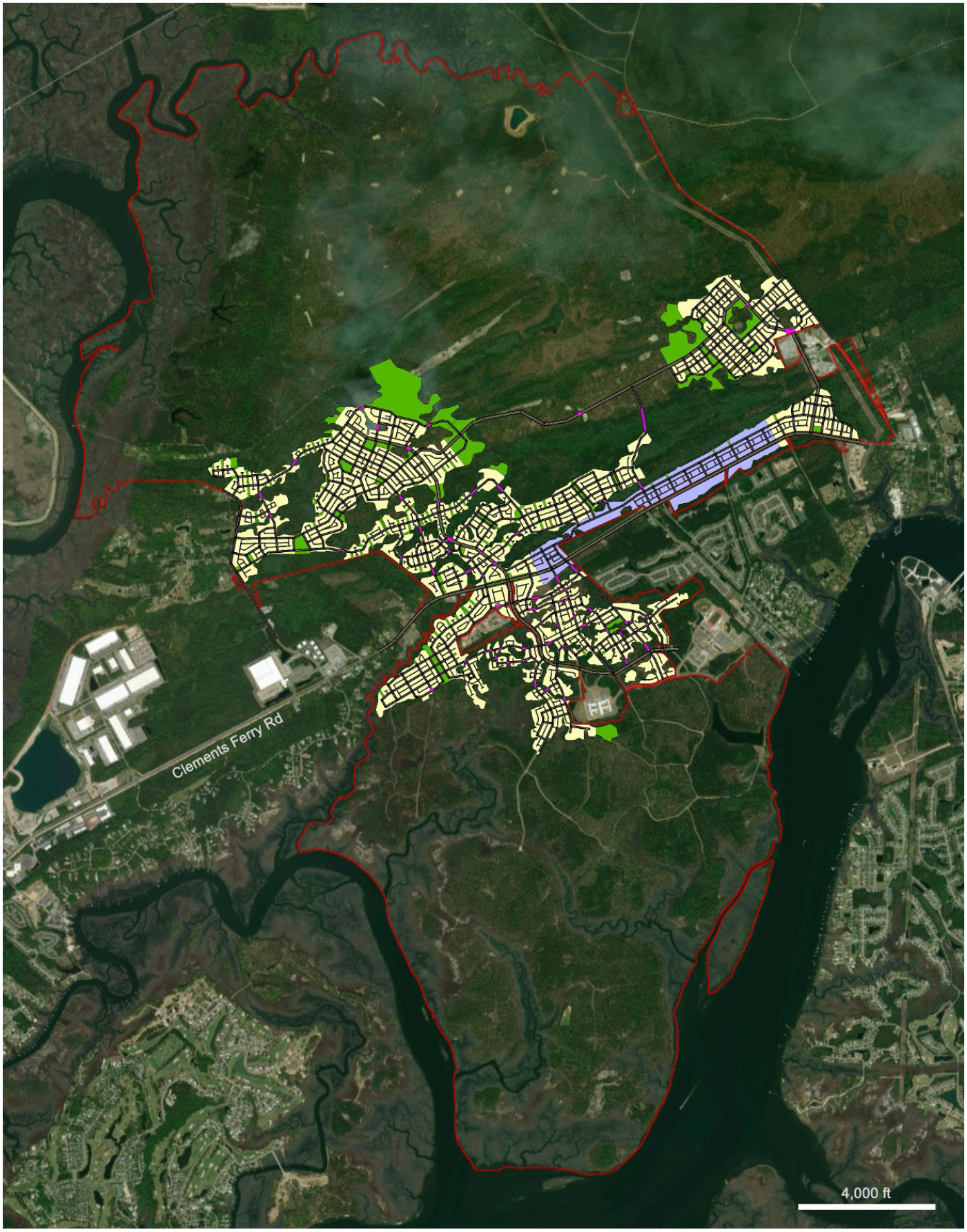


Fig. 24 *Version 1 Site Plan Identifying Wetland Impacts Indicated in Pink, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

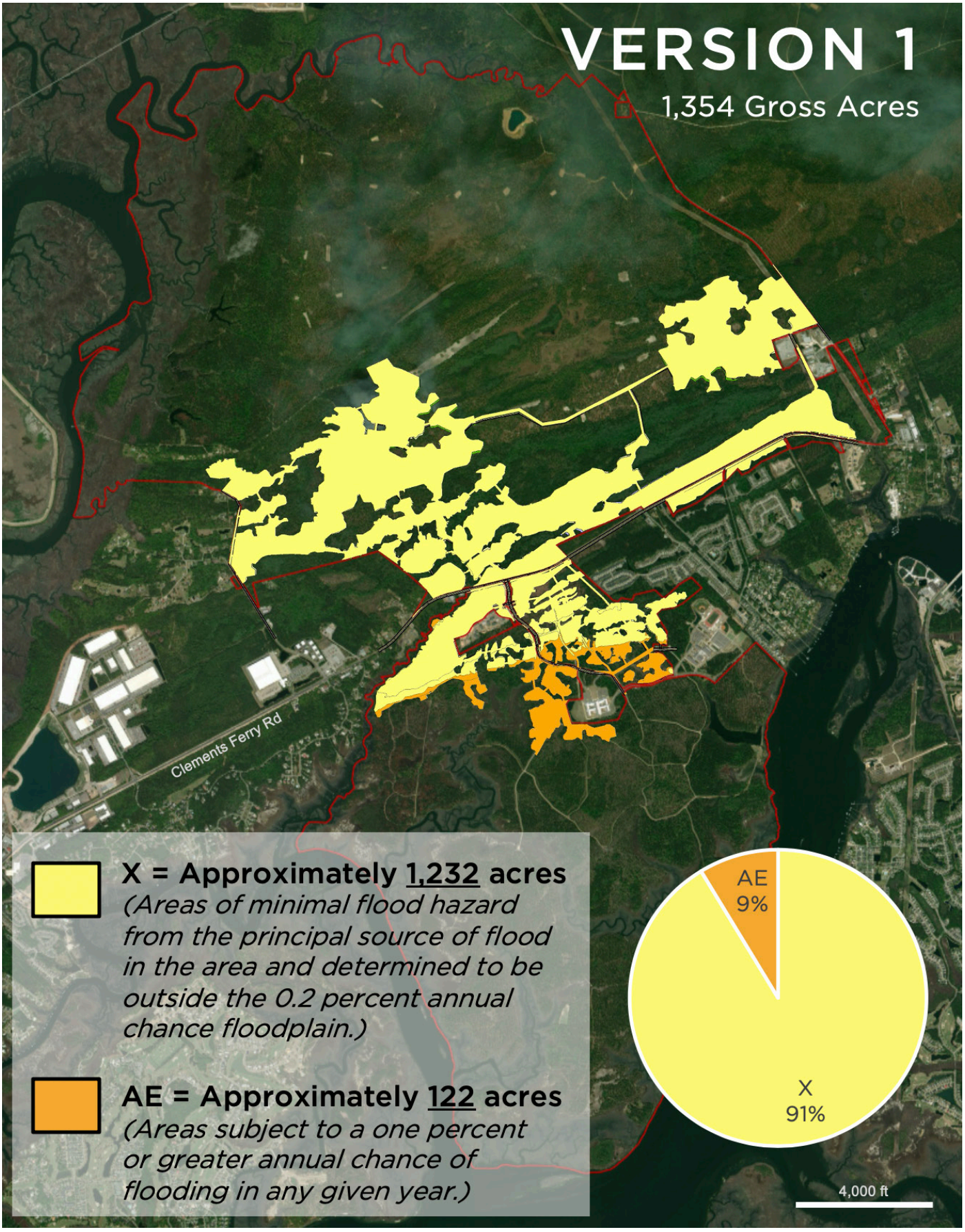


Fig. 25 *Version 1 Site Plan with Flood Zones Highlighted*

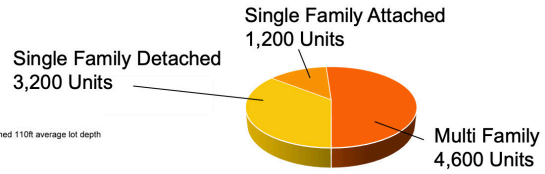
VERSION 1: LOWER T-ZONE EMPHASIS

Cainhoy - Draft Quantity Calculations

Produced by Dover, Kohl & Partners 11/11/2019

Building / Lot Types:	Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use
typ # of res units/type:	0	3	1	1	1	1	2	1	8	12	1	6	12
typ ft lot frontage/type:	50	120	125	70	50	40	50	25	70	90	25	50	80
typ lot area *:	5,500	13,200	13,750	7,700	5,500	4,400	5,500	2,750	7,700	9,900	2,750	5,500	8,800
typ residential sq ft/type:	0	6,000	4,000	3,000	2,000	1,500	4,000	2,000	7,000	10,000	2,000	5,000	10,000
typ non-res sq ft/type:	0	0	0	0	0	0	0	0	0	0	1,000	2,500	5,000

* Assumed 110ft average lot depth



Version 1: Lower T-Zone Emphasis

		Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use	Total T Zone Counts:	Net Counts: (lots only)	Gross Counts: (lots + thoroughfares + public open space)
T5	number of lots	20					200	100	300	60	80	50	50	50	**910 lots**	103 acres of T5 lots	62 acres of T5 thoroughfares **
	number of units	0					200	200	300	480	960	50	300	600	**3,090 units**		41 acres of T3-O civic / open / stormwater **
	lot frontage ft	1000					8000	5000	7500	4200	7200	1250	2500	4000	40,650 ft of frontage		**205 total gross acres of T5**
	lot sq ft	110,000					880,000	550,000	825,000	462,000	792,000	137,500	275,000	440,000	4,471,500 sq ft (110ft depth avg)	8.86 lots/net acre avg	4.43 lots/gross acre avg
	residential bldg sq ft	-					300,000	400,000	600,000	420,000	800,000	100,000	250,000	500,000	3,370,000 sq ft of residential	30.10 units/net acre avg	15.05 units/gross acre avg
	non-res bldg sq ft	-					-	-	-	-	-	50,000	125,000	250,000	425,000 sq ft non-res		
	% of units in T5	0.00%					6.47%	6.47%	9.71%	15.53%	31.07%	1.62%	9.71%	19.42%			
T4	number of lots	20				160	290	100	300	120	75	50	50		**1,165 lots**	131 acres of T4 lots	79 acres of T4 thoroughfares **
	number of units	0				160	290	200	300	960	900	50	300		**3,160 units**		53 acres of T3-O civic / open / stormwater **
	lot frontage ft	1000				8000	11600	5000	7500	8400	6750	1250	2500		52,000 ft of frontage		**263 total gross acres of T4**
	lot sq ft	110,000				880,000	1,276,000	550,000	825,000	924,000	742,500	137,500	275,000		5,720,000 sq ft (110ft depth avg)	8.87 lots/net acre avg	4.44 lots/gross acre avg
	residential bldg sq ft	-				320,000	435,000	400,000	600,000	840,000	750,000	100,000	250,000		3,695,000 sq ft of residential	24.06 units/net acre avg	12.03 units/gross acre avg
	non-res bldg sq ft	-				-	-	-	-	-	-	50,000	125,000		175,000 sq ft non-res		
	% of units in T4	0.00%				5.06%	9.18%	6.33%	9.49%	30.38%	28.48%	1.58%	9.49%				
T3-O	number of lots	20	250	150	220	250	300	100							**1,290 lots**	239 acres of T3-O lots	143 acres of T3-O thoroughfares **
	number of units	0	750	150	220	250	300	200							**1,870 units**		96 acres of T3-O civic / open / stormwater **
	lot frontage ft	1000	30000	18750	15400	12500	12000	5000							94,650 ft of frontage		**475 total gross acres of T3-O**
	lot sq ft	110,000	3,300,000	2,062,500	1,694,000	1,375,000	1,320,000	550,000							10,411,500 sq ft (110ft depth avg)	5.40 lots/net acre avg	2.70 lots/gross acre avg
	residential bldg sq ft	-	1,500,000	600,000	660,000	500,000	450,000	400,000							4,110,000 sq ft of residential	7.82 units/net acre avg	3.91 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-							0 sq ft non-res		
	% of units in T3-O	0.00%	40.11%	8.02%	11.76%	13.37%	16.04%	10.70%									
T3-R	number of lots	20	90	160	200	250									**720 lots**	147 acres of T3-R lots	88 acres of T3-R thoroughfares **
	number of units	0	270	160	200	250									**880 units**		59 acres of T3-O civic / open / stormwater **
	lot frontage ft	1000	10800	20000	14000	12500									58,300 ft of frontage		**294 total gross acres of T3-R**
	lot sq ft	110,000	1,188,000	2,200,000	1,540,000	1,375,000									6,413,000 sq ft (110ft depth avg)	4.89 lots/net acre avg	2.45 lots/gross acre avg
	residential bldg sq ft	-	540,000	640,000	600,000	500,000									2,280,000 sq ft of residential	5.98 units/net acre avg	2.99 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-									0 sq ft non-res		
	% of units in T3-R	0.00%	30.68%	18.18%	22.73%	28.41%									**Total Site Counts:**		
Total Bldg / Lot Type Counts:	**# of lots**	**80**	**340**	**310**	**420**	**660**	**790**	**300**	**600**	**180**	**155**	**100**	**100**	**50**	**4,085 lots**	620 total acres of lots	372 total acres of thoroughfares **
	# of res units	**0**	**1020**	**310**	**420**	**660**	**790**	**600**	**600**	**1440**	**1860**	**100**	**600**	**600**	**9,000 units**		248 total acres of civic / open / stormwater **
	lot frontage ft	4000	40800	38750	29400	33000	31600	15000	15000	12600	13950	2500	5000	4000	245,600 ft of frontage		**1240 total gross acres**
	lot sq ft	440,000	4,488,000	4,262,500	3,234,000	3,630,000	3,476,000	1,650,000	1,650,000	1,386,000	1,534,500	275,000	550,000	440,000	27,016,000 sq ft	6.59 lots/net acre avg	3.29 lots/gross acre avg
	residential bldg sq ft	-	2,040,000	1,240,000	1,260,000	1,320,000	1,185,000	1,200,000	1,200,000	1,260,000	1,550,000	200,000	500,000	500,000	13,455,000 sq ft res	14.51 units/net acre avg	7.26 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-	-	-	-	100,000	250,000	250,000	600,000 sq ft non-res		**7.8 neighborhoods *****
	% of total res unit mix	0.00%	11.33%	3.44%	4.67%	7.33%	8.78%	6.67%	6.67%	16.00%	20.67%	1.11%	6.67%	6.67%			
			Single Family portion of residential unit mix				35.6%				Multi Family portion of residential unit mix			64.4%			

* Neighborhood composition assumptions:
50% of land area devoted to Lots
30% of land area devoted to Thoroughfar
20% of land area devoted to Civic / Stormwater / Open Space

** Neighborhood avg size assumption:
160 acres (1/2 mile x 1/2 mile)

Version 1 Mix

4,085 Lots
9,000 Units
1,240 Gross Acres (= 7.8 Standard 160-acre Neighborhoods)

T5: 205 Gross Acres
T4: 263 Gross Acres
T3 (O&R): 772 Gross Acres
(+Workplace District: 114 Gross Acres)

Fig. 22 *Version 1: Medium T-Zone Emphasis with Development Use Chart*

SITE PLAN ALTERNATIVE

VERSION 2

Version 2 constrains the development area to 1,160 gross acres. This increase in density results in a somewhat lower proportion of single-family detached residences, relative to single-family attached and multi-family types, than in Version 1 (Fig. 26).

This version includes 2,510 single family detached units, 1,350 single family attached units, and 5,140 multi-family attached units across 3,805 residential lots (Fig. 27).

The residential component of this version utilizes 523 total acres of land, while 314 acres are utilized for thoroughfares, and 209 acres of land are dedicated to civic space, open space, and stormwater management areas.

Development scenario Version 2 was compared to the Charleston and Savannah examples at the same scale referenced in Figure 20. The 9,000 units of Version 2 occupy almost the same amount of land as 9,000 units in Charleston and somewhat less than 9,000 units in Savannah.

Version 2 would therefore largely feature development quite similar in intensity to Charleston's historic district.

The documented RCW locations on the Cainhoy property were then overlaid onto the site plan alternative to analyze potential impacts (Fig. 28). Version 2 reduces the northeastern areas that were included for development in Version 1, and therefore further avoids RCW adjacency in those locations. The western portion of Version 2 approaches RCW cavity trees most closely while still maintaining development a minimum of approximately 100 feet from the edge of RCW buffer zones.

The design of Version 2 was also configured to further avoid and minimize the impacts to wetlands on the property (Fig. 29) compared to Version 1. Version 2 involves approximately 11 acres of freshwater wetland impacts, restricted entirely to road crossings. No wetlands are impacted by building lots or stormwater systems. Further, 1,044 acres, or 90% of the gross area for Version 2, are within the FEMA designated X Flood Zone, which is outside of the 500-year and 100-year floodplains and has a relatively minimal flood hazard. Only 116 acres, or 10% of the gross area for Version 2, are within the FEMA designated AE Flood Zone (Fig. 30).

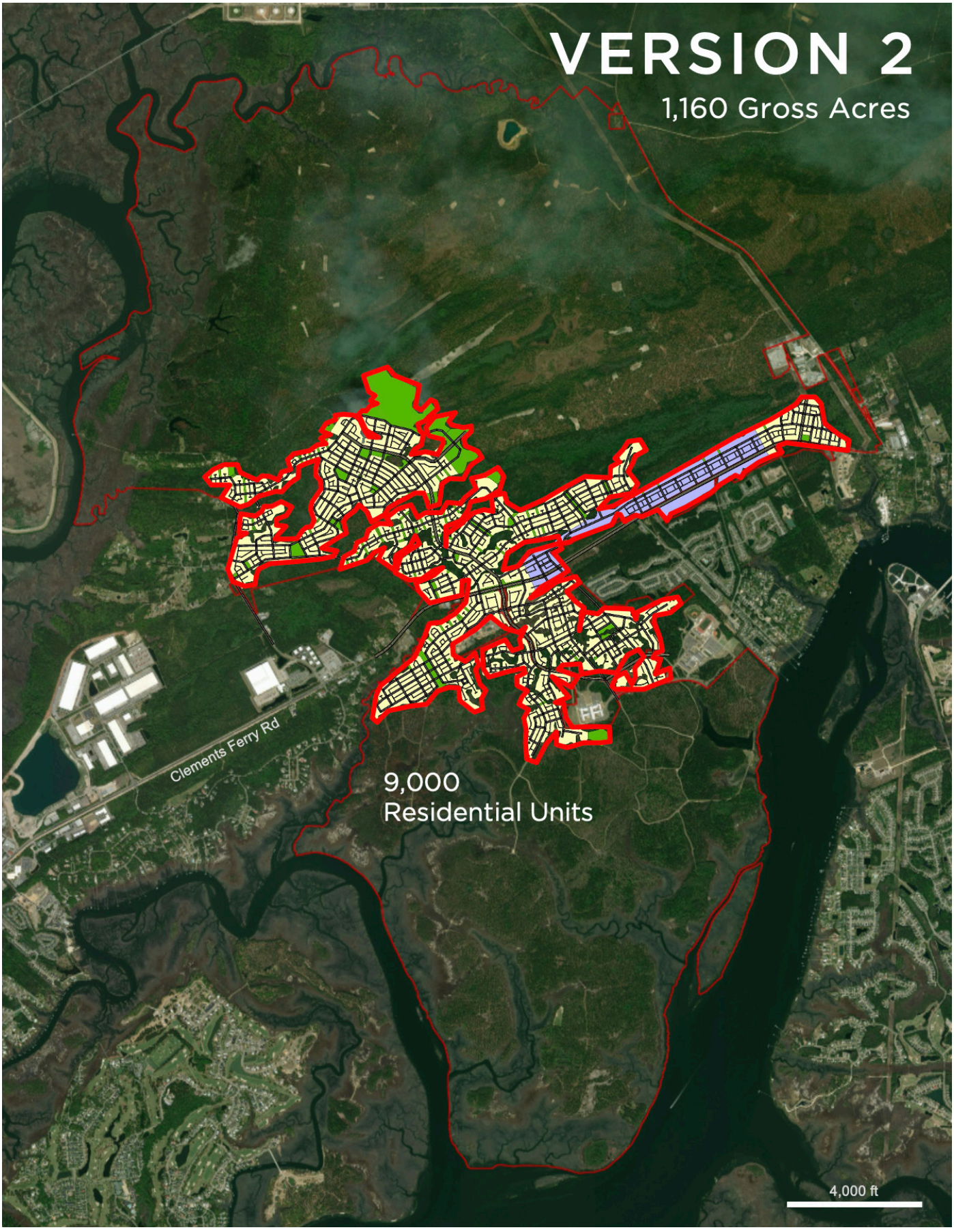


Fig. 26 *Version 2 Site Plan with Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

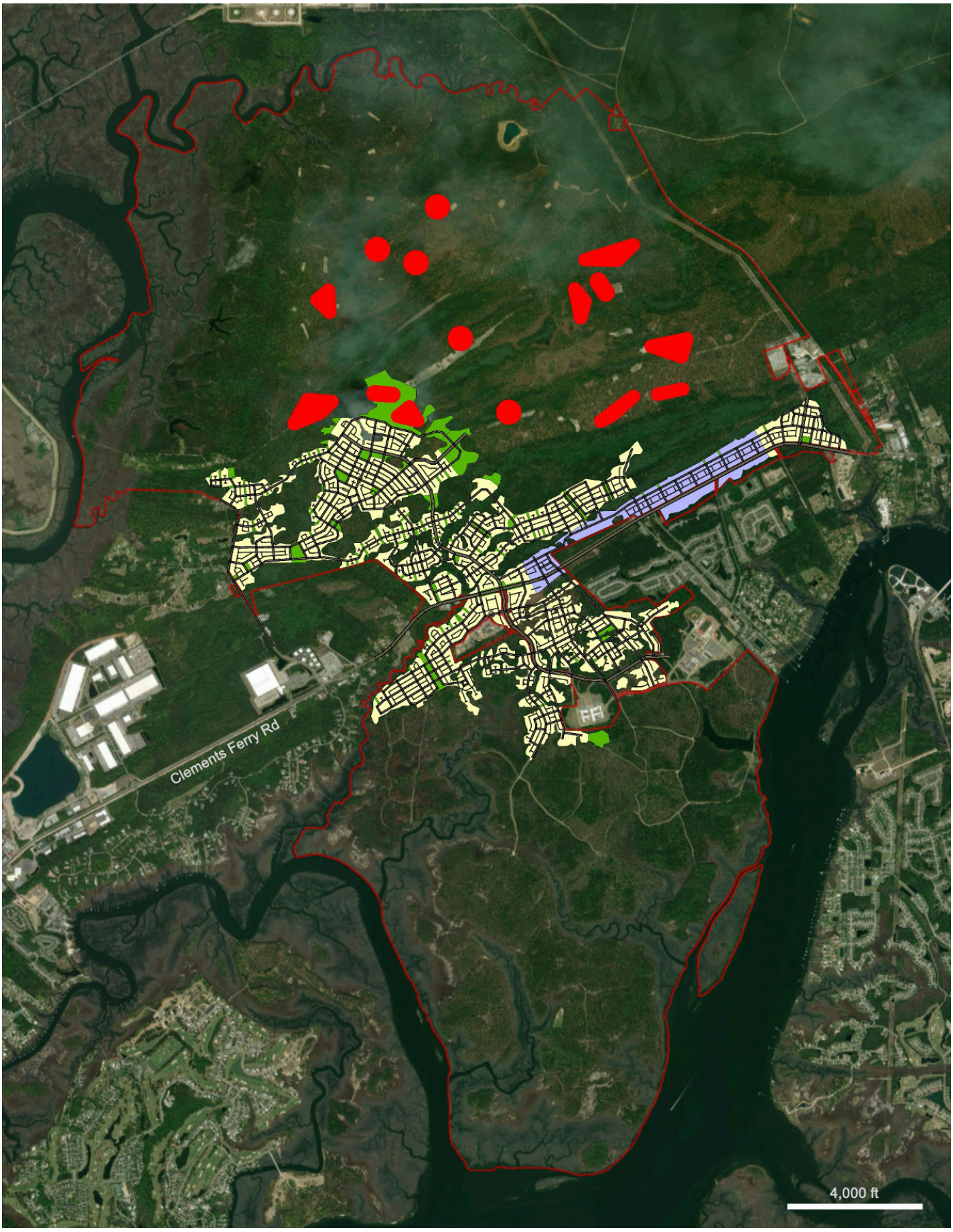


Fig. 28 *Version 2 Site Plan Identifying RCW Locations with Buffers Indicated in Red, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

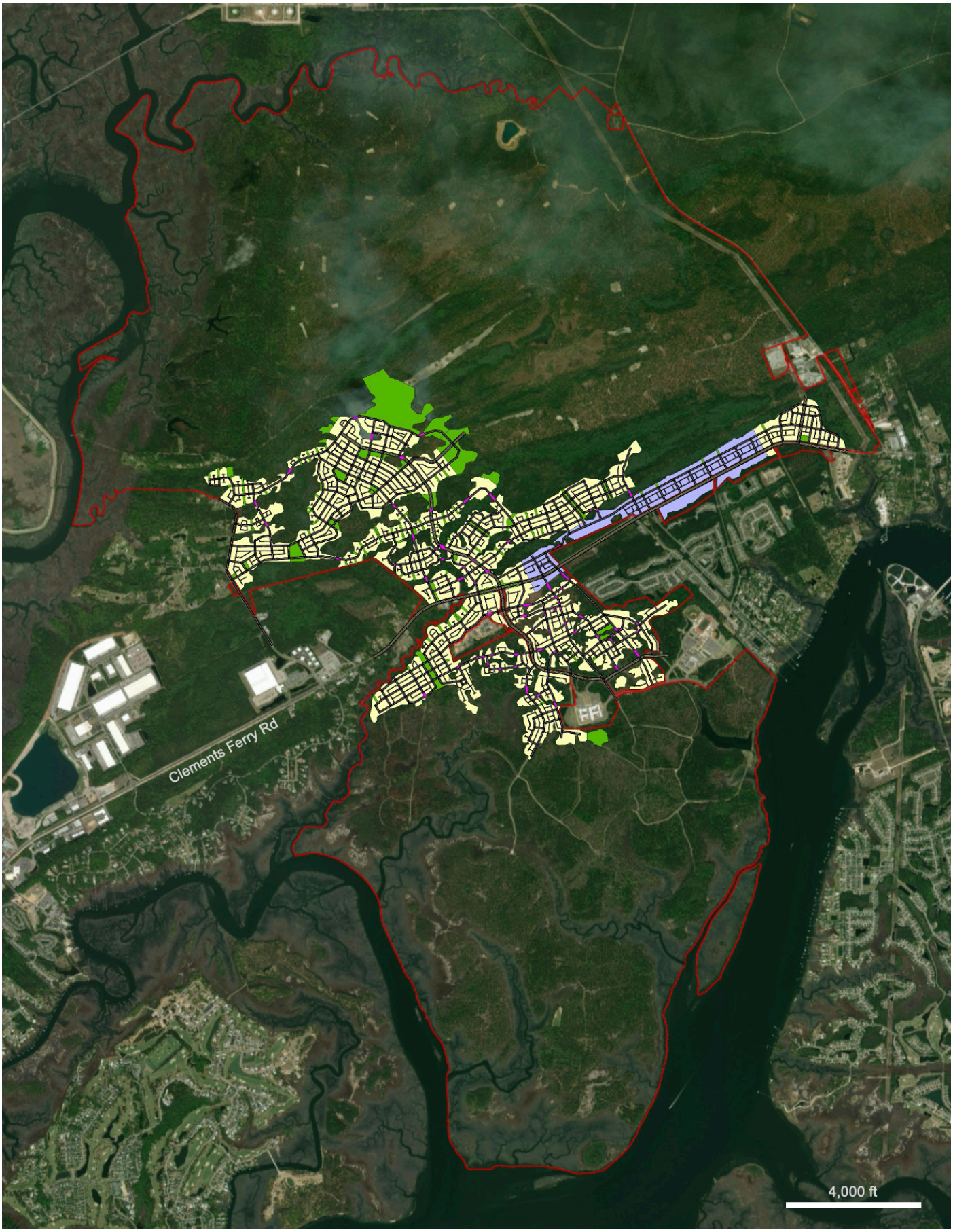


Fig. 29 *Version 2 Site Plan Identifying Wetland Impacts Indicated in Pink, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

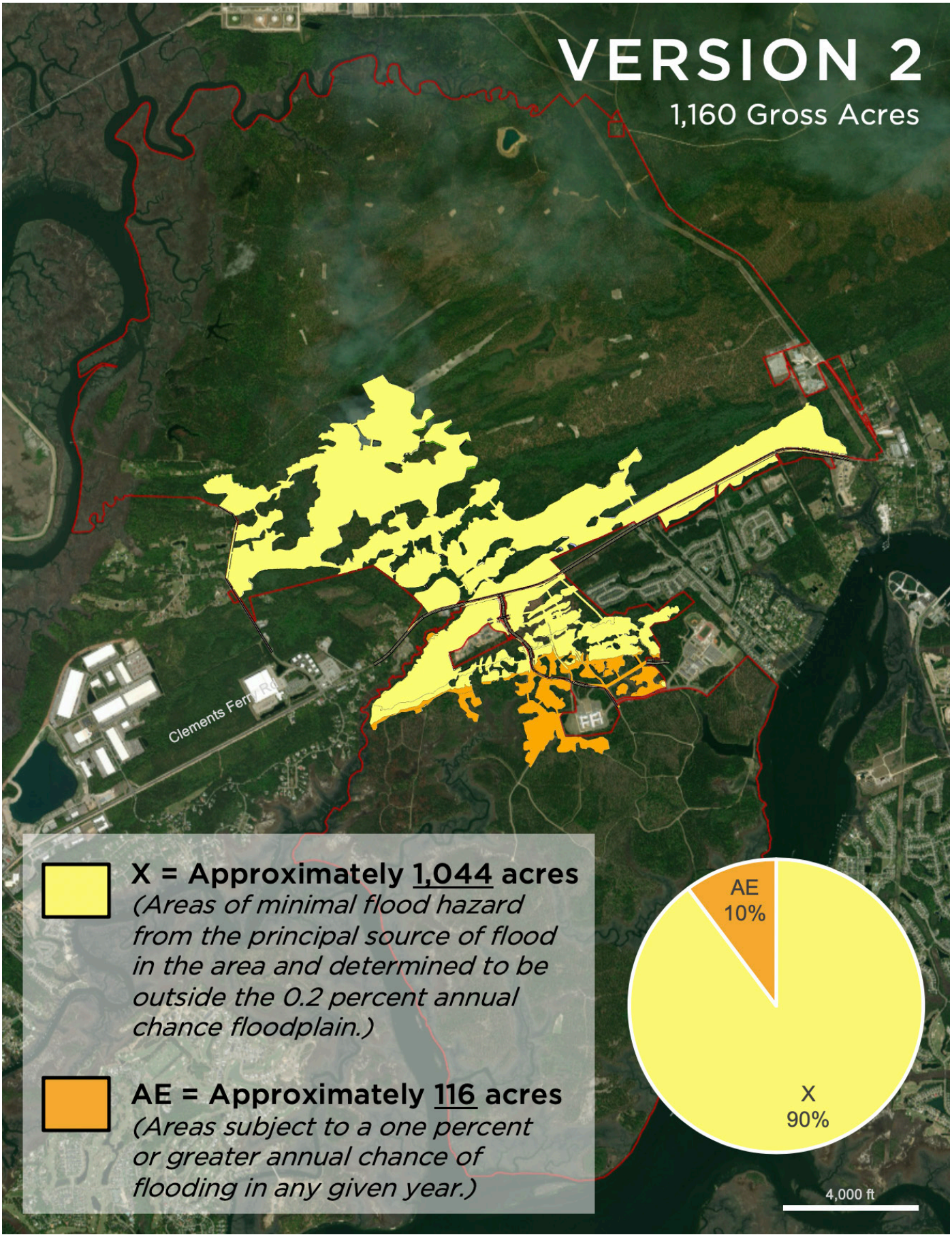
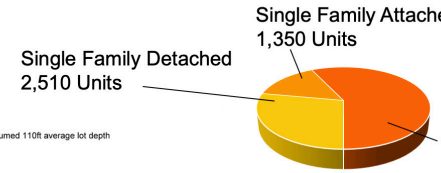


Fig. 30 *Version 2 Site Plan with Flood Zones Highlighted*

VERSION 2: MEDIUM DISTRIBUTION ACROSS T-ZONES



Cainhoy - Draft Quantity Calculations

Produced by Dover, Kohl & Partners 11/11/2019

Building / Lot Types:	Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use
typ # of res units/type	0	3	1	1	1	1	2	1	8	12	1	6	12
typ ft lot frontage/type	50	120	125	70	50	40	50	25	70	90	25	50	80
typ lot area *	5,500	13,200	13,750	7,700	5,500	4,400	5,500	2,750	7,700	9,900	2,750	5,500	8,800
typ residential sq ft/type	0	6,000	4,000	3,000	2,000	1,500	4,000	2,000	7,000	10,000	2,000	5,000	10,000
typ non-res sq ft/type	0	0	0	0	0	0	0	0	0	0	1,000	2,500	5,000

* Assumed 110ft average lot depth

Version 2: Medium Distribution Across T-Zones

		Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use
T5	number of lots	20					220	100	375	80	85	60	60	60
	number of units	0					220	200	375	640	1020	60	360	720
	lot frontage ft	1000					8800	5000	9375	5600	7650	1500	3000	4800
	lot sq ft	110,000					968,000	550,000	1,031,250	616,000	841,500	165,000	330,000	528,000
	residential bldg sq ft	-					330,000	400,000	750,000	560,000	850,000	120,000	300,000	600,000
	non-res bldg sq ft	-					-	-	-	-	-	60,000	150,000	300,000
	% of units in T5	0.00%					6.12%	5.56%	10.43%	17.80%	28.37%	1.67%	10.01%	20.03%
T4	number of lots	20				120	300	100	375	120	80	60	60	
	number of units	0				120	300	200	375	960	960	60	360	
	lot frontage ft	1000				6000	12000	5000	9375	8400	7200	1500	3000	
	lot sq ft	110,000				660,000	1,320,000	550,000	1,031,250	924,000	792,000	165,000	330,000	
	residential bldg sq ft	-				240,000	450,000	400,000	750,000	840,000	800,000	120,000	300,000	
	non-res bldg sq ft	-				-	-	-	-	-	-	60,000	150,000	
	% of units in T4	0.00%				3.60%	9.00%	6.00%	11.24%	28.79%	28.79%	1.80%	10.79%	
T3-O	number of lots	20	175	50	180	175	300	100						
	number of units	0	525	50	180	175	300	200						
	lot frontage ft	1000	21000	6250	12600	8750	12000	5000						
	lot sq ft	110,000	2,310,000	687,500	1,386,000	962,500	1,320,000	550,000						
	residential bldg sq ft	-	1,050,000	200,000	540,000	350,000	450,000	400,000						
	non-res bldg sq ft	-	-	-	-	-	-	-						
	% of units in T3-O	0.00%	36.71%	3.50%	12.59%	12.24%	20.98%	13.99%						
T3-R	number of lots	20	75	90	140	185								
	number of units	0	225	90	140	185								
	lot frontage ft	1000	9000	11250	9800	9250								
	lot sq ft	110,000	990,000	1,237,500	1,078,000	1,017,500								
	residential bldg sq ft	-	450,000	360,000	420,000	370,000								
	non-res bldg sq ft	-	-	-	-	-								
	% of units in T3-R	0.00%	35.16%	14.06%	21.88%	28.91%								
Total Bldg / Lot Type Counts:	# of lots	80	250	140	320	480	820	300	750	200	165	120	120	60
	# of res units	0	750	140	320	480	820	600	750	1600	1980	120	720	720
	lot frontage ft	4000	30000	17500	22400	24000	32800	15000	18750	14000	14850	3000	6000	4800
	lot sq ft	440,000	3,300,000	1,925,000	2,464,000	2,640,000	3,608,000	1,650,000	2,062,500	1,540,000	1,633,500	330,000	660,000	528,000
	residential bldg sq ft	-	1,500,000	560,000	960,000	960,000	1,230,000	1,200,000	1,500,000	1,400,000	1,650,000	240,000	600,000	600,000
	non-res bldg sq ft	-	-	-	-	-	-	-	-	-	-	120,000	300,000	300,000
	% of total res unit mix	0.00%	8.33%	1.56%	3.56%	5.33%	9.11%	6.67%	8.33%	17.78%	22.00%	1.33%	8.00%	8.00%
			Single Family portion of residential unit mix				27.9%	Multi Family portion of residential unit mix						72.1%

Total T Zone Counts:	Net Counts: (lots only)	Gross Counts: (lots + thoroughfares + public open space)
1,060 lots	118 acres of T5 lots	71 acres of T5 thoroughfares **
3,595 units		47 acres of T3-O civic / open / stormwater **
46,725 ft of frontage		**236 total gross acres of T5**
5,139,750 sq ft (110ft depth avg)	8.98 lots/net acre avg	4.49 lots/gross acre avg
3,910,000 sq ft of residential	30.47 units/net acre avg	15.23 units/gross acre avg
510,000 sq ft non-res		
1,235 lots	135 acres of T4 lots	81 acres of T4 thoroughfares **
3,335 units		54 acres of T3-O civic / open / stormwater **
53,475 ft of frontage		**270 total gross acres of T4**
5,882,250 sq ft (110ft depth avg)	9.15 lots/net acre avg	4.57 lots/gross acre avg
3,900,000 sq ft of residential	24.70 units/net acre avg	12.35 units/gross acre avg
210,000 sq ft non-res		
1,000 lots	168 acres of T3-O lots	101 acres of T3-O thoroughfares **
1,430 units		67 acres of T3-O civic / open / stormwater **
66,600 ft of frontage		**336 total gross acres of T3-O**
7,326,000 sq ft (110ft depth avg)	5.95 lots/net acre avg	2.97 lots/gross acre avg
2,990,000 sq ft of residential	8.50 units/net acre avg	4.25 units/gross acre avg
0 sq ft non-res		
510 lots	102 acres of T3-R lots	61 acres of T3-R thoroughfares **
640 units		41 acres of T3-O civic / open / stormwater **
40,300 ft of frontage		**204 total gross acres of T3-R**
4,433,000 sq ft (110ft depth avg)	5.01 lots/net acre avg	2.51 lots/gross acre avg
1,600,000 sq ft of residential	6.29 units/net acre avg	3.14 units/gross acre avg
0 sq ft non-res		
Total Site Counts:		
3,805 lots	523 total acres of lots	314 total acres of thoroughfares **
9,000 units		209 total acres of civic / open / stormwater **
207,100 ft of frontage		**1,046 total gross acres**
22,781,000 sq ft	7.28 lots/net acre avg	3.64 lots/gross acre avg
12,400,000 sq ft res	17.21 units/net acre avg	8.60 units/gross acre avg
720,000 sq ft non-res		**6.5 neighborhoods *****

* Neighborhood composition assumptions:
50% of land area devoted to Lots
30% of land area devoted to Thoroughfar
20% of land area devoted to Civic / Stormwater / Open Space

** Neighborhood avg size assumption: 160 acres (1/2 mile x 1/2 mile)

Version 2 Mix

3,805 Lots
9,000 Units
1,046 Gross Acres (= 6.5 Standard 160-acre Neighborhoods)

T5: 236 Gross Acres
T4: 270 Gross Acres
T3 (O&R): 540 Gross Acres
(+Workplace District: 114 Gross Acres)

Fig. 27 *Version 2: Medium T-Zone Emphasis with Development Use Chart*

SITE PLAN ALTERNATIVE
VERSION 3

At 849 gross acres, Version 3 constrains the area to be developed the most of the first three test scenarios at 849 gross acres. This dense site plan design features the highest relative intensity of development character and the highest proportion of multi-family residences relative to single-family detached and attached types. However, Version 3 still contains a significant proportion of single-family homes (Fig. 31).

This version includes 1,050 single family detached units, 1,650 single family attached units, and 6,300 multi-family attached units across 3,335 residential lots (Fig. 32).

The residential component of this version utilizes 368 total acres of land, while 221 acres are utilized for thoroughfares, and 147 acres of land are dedicated to civic space, open space, and stormwater management areas.

When development scenario Version 3 is compared to the Charleston and Savannah examples at the same scale referenced in Figure 20, the 9,000 units of Version 3 occupy somewhat less land than the 9,000 units in Charleston and quite a bit less than 9,000 units in Savannah.

A substantial portion of Version 3 would therefore feature development similar to the most intensely developed areas in the Charleston and Savannah historic districts.

The documented RCW locations on the Cainhoy property were then overlaid onto the site plan alternative to analyze potential impacts (Fig. 33). Like Version 2, Version 3 reduces the northeastern areas that were included for development in Version 1, and therefore further avoids RCW adjacency in those locations. The western portion of Version 3 approaches RCW cavity trees most closely while still maintaining development a minimum of approximately 100 feet from the edge of RCW buffer zones.

The design of Version 3 was also configured to avoid and minimize the impacts to wetlands on the property (Fig. 34) more than achieved in Versions 1 and 2. Version 3 involves approximately 5.2 acres of freshwater wetland impacts, restricted entirely to road crossings. None of the wetlands are impacted by building lots or stormwater systems. Further, 840 acres, or 99% of the gross area for Version 3, are within the FEMA designated X Flood Zone, which is outside of the 500-year and 100-year floodplains and has a relatively minimal flood risk. Only 9 acres, or 1% of the gross area for Version 3, are within the FEMA designated AE Flood Zone (Fig. 35).

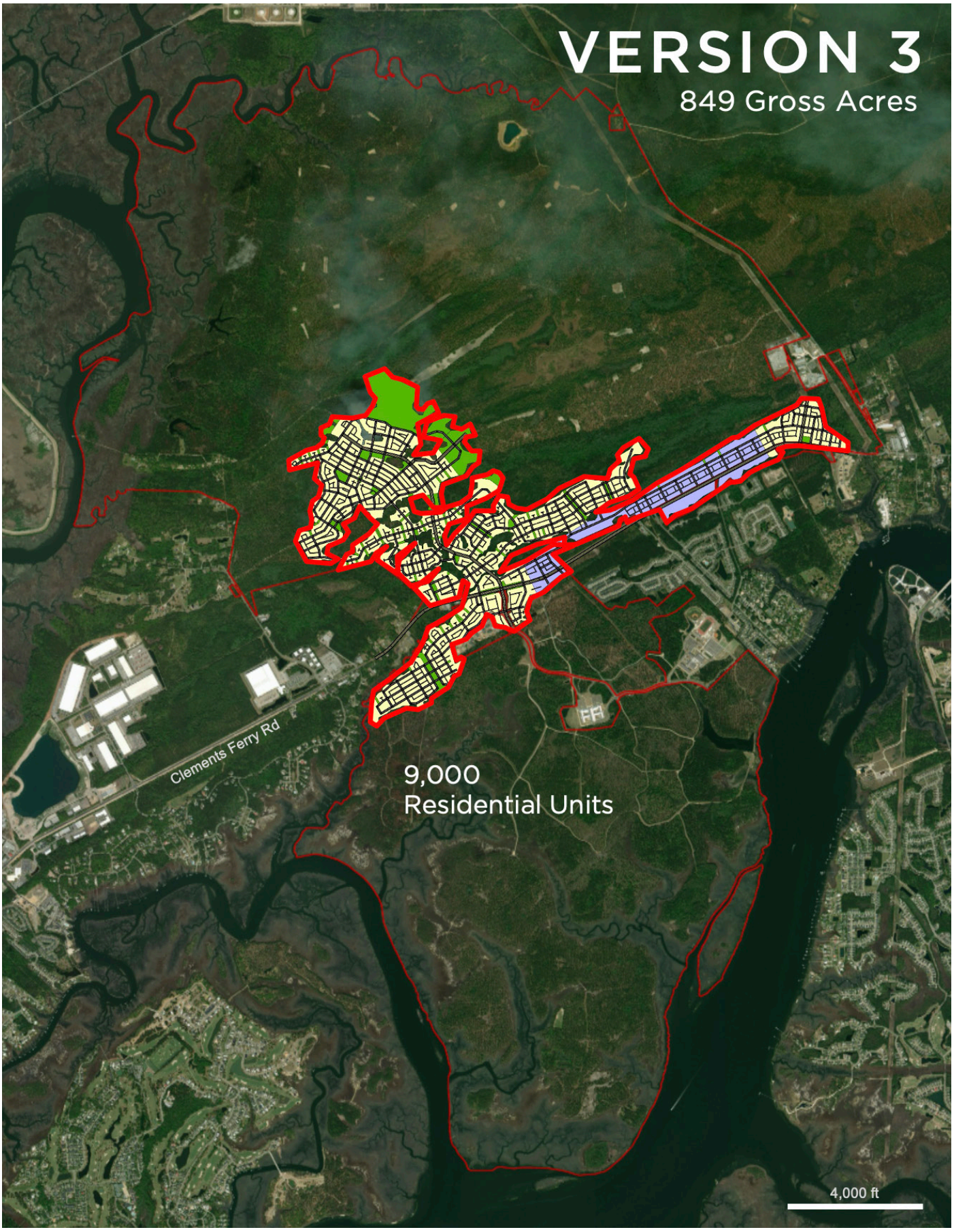


Fig. 31 *Version 3 Site Plan with Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

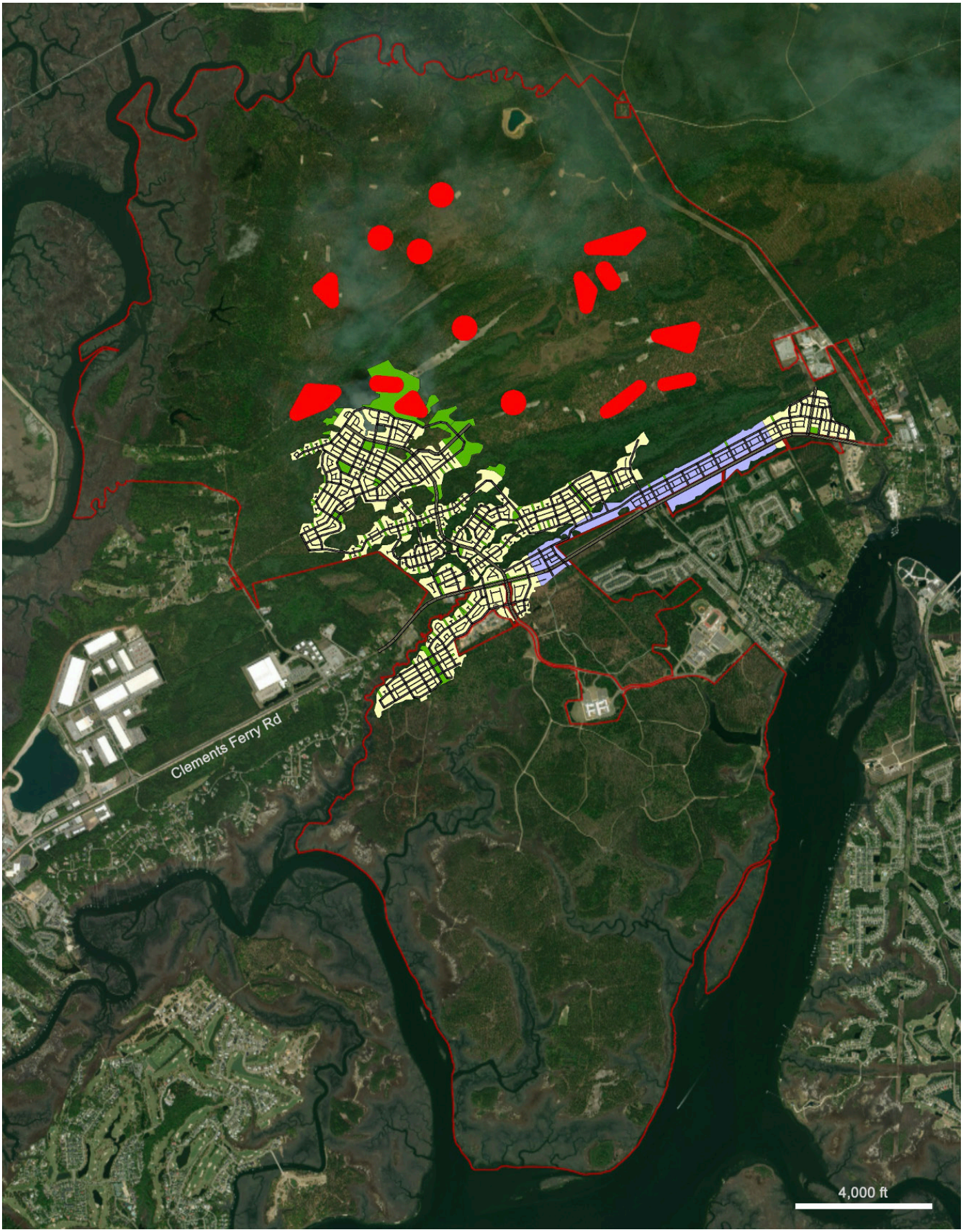


Fig. 33 *Version 3 Site Plan Identifying RCW Locations with Buffers Indicated in Red, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

Fig. 34 *Version 3 Site Plan Identifying Wetland Impacts Indicated in Pink, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

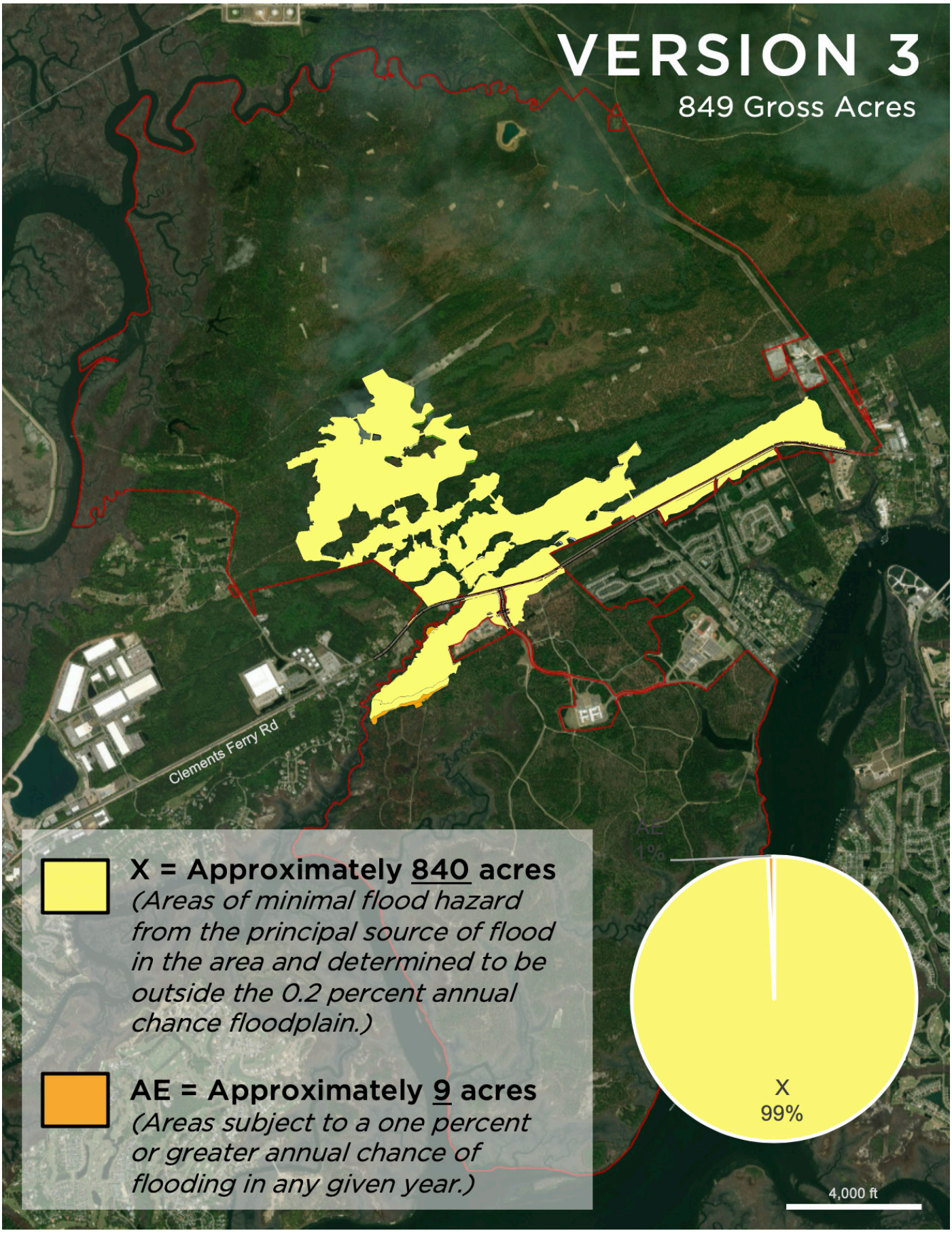


Fig. 35 *Version 3 Site Plan with Flood Zones Highlighted*

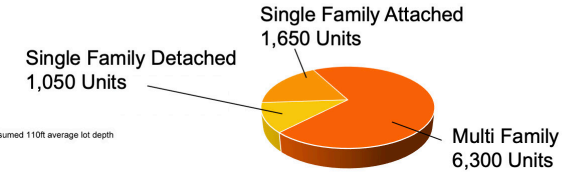
VERSION 3: HIGHER T-ZONE EMPHASIS

Cainhoy - Draft Quantity Calculations

Produced by Dover, Kohl & Partners 18/02/2020

Building / Lot Types:	Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use
typ # of res units/type:	0	3	1	1	1	1	2	1	6	12	1	6	12
typ ft lot frontage/type:	50	120	125	70	50	40	50	25	70	90	25	50	80
typ lot area *:	5,500	13,200	13,750	7,700	5,500	4,400	5,500	2,750	7,700	9,900	2,750	5,500	8,800
typ residential sq ft/type:	0	6,000	4,000	3,000	2,000	1,500	4,000	2,000	7,000	10,000	2,000	5,000	10,000
typ non-res sq ft/type:	0	0	0	0	0	0	0	0	0	0	1,000	2,500	5,000

* Assumed 110ft average lot depth



Version 3: High T-Zone Emphasis

		Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use	Total T Zone Counts:	Net Counts: (lots only)	Gross Counts: (lots + thoroughfares + public open space)
T5	number of lots	20					300	100	550	100	100	100	100	75	**1,445 lots**	155 acres of T5 lots	93 acres of T5 thoroughfares **
	number of units	0					300	200	550	800	1200	100	600	900	**4,650 units**		62 acres of T5 civic / open / stormwater **
	lot frontage ft	1000					12000	5000	13750	7000	9000	2500	5000	6000	61,250 ft of frontage		**309 total gross acres of T5**
	lot sq ft	110,000					1,320,000	550,000	1,512,500	770,000	990,000	275,000	550,000	660,000	6,737,500 sq ft (110ft depth avg)	9.34 lots/net acre avg	4.67 lots/gross acre avg
	residential bldg sq ft	-					450,000	400,000	1,100,000	700,000	1,000,000	200,000	500,000	750,000	5,100,000 sq ft of residential	30.06 units/net acre avg	15.03 units/gross acre avg
	non-res bldg sq ft	-					-	-	-	-	-	100,000	250,000	375,000	725,000 sq ft non-res		
	% of units in T5	0.00%					6.45%	4.30%	11.83%	17.20%	25.81%	2.15%	12.90%	19.35%			
T4	number of lots	20				40	300	100	500	100	100	100	100		**1,360 lots**	141 acres of T4 lots	85 acres of T4 thoroughfares **
	number of units	0				40	300	200	500	800	1200	100	600		**3,740 units**		57 acres of T4 civic / open / stormwater **
	lot frontage ft	1000				2000	12000	5000	12500	7000	9000	2500	5000		56,000 ft of frontage		**283 total gross acres of T4**
	lot sq ft	110,000				220,000	1,320,000	550,000	1,375,000	770,000	990,000	275,000	550,000		6,160,000 sq ft (110ft depth avg)	9.62 lots/net acre avg	4.81 lots/gross acre avg
	residential bldg sq ft	-				80,000	450,000	400,000	1,000,000	700,000	1,000,000	200,000	500,000		4,330,000 sq ft of residential	26.45 units/net acre avg	13.22 units/gross acre avg
	non-res bldg sq ft	-				-	-	-	-	-	-	100,000	250,000		350,000 sq ft non-res		
	% of units in T4	0.00%				1.07%	8.02%	5.35%	13.37%	21.39%	32.09%	2.67%	16.04%				
T3-O	number of lots	20	5	10	40	40	200	100							**415 lots**	52 acres of T3-O lots	31 acres of T3-O thoroughfares **
	number of units	0	15	10	40	40	200	200							**505 units**		21 acres of T3-O civic / open / stormwater **
	lot frontage ft	1000	600	1250	2800	2000	8000	5000							20,650 ft of frontage		**104 total gross acres of T3-O**
	lot sq ft	110,000	66,000	137,500	308,000	220,000	880,000	550,000							2,271,500 sq ft (110ft depth avg)	7.96 lots/net acre avg	3.98 lots/gross acre avg
	residential bldg sq ft	-	30,000	40,000	120,000	80,000	300,000	400,000							970,000 sq ft of residential	9.68 units/net acre avg	4.84 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-							0 sq ft non-res		
	% of units in T3-O	0.00%	2.97%	1.98%	7.92%	7.92%	39.60%	39.60%									
T3-R	number of lots	20	5	10	40	40									**115 lots**	19 acres of T3-R lots	12 acres of T3-R thoroughfares **
	number of units	0	15	10	40	40									**105 units**		8 acres of T3-R civic / open / stormwater **
	lot frontage ft	1000	600	1250	2800	2000									7,650 ft of frontage		**39 total gross acres of T3-R**
	lot sq ft	110,000	66,000	137,500	308,000	220,000									841,500 sq ft (110ft depth avg)	5.95 lots/net acre avg	2.98 lots/gross acre avg
	residential bldg sq ft	-	30,000	40,000	120,000	80,000									270,000 sq ft of residential	5.44 units/net acre avg	2.72 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-									0 sq ft non-res		
	% of units in T3-R	0.00%	14.29%	9.52%	38.10%	38.10%											
															Total Site Counts:		
Total Bldg / Lot Type Counts:	**# of lots**	**80**	**10**	**20**	**80**	**120**	**800**	**300**	**1050**	**200**	**200**	**200**	**200**	**75**	**3,335 lots**	368 total acres of lots	221 total acres of thoroughfares **
	# of res units	**0**	**30**	**20**	**80**	**120**	**800**	**600**	**1050**	**1600**	**2400**	**200**	**1200**	**900**	**9,000 units**		147 total acres of civic / open / stormwater **
	lot frontage ft	4000	1200	2500	5600	6000	32000	15000	26250	14000	18000	5000	10000	6000	145,550 ft of frontage		**735 total gross acres**
	lot sq ft	440,000	132,000	275,000	616,000	660,000	3,520,000	1,650,000	2,887,500	1,540,000	1,980,000	550,000	1,100,000	660,000	16,010,500 sq ft	9.07 lots/net acre avg	4.54 lots/gross acre avg
	residential bldg sq ft	-	60,000	80,000	240,000	240,000	1,200,000	1,200,000	2,100,000	1,400,000	2,000,000	400,000	1,000,000	750,000	10,670,000 sq ft res	24.49 units/net acre avg	12.24 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-	-	-	-	200,000	500,000	375,000	1,075,000 sq ft non-res		**4.6 neighborhoods ***
	% of total res unit mix	0.00%	0.33%	0.22%	0.89%	1.33%	8.89%	6.67%	11.67%	17.78%	26.67%	2.22%	13.33%	10.00%			
			Single Family portion of residential unit mix				11.7%				Multi Family portion of residential unit mix			88.3%			

* Neighborhood composition assumptions:
50% of land area devoted to Lots
30% of land area devoted to Thoroughfar
20% of land area devoted to Civic / Stormwater / Open Space

* Neighborhood avg size assumption: 160 acres (1/2 mile x 1/2 mile)

Version 3 Mix

3,335 Lots
9,000 Units
735 Gross Acres (= 4.6 Standard 160-acre Neighborhoods)

T5: 309 Gross Acres
T4: 283 Gross Acres
T3 (O&R): 143 Gross Acres
(+Workplace District: 114 Gross Acres)

Fig. 32 *Version 3: Medium T-Zone Emphasis with Development Use Chart*

SITE PLAN ALTERNATIVE
VERSION *4*

A fourth site plan alternative was designed that maintains the same proportional mix of residential units found in the previous third alternative, while reducing the total residential unit count to facilitate constraining and modifying the development footprint to avoid all wetland impacts (Fig. 36).

In order to demonstrate a scenario where all wetland impacts are eliminated, the plan area of Version 3 was modified and constrained while maintaining the relative intensity and proportional mix of units. As the developed area was constrained to 599 gross acres, the total unit count was proportionally reduced to 6,000 units. This 6,000-unit plan is only illustrative of what could be achieved on the Cainhoy site with zero wetland impacts; the number of residential units is malleable and could be increased by increasing the density of housing units and/or expanding the development footprint to other upland areas, while still impacting no wetlands.

This version includes 675 single family detached units, 1,132 single family attached units, and 4,193 multi-family attached units across 2,225 residential lots (Fig. 37).

The residential component of this version utilizes 242 total acres of land, while 145 acres are utilized for thoroughfares, and 97 acres of land are dedicated to civic space, open space, and stormwater management areas.

When development scenario Version 4 is placed alongside the Charleston and Savannah examples at the same scale, the 6,000 units of Version 4 occupy substantially less land than the 9,000 units in the Charleston and Savannah comparisons utilized in the previous three versions.

The documented RCW locations on the Cainhoy property were then overlaid onto the site plan alternative to analyze potential impacts (Fig. 38). Version 4 moves the development footprint southward, further away from mapped RCW cavity tree locations. The closest adjacency of development in Version 4 to RCW buffer zones is approximately 1,000 feet.

As mentioned, the design of Version 4 was configured to avoid all wetlands on the property. Further, 497 acres, or 83% of the gross area for Version 4, are within the FEMA designated X Flood Zone, which is outside of the 500-year and 100-year floodplains and has a relatively minimal flood risk. Approximately 102 acres, or 17% of the gross area for Version 4, are within the FEMA designated AE Flood Zone (Fig. 39).

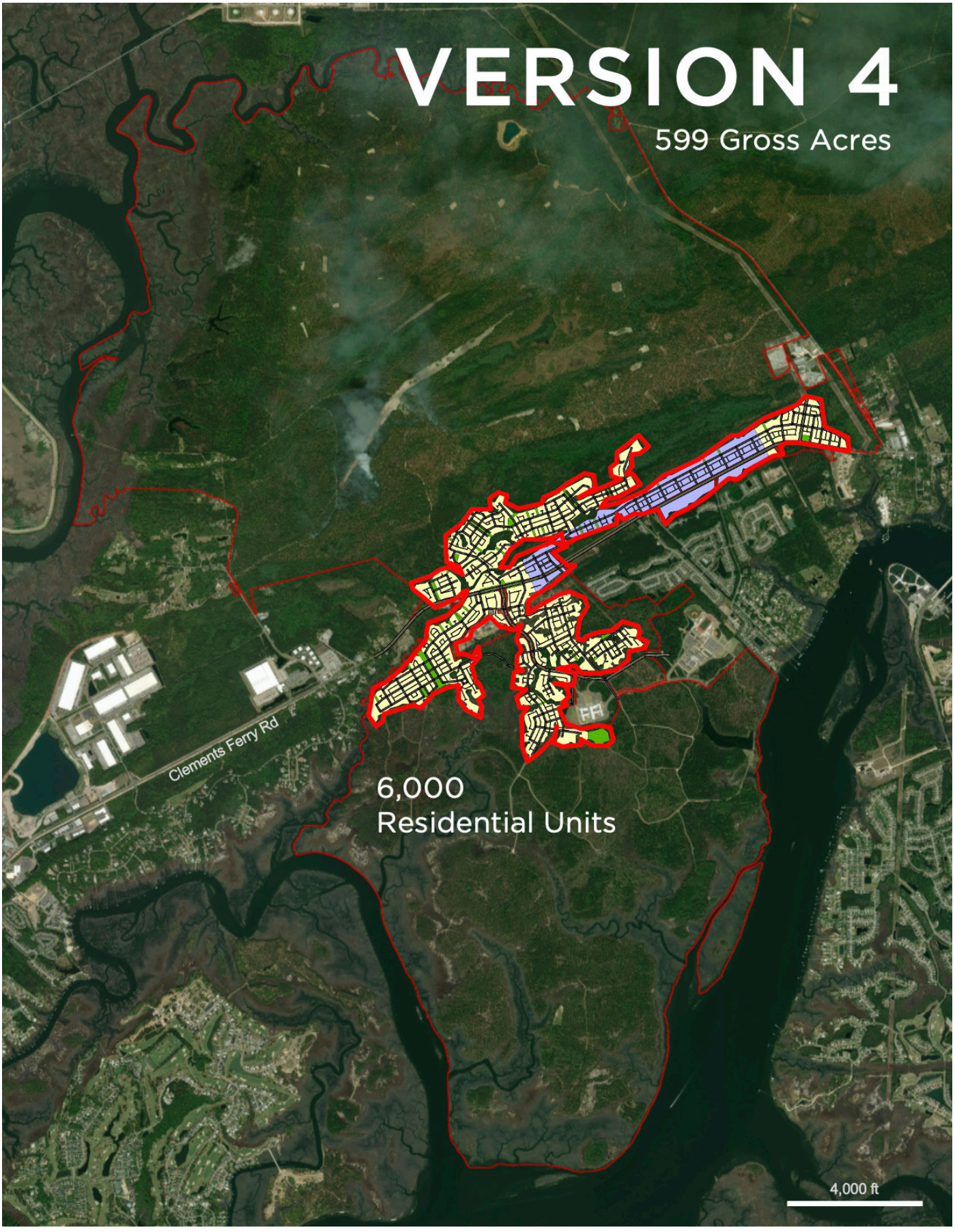


Fig. 36 *Version 3 Site Plan with Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

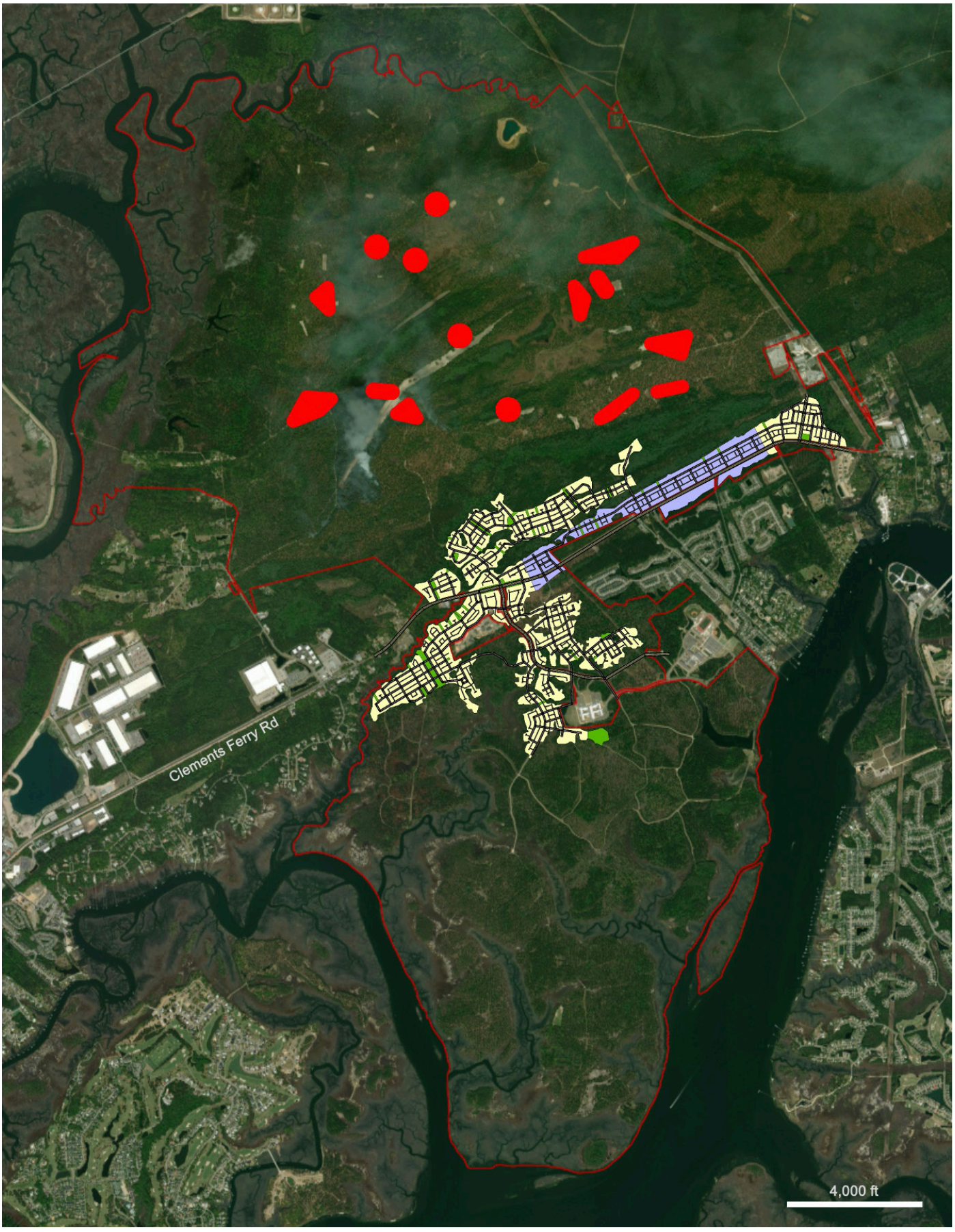


Fig. 38 *Version 3 Site Plan Identifying RCW Locations with Buffers Indicated in Red, Residential Areas Indicated in Tan, Commercial District Indicated in Purple, and Parks Indicated in Green*

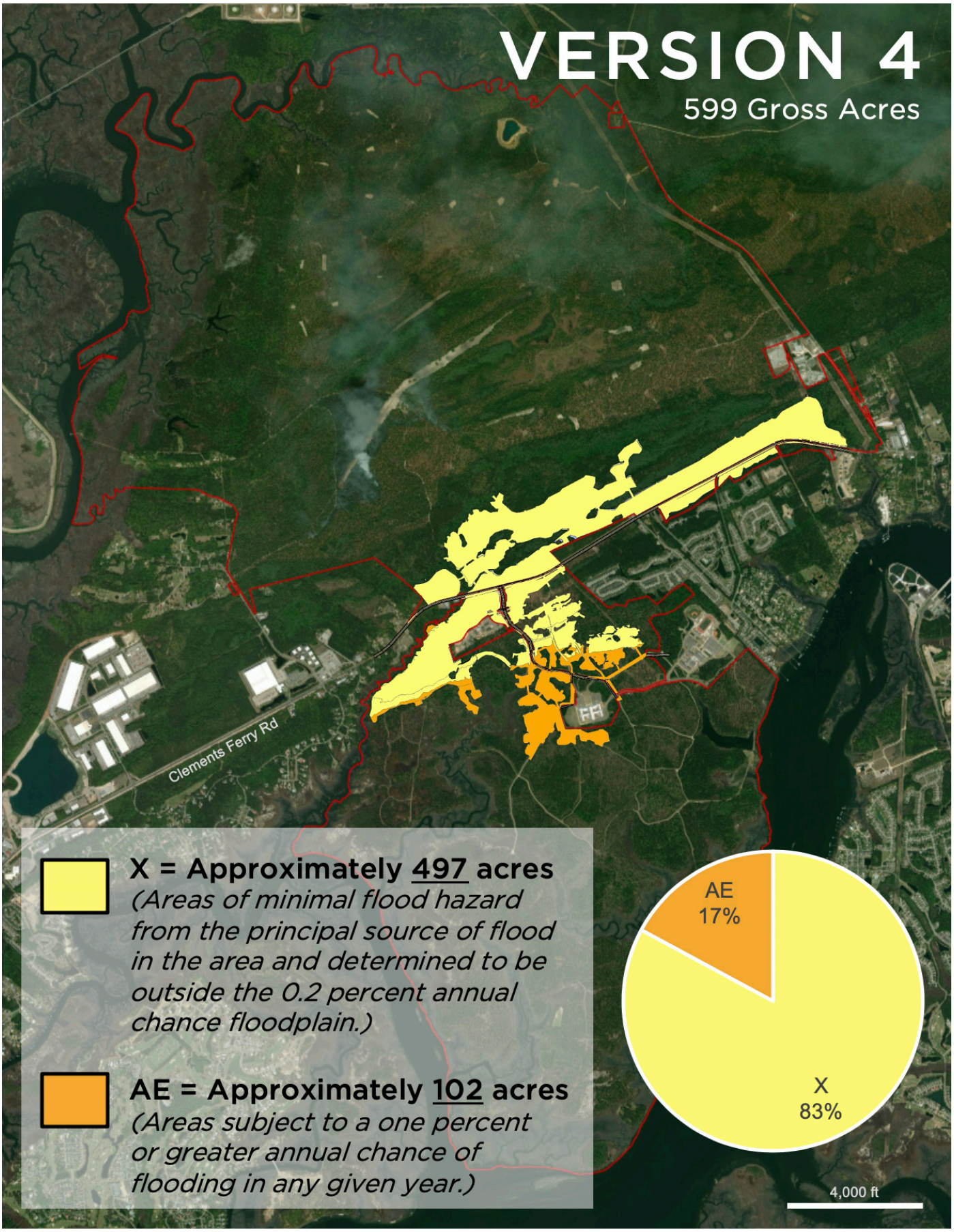
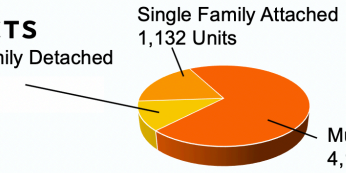


Fig. 39 *Version 4 Site Plan with Flood Zones Highlighted*

VERSION 4: HIGHER T-ZONE EMPHASIS

FOOTPRINT AND UNIT COUNT REDUCED TO ELIMINATE WETLAND IMPACTS



Cainhoy - Draft Quantity Calculations

Produced by Dover, Kohl & Partners 18/02/2020

Building / Lot Types:	Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use
typ # of res units/type:	0	3	1	1	1	1	2	1	8	12	1	6	12
typ ft lot frontage/type:	50	120	125	70	50	40	50	25	70	90	25	50	80
typ lot area *:	5,500	13,200	13,750	7,700	5,500	4,400	5,500	2,750	7,700	9,900	2,750	5,500	8,800
typ residential sq ft/type:	0	6,000	4,000	3,000	2,000	1,500	4,000	2,000	7,000	10,000	2,000	5,000	10,000
typ non-res sq ft/type:	0	0	0	0	0	0	0	0	0	0	1,000	2,500	5,000

* Assumed 110ft average lot depth

Version 4: High T-Zone Emphasis - Footprint and Unit Count Reduced to Eliminate Wetland Impact

		Civic Building	House Compound	Estate House	Large Lot House	House	Small Lot House	Duplex	Rowhouse	Mansion Apartment	Apartment House	Small Mixed-Use	Mixed-Use	Large Mixed-Use	Total T Zone Counts:	Net Counts: (lots only)	Gross Counts: (lots + thoroughfares + public open space)
	number of lots	12					200	66	368	66	67	66	67	50	**962 lots**	103 acres of T5 lots	62 acres of T5 thoroughfares **
	number of units	0					200	132	368	528	804	66	402	600	**3,100 units**		41 acres of T5 civic / open / stormwater **
	lot frontage ft	600					8000	3300	9200	4620	6030	1650	3350	4000	40,750 ft of frontage		**206 total gross acres of T5**
T5	lot sq ft	66,000					880,000	363,000	1,012,000	508,200	663,300	181,500	368,500	440,000	4,482,500 sq ft (110ft depth avg)	9.35 lots/net acre avg	4.67 lots/gross acre avg
	residential bldg sq ft	-					300,000	264,000	736,000	462,000	670,000	132,000	335,000	500,000	3,399,000 sq ft of residential	30.13 units/net acre avg	15.06 units/gross acre avg
	non-res bldg sq ft	-					-	-	-	-	-	66,000	167,500	250,000	483,500 sq ft non-res		
	% of units in T5	0.00%					6.45%	4.26%	11.87%	17.03%	25.94%	2.13%	12.97%	19.35%			
	number of lots	12				25	200	66	368	66	67	65	66		**935 lots**	96 acres of T4 lots	57 acres of T4 thoroughfares **
	number of units	0				25	200	132	368	528	804	65	396		**2,518 units**		38 acres of T4 civic / open / stormwater **
	lot frontage ft	600				1250	8000	3300	9200	4620	6030	1625	3300		37,925 ft of frontage		**192 total gross acres of T4**
T4	lot sq ft	66,000				137,500	880,000	363,000	1,012,000	508,200	663,300	178,750	363,000		4,171,750 sq ft (110ft depth avg)	9.76 lots/net acre avg	4.88 lots/gross acre avg
	residential bldg sq ft	-				50,000	300,000	264,000	736,000	462,000	670,000	130,000	330,000		2,942,000 sq ft of residential	26.29 units/net acre avg	13.15 units/gross acre avg
	non-res bldg sq ft	-				-	-	-	-	-	-	65,000	165,000		230,000 sq ft non-res		
	% of units in T4	0.00%				0.99%	7.94%	5.24%	14.61%	20.97%	31.93%	2.58%	15.73%				
	number of lots	12	3	6	20	25	130	66							**262 lots**	32 acres of T3-O lots	19 acres of T3-O thoroughfares **
	number of units	0	9	6	20	25	130	132							**322 units**		13 acres of T3-O civic / open / stormwater **
	lot frontage ft	600	360	750	1400	1250	5200	3300							12,860 ft of frontage		**65 total gross acres of T3-O**
T3-O	lot sq ft	66,000	39,600	82,500	154,000	137,500	572,000	363,000							1,414,600 sq ft (110ft depth avg)	8.07 lots/net acre avg	4.03 lots/gross acre avg
	residential bldg sq ft	-	18,000	24,000	60,000	50,000	195,000	264,000							611,000 sq ft of residential	9.92 units/net acre avg	4.96 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-							0 sq ft non-res		
	% of units in T3-O	0.00%	2.80%	1.86%	6.21%	7.76%	40.37%	40.99%									
	number of lots	12	3	6	20	25									**66 lots**	11 acres of T3-R lots	7 acres of T3-R thoroughfares **
	number of units	0	9	6	20	25									**60 units**		4 acres of T3-R civic / open / stormwater **
	lot frontage ft	600	360	750	1400	1250									4,360 ft of frontage		**22 total gross acres of T3-R**
T3-R	lot sq ft	66,000	39,600	82,500	154,000	137,500									479,600 sq ft (110ft depth avg)	5.99 lots/net acre avg	3.00 lots/gross acre avg
	residential bldg sq ft	-	18,000	24,000	60,000	50,000									152,000 sq ft of residential	5.45 units/net acre avg	2.72 units/gross acre avg
	non-res bldg sq ft	-	-	-	-	-									0 sq ft non-res		
	% of units in T3-R	0.00%	15.00%	10.00%	33.33%	41.67%											
	# of lots	**48**	**6**	**12**	**40**	**75**	**530**	**198**	**736**	**132**	**134**	**131**	**133**	**50**	**Total Site Counts:**		
Total	**# of res units**	**0**	**18**	**12**	**40**	**75**	**530**	**396**	**736**	**1056**	**1608**	**131**	**798**	**600**	**2,225 lots**	242 total acres of lots	145 total acres of thoroughfares **
Bldg / Lot	lot frontage ft	2400	720	1500	2800	3750	21200	9900	18400	9240	12060	3275	6650	4000	**6,000 units**		97 total acres of civic / open / stormwater **
Type	lot sq ft	264,000	79,200	165,000	308,000	412,500	2,332,000	1,089,000	2,024,000	1,016,400	1,326,600	360,250	731,500	440,000	95,895 ft of frontage		434 total gross acres
Counts:	residential bldg sq ft	-	36,000	48,000	120,000	150,000	795,000	792,000	1,472,000	924,000	1,340,000	262,000	665,000	500,000	10,548,450 sq ft	9.19 lots/net acre avg	4.59 lots/gross acre avg
	non-res bldg sq ft	-	-	-	-	-	-	-	-	-	-	131,000	332,500	250,000	7,104,000 sq ft res	24.78 units/net acre avg	12.39 units/gross acre avg
	% of total res unit mix	0.00%	0.30%	0.20%	0.67%	1.25%	8.83%	6.60%	12.27%	17.60%	26.80%	2.18%	13.30%	10.00%	713,500 sq ft non-res		**3.0 neighborhoods *****
					Single Family portion of residential unit mix		11.3%				Multi Family portion of residential unit mix			88.8%			

* Neighborhood composition assumptions:
50% of land area devoted to Lots
30% of land area devoted to Thoroughfar
20% of land area devoted to Civic / Stormwater / Open Space

* Neighborhood avg size assumption:
160 acres (1/2 mile x 1/2 mile)

Version 4 Mix

2,225 Lots
6,000 Units
485 Gross Acres (= 3 Standard 160-acre Neighborhoods)

T5: 206 Gross Acres
T4: 192 Gross Acres
T3 (O&R): 87 Gross Acres
(+Workplace District: 114 Gross Acres)

Fig. 37 *Version 4: Medium T-Zone Emphasis with Development Use Chart*

CONCLUSION

The four alternative plan versions present varied character intensity proportional with the total size of each version's development area. Version 1 features the largest overall development area and the lowest average intensity of development. Version 2 is intermediate. Version 3 features the most compact development area, and therefore, the highest average intensity of development of scenarios achieving 9,000 residential units. Version 4 demonstrates how a feasible development could be designed for this site without impacting any delineated wetlands. Although Version 4 reduces the number of residential units from 9,000 to 6,000, that number is adjustable depending on the density of housing units and the overall development footprint.

Each of the four test scenario plan versions were designed to avoid homogeneity and featured a diverse range of uses, building types and highly livable character types that continue to be preferred by many homebuyers across the nation (Appendix B).

Development scenario Versions 1, 2 and 3 all achieve 9,000 residential units, plus an associated quantity of commercial units and a 114 gross acre Workplace District, within an interconnected network of walkable streets and public spaces configured to minimize impacts on both wetlands and RCW habitat. Development scenario plan Version 4 achieved 6,000 residential units as well as the same quantity of commercial space and Workplace District, while maintaining an interconnected network of walkable streets and public spaces without impacting any RCW habitat or wetlands.

We believe each of these development versions allows for significant development of the property, while accounting for the need to avoid and minimize impacts to wetlands, the need to protect endangered species, and the risk of development in the floodplain, particularly with current sea level rise projections. Each of the first three development versions demonstrates that it is possible to build a 9,000 residential unit development on the property while greatly avoiding and minimizing impacts to wetlands, protecting RCW colonies, and considering the risk of development within the floodplain, and the fourth version demonstrates the ability to avoid all critical resources.

DOVER, KOHL & PARTNERS
town planning

Dover, Kohl & Partners was founded in 1987. Our expertise lies in balancing the visionary 'civic art' of planning with the practical consensus building needed to make projects succeed. We are trained in the principles of sustainable town planning, and have perfected techniques for documenting and understanding local traditions in building to enhance each community's sense of place.

Our plans and codes focus on smart growth, sustainability, and emphasizing that there does not have to be a trade-off between livability, economic prosperity, and environmental concerns. Victor Dover and Joseph Kohl are charter members of the Congress for the New Urbanism and have worked for many public agencies, developers, and citizen groups to create appropriate methods of land development regulations. Victor Dover served on the LEED for Neighborhood Development Core Committee, and the Congress for the New Urbanism Board; both Joseph and Victor are founding members and on the Board of the Form-Based Codes Institute. The firm has produced and facilitated over 200 charrettes during the last decade.

Victor Dover and John Massengales's new book, Street Design: The Secret to Great Cities and Towns, is on bookshelves now. Over the course of three years, Victor and John traveled across the US, Europe and Central America to compile research for the book, amassing a collection of over 15,000 photographs and measurements of hundreds of compelling examples, including historic, retrofitted, and new streets. Writing the book has helped the Dover-Kohl team reach a new understanding of the possibilities for streets in American cities in modern times. Dover-Kohl especially understands how to preserve local distinctiveness and a sense of place while also enhancing usability for all modes of travel – pedestrians, bicyclists, motorists and transit users – and creating great addresses.

Our work has also been published in *Progressive Architecture*, *Metropolitan Home*, numerous planning journals, and has been featured on National Public Radio, CNN's *Earthwatch*, and in *Business Week*. Dover-Kohl projects have been profiled in *The New Urbanism* by Peter Katz, *Rural By Design* by Randall Arendt, *Sustainable Urbanism* by Douglas Farr, *Retrofitting Suburbia* by Ellen Dunham-Jones, *Form-Based Codes* by Daniel Parolek, as well as *Land Use Strategies* and *Public Participation Tools*, both published by the Center for Livable Communities.

Dover-Kohl has received numerous state and regional American Planning Association (APA) Awards for projects including: Seven50 (the Southeast Florida Regional Prosperity Plan); the Downtown Plan for Richmond, VA; the Jamestown Mall Area Plan in St. Louis, MO; and the Downtown Plan and SmartCode for Montgomery, AL. The firm has also received national Congress for the New Urbanism (CNU) Charter Awards for Plan NoBe in Miami Beach, FL; Columbia Pike in Arlington County, VA; the Town Resiliency Plan for Jean Lafitte, LA; I'On in Mount Pleasant, SC; City Plan 2025 for Fayetteville, AR; and Glenwood Park in Atlanta, GA. The EPA awarded Plan El Paso a 2011 National Award for Smart Growth Excellence in Programs, Policies, and Regulations. Dover-Kohl's work has received the Driehaus Form-Based Codes Award three times since its inception in 2007 for Towns, Villages, Countryside Land Development Regulations in St. Lucie County, Florida; the Compact Communities Code for Lee County, Florida; and the 2012 award for the Bradenton Form-Based Code for Bradenton, Florida.


Revitalizing Downtowns & Historic Places


Designing New Neighborhoods & Towns


Planning Cities & Regions


Reinventing Corridors


Retrofitting Suburbia


Shaping Transit Oriented Development


Form Based Codes for Municipal & Private Clients

1571 Sunset Drive, Coral Gables, FL 33143 ph: 305.666.0446 | fax: 305.666.0360 | doverkohl.com

ZIMMERMAN/VOLK ASSOCIATES, INC.
Post Office Box 4907
Clinton, New Jersey 08809
908 735-6336
info@ZVA.cc • www.ZVA.cc

Residential Market Analysis Across the Urban-to-Rural Transect

June 15, 2020

Re: Cainhoy Site
Berkeley County, South Carolina
Design Exploration of Alternative Plan Variations

Zimmerman/Volk Associates (ZVA) has been asked by Dover, Kohl & Partners to render an opinion on the Cainhoy Site Design Exploration of Alternative Plan Variations. For over three decades, ZVA has specialized in the market analysis of housing in urban, traditional and other mixed-use walkable neighborhoods nationwide. Our long experience in the Charleston area ranges from the mid-'90s pre-development market positioning of I'On in Mount Pleasant to a 2016 analysis of a large site within the Charleston city limits.

ZVA has not conducted an analysis of the market potential and optimum market position of the Cainhoy site and therefore cannot address the specific feasibility of the alternative plans. However, the concepts underlying the plans are perfectly in keeping with current residential neighborhood preferences toward compact walkable mixed-use neighborhoods and away from auto-dependent single-use subdivisions.

Since the National Association of Realtors (NAR) first rigorous survey of community preferences in 2004, there has been a consistent and growing preference for walkable neighborhoods.

> "The more walkable the community, the more satisfied residents are with their quality of life."
>
> "Americans prefer walkable communities, but only to a point. A small majority—as in other years—prefer a walkable community even if it means a smaller yard, but just under half prefer the larger yard and more driving. For the first time, however, half of all respondents say they prefer a walkable community and shorter commute even if it means living in an attached home."
>
> —2017 (most recent) NAR Community Preference Survey

The walkable neighborhood preference that includes an attached residence does not necessarily mean that the attached dwelling is a compromise. There is a significant mismatch between households and the nation's housing stock. Households consisting of just one or two people are 62 percent of all U.S. households, and yet the housing type least appropriate for one- and two-person households, the single-family detached house, represents 62 percent of all U.S. dwellings.

Based on the demographics of buyer households nationally, there is frequently an underserved and significant market for residential options other than the detached house. According to the NAR 2020 Characteristics of Home Buyers, only 35 percent of buyers are families with children. The majority consists of a mix of married couples without children (26 percent of all buyers); single, mostly older women (17 percent); unmarried, mostly younger couples (nine percent); and single men (nine percent).

Cainhoy Site, Berkeley County, South Carolina
June 15, 2020

From the developer's perspective, the compact form and fine-grained mix of housing types makes infrastructure substantially more efficient. Offering a wide range of rental and ownership housing types within a walkable neighborhood increases the breadth of the potential market, accelerating the pace of neighborhood and community development.

Sincerely,

Todd Zimmerman
Director Emeritus