III. IMPACTS

U.S. Department of Transportation
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Delaware Department of Transportation

III. IMPACTS

This section describes the socio-economic, cultural and natural environmental resource impacts that are associated with the Preferred Alternative. Other alternatives, discussed in the previous chapter are also discussed where appropriate for comparative purposes.

A. Socio-Economic Environment

Table III-1 shows the State of Delaware, Kent County and the Project Area's general socio-economic characteristics. Census Blocks were used for the Project Area statistics because they provide the most detailed socio-economic data at the Project Area level of detail.

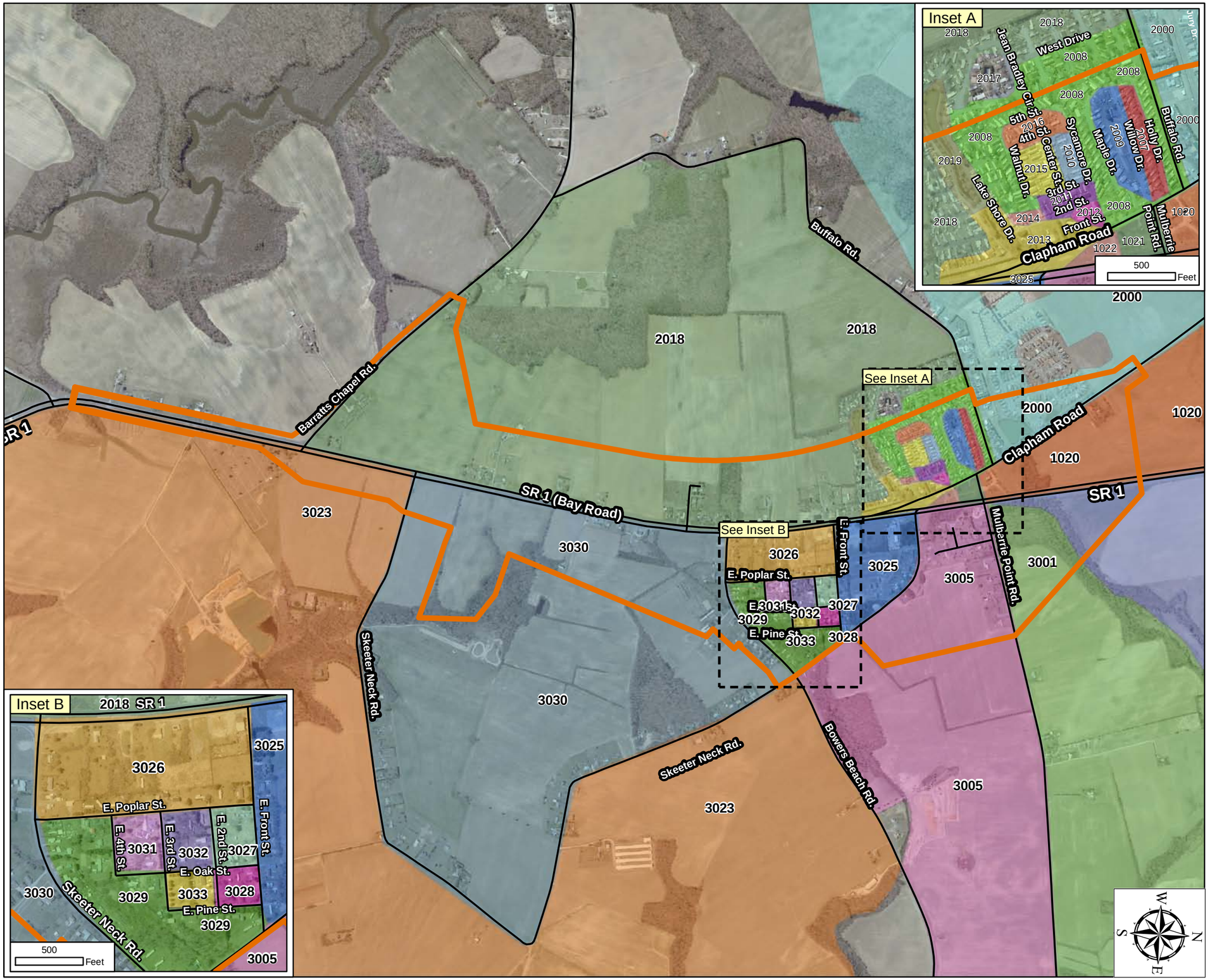
Table III-1: Population and Housing Characteristics for Delaware, Kent County and the Project Area

Summary Statistics	Delaware	Kent County	Project Area[1]
Total Population	783,600	147,601	1,480
*Projected total Population (2020)	1,032,974	160,911	N/A
Housing Units	343,072	60,172	356
% Male/ % Female	48.5% / 51.5%	47.6% / 52.4%	49.6% / 50.4%
% Population 65 Years and Older	13.0%	12.5%	18.5%
Median Household Income	$47,381	$47,772	$40,807
Race/Ethnicity[2]			
Population of One Race Only	770,567 (98.33%)	143,403 (97.2%)	1,645 (97.4%)
White alone	584,773 (74.63%)	103,777 (70.3%)	1,390 (82.3%)
Black or African-American alone	150,666 (19.23%)	31,585 (21.4%)	211 (12.5%)
American Indian and Alaska Native alone	2,731 (0.35%)	701 (0.5%)	4 (0.24%)
Asian alone	16,259 (2.07%)	3,209 (2.2%)	19 (1.12%)
Native Hawaiian and Pacific Islander alone	283 (0.04%)	84 (0.1%)	2 (0.12%)
Some Other Race alone	15,855 (2.02%)	4,047 (2.7%)	19 (1.12%)
Two or more Races	13,033 (1.66%)	4,198 (2.8%)	44 (2.60%)
Hispanic or Latino	37,613 (4.8%)	5,662 (3.8%)	58 (3.43%)

Notes: *Delaware Population Consortium
1. Census tract data from two census tracts included in Project Area.
2. Race/Ethnicity does not sum to the total number of persons in each tract because:
   - Hispanics can be of any race
   - Some Census participants may identify themselves with more than one race

Source: 2000 US Census

The eastern portion of the Project Area is contained within Census Tract 424 and the western portion in Census Tract 422.02. **Figure III-1** shows the Census Tracts and Block Groups that overlap the Project Area.



SR 1,Little Heaven
Grade Separated Intersection
Environmental Assessment

Project Area

Census Blocks

Figure III-1
Census Blocks

0 1,000 2,000
Feet

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1. Neighborhoods and Communities

The Project Area is home to approximately 1,480 residents that reside in the area's 356 housing units. Most of those residents live within the five residential subdivisions of Barker's Landing, High Point, Tara, Bakers Choice and Ocean Drive Manor (shown on **Figure III-2**). Several residential subdivisions are proposed in close proximity to the Project Area.

Access to all of these subdivisions would be maintained either at their existing access points or at new safer, relocated access points. Each of the communities would benefit from safer access to SR 1 and across SR 1 via the grade separated intersection. No adverse impacts to this subdivision would result from implementing the Preferred Alternative.

Barker's Landing is a medium-density residential subdivision composed of approximately 125 manufactured homes. It is located northwest of the intersection of Clapham Road and Buffalo Road. Jury Drive provides the sole access point onto Clapham Road.

The High Point subdivision is comprised of approximately 200 manufactured homes. It is located at the southwest quadrant of the intersection of Clapham Road and Buffalo Road to the south of the Barker's Landing subdivision. This community was identified as a potential Environmental Justice community. There are two existing access points to this community along southbound Clapham Road. One would be closed due to traffic safety issues. A new access point would be provided along Buffalo Road as a result of the implementing the Preferred Alternative. This new access point would result in a partial right-of-way acquisition and the relocation of two manufactured homes. No adverse impacts to this subdivision would result from implementing the Preferred Alternative.

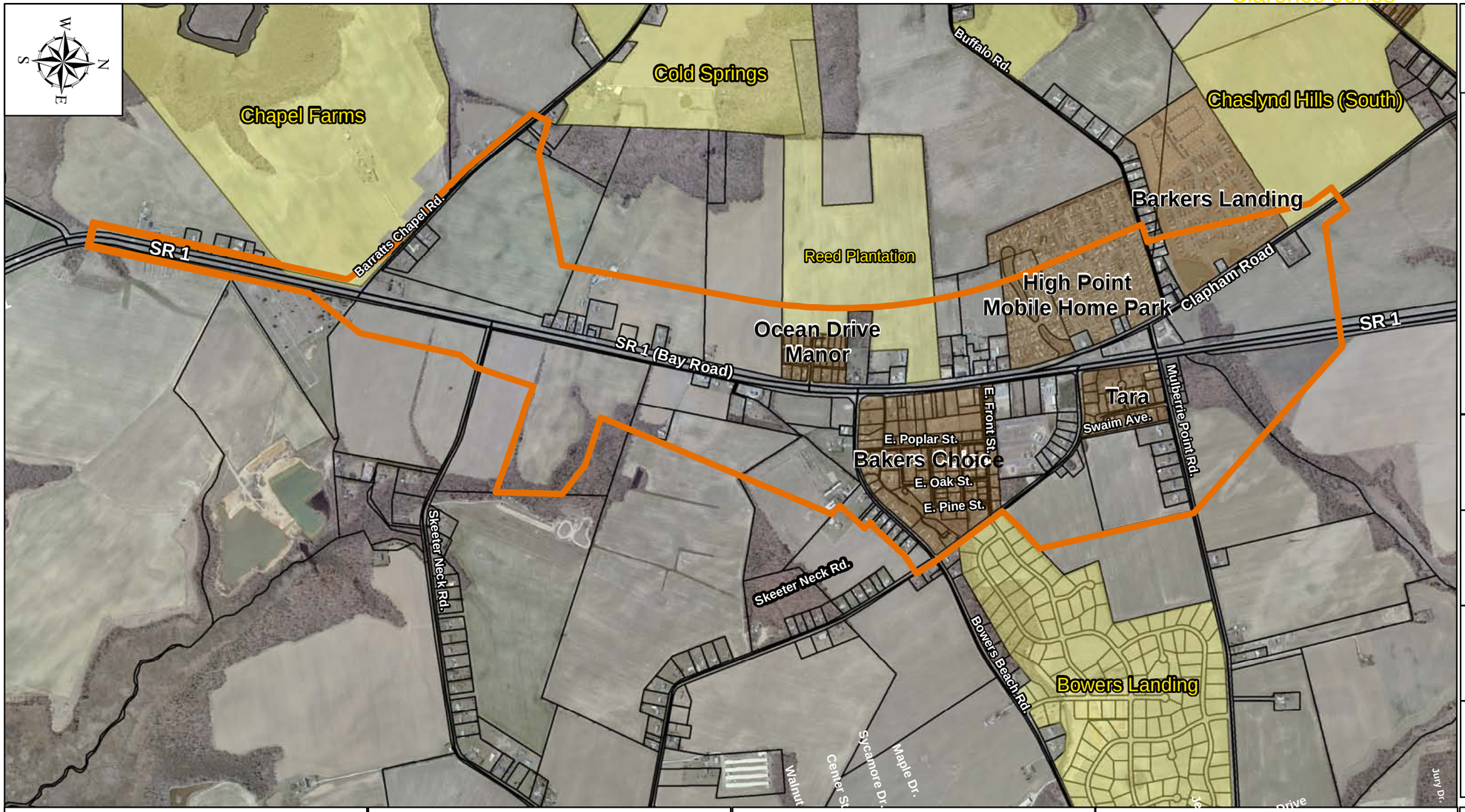
The Tara subdivision consists of 18 single-family homes. It is located off of eastbound Mulberrie Point Road and is bordered by North Skeeter Neck Road to the south and to the east by a single-family residence fronting Mulberrie Point Road and an agricultural field. The Tara subdivision consists of two cul-de-sacs (Swaim Avenue and Blevins Street). The only access point to this neighborhood is at Swaim Avenue off Mulberrie Point Road. Two total acquisitions with residential relocations would result as part of the implementation of the Preferred Alternative in order for a new road connecting Mulberrie Point Road and the new east service road. The community would maintain its existing access point at Swaim Avenue and Mulberrie Point Road. Direct access to SR 1 would be removed. No adverse impacts to this subdivision would result from implementing the Preferred Alternative. The new access would be safer and would divert through traffic around the subdivision instead of in front of it.

The Bakers Choice subdivision is comprised of approximately 80 manufactured homes. It is bound by SR 1 to the West, East Front Street to the North and Skeeter Neck Road to the South and East. There are six total acquisitions with relocations in the subdivision that would result from the acquisition of right-of way.

The Ocean Drive Manor subdivision consists of 14 single-family homes, ten of which front southbound SR 1 to the north and south of Wilkins Avenue. The other four are located along the cul-de-sacs of Wilkins and Govans Avenues, which are cul-de-sacs where their only access is to SR 1. There are an additional 14 undeveloped subdivided parcels along the right-of-way for what would be a future extension of Govans Avenue.

Wickham Woods

Clarence Jones



SR 1,Little Heaven
Grade Separated Intersection
Environmental Assessment

Project Area

Neighborhood/Community

- **Existing Subdivision**
- **Proposed Subdivision**
- **Property Boundaries**

Figure III-2
Neighborhoods and Communities

0 1,000 2,000
Feet

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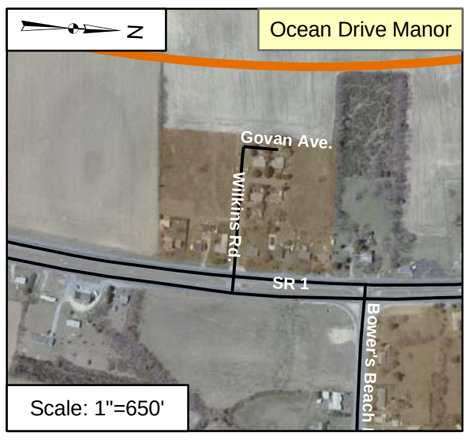
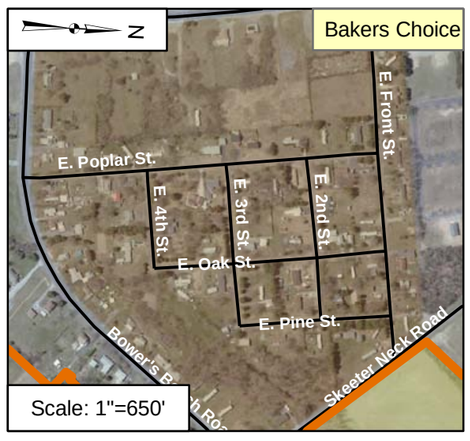
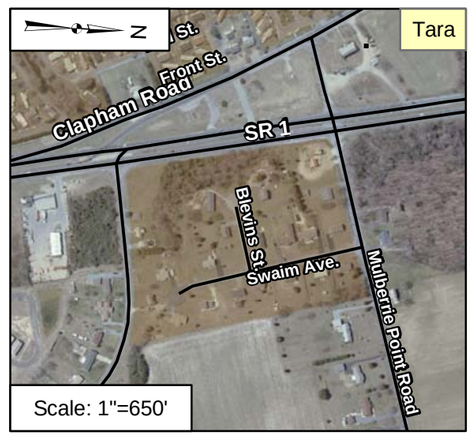
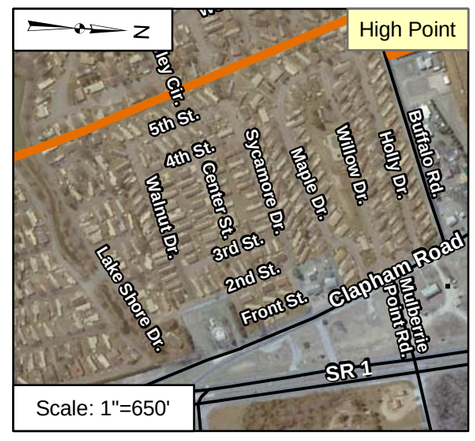
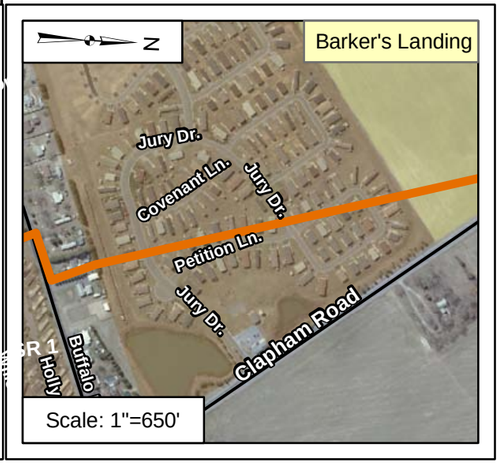










2. Relocations

There are twelve parcels requiring relocation assistance and payments under Preferred Alternative C. Ten of the parcels would be total acquisitions and two would be partial acquisitions. Although some of the parcels have multiple uses they generally consist of seven of the twelve parcels being businesses and five of the twelve parcels consisting of residential uses.

Most of the businesses in the Project Area have access directly to SR 1. No impacts to residential or business properties are anticipated for the No-Build Alternative. Each of the build alternatives (Alternatives A, B, C, D, E and F) would require some right-of-way acquisitions and/or relocations of residences and businesses as shown in **Table III-2**.

All right-of-way acquisitions and relocations will be done in accordance with the requirements of the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* as amended in 2000. According to the *Act* persons displaced by federally funded projects will be provided with relocation assistance and are to be treated fairly, consistently and equitably so that they will not suffer disproportionate impacts as a result of the project. Businesses and residential properties that currently have direct access to SR 1 would be provided with alternate access via the service roads in place of SR 1.

A project relocation plan was developed to address relocations. There is presently an ample supply of comparable or better replacement housing available and it would appear that an adequate supply of available housing will be available at the time of relocation as the area continues to maintain its current levels.

Table III-2: Properties Affected under Each of the Build Alternatives*

Potential Right of Way Impacts	Unit	Alternatives						
		No-build	A	B	C	D	E	F (1.81 miles)
Total of Properties Affected*	Number	0	56	52	72	35	38	42
Total Right-of-Way Acquisition	Acres	0	85.92	79.86	76.93	62.48	64.63	64.10
Residential/Agricultural	Acres	0	73.99	68.02	64.53	53.24	54.16	55.20
Business	Acres	0	11.93	11.84	12.40	9.24	10.46	9.52
Residential Relocations	Number	0	22	17	5	14	14	14
Business Relocations	Number	0	10	10	7	8	8	8

*Affected properties are any lots or tax parcels where encroachment of the project alternative may occur.
NOTE: The length of Alternatives A and B is approximately 1.42 miles. The length of Alternatives C is approximately 2.76 miles and the length of Alternatives D through F is approximately 1.95 miles.

3. Environmental Justice Communities

Executive Order (EO) 12898 *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* was signed on February 11, 1994. The EO requires the assessment of disproportionately high adverse human health and environmental impacts on minority and low-income populations resulting from proposed federal actions.

EO 12898 requires that every project using federal aid develop its own unique public outreach program that specifically addresses the individual community needs within that Project Area. The public outreach program utilized during the project development of these improvement alternatives was previously discussed in *Chapter II. A. Project History and Public Involvement.* Several meetings provided public outreach opportunities to individuals in the Project Area and allowed them to provide meaningful input and comments that were taken into consideration the alternatives development, the selection of Preferred Alternative C and the refinements made to

the preferred alternative as it progressed through the design. Based on the information provided in this section no adverse impacts are anticipated based on the implementation of the preferred alternative because it provides safe and efficient access to these communities.

a. Low Income Population

EO 12898 adds low income populations to the list of populations which should be investigated to ensure that they are not excluded from the benefits of the project, or subject to discrimination caused by federal programs, policies and activities. The EO identifies *low-income persons* as individuals whose median household income is at or below the Department of Health and Human Services (DHHS) poverty guidelines. The poverty guidelines issued by the DHHS are abstracted from the original poverty thresholds and are updated each year by the United States Census Bureau. Despite being several years old, the 2000 U.S. Census provides the only complete data at the Census block group level for individuals at or below the poverty level.

Based on the 2000 U.S. Census, about 8.10% of families and 10.70% of the population of Kent County were below the poverty level. As shown in **Table III-3** persons below the poverty level are greatest in Block Group 1 of Census Tract 422.02, where 168 or 9% of individuals in that Block Group are below the level and Block Group 3 of Census Tract 424 where 125 or 12% are below the poverty level. In Block Group 2 of Census Tract 422.02, eight percent, or 95 persons were below the poverty line.

Table III-3: Project Area Census Block Groups by Number of Persons at or Below the Poverty Level

Census Tract/Block Group	Persons at or Below the Poverty Level	
	Number	Percent of Census Block
Tract 422.02/Block Group 1	168	9%
Tract 424/Block Group 3	125	12%
Tract 422.02/Block Group 2	95	8%
Block Group Totals:	388	13%

Source: Year 2000 U.S. Census

b. Minority Population

The EO reaffirms the provisions of Title VI of the Civil Rights Act of 1964 and related statutes. Title VI requires federal agencies to ensure that their programs, policies and activities do not have the effect of excluding populations from the benefits of the project, or subjecting persons or populations to discrimination based on race, color, or national origin.

The EO identifies *minority persons* as a person who is African American (a person having origins in any of the black racial groups of Africa); Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture origin, regardless of race); Asian American (a person having origins in any of the original peoples of the Far East, South East, the Indian subcontinent, or the Pacific Islands); American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

Table III-4 summarizes the race, ethnicity and minority population for each of the 26 Census Blocks that overlap the Project Area and ranks them in order by minority population which coincides with the mapping on **Figure III-3**.

Twenty-one percent or 314 individuals of the total 1,480 population in the Census Blocks that overlap the Project Area are minorities. Based on the analysis, the two communities of High Point and Baker's Choice were identified as potential Environmental Justice communities.

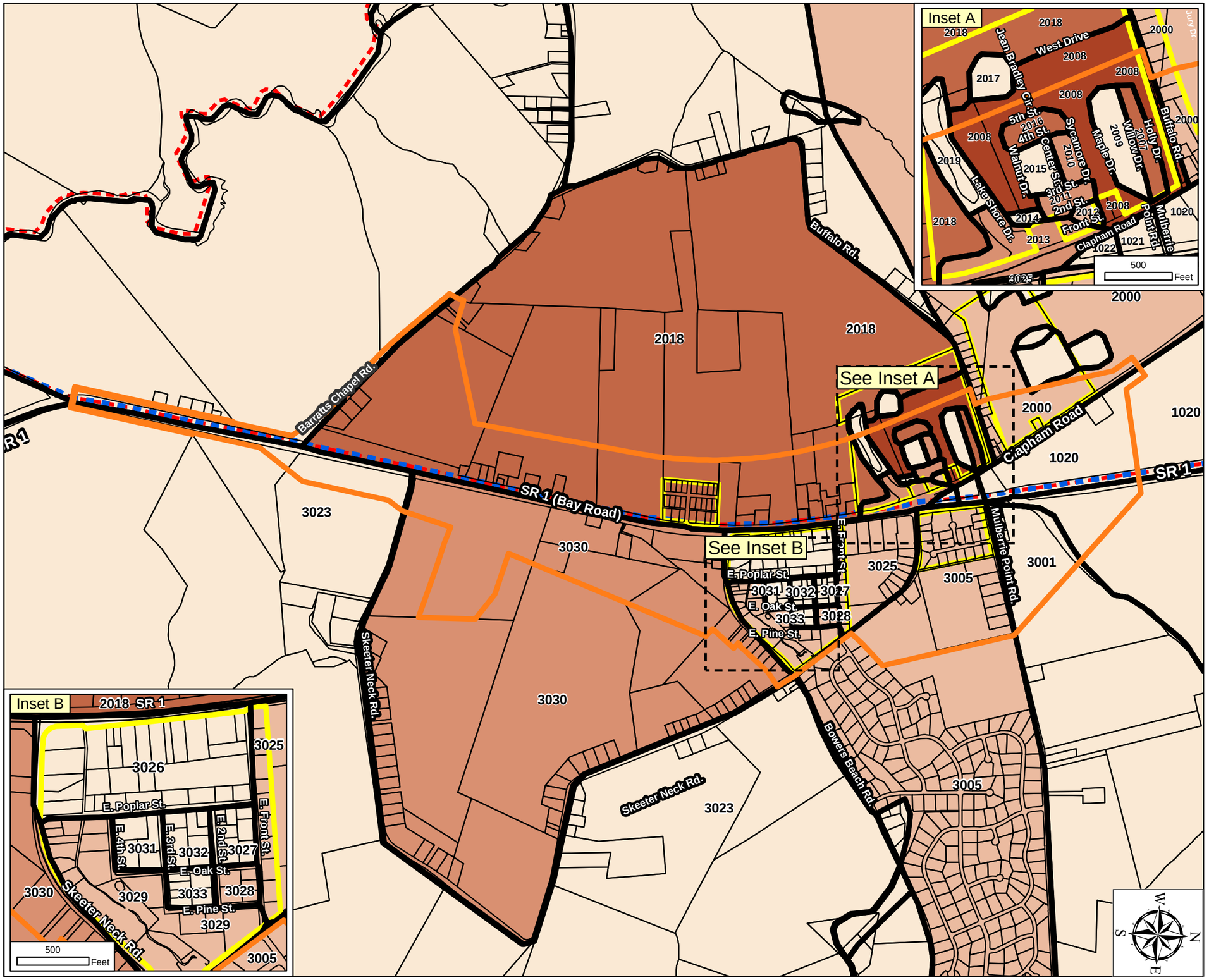
Table III-4: Project Area Census Block Groups Ranked by Total Minority Population

Geography		Race							Ethnicity	Totals		
Census Tract	Census Block	White alone	Black or African American alone	American Indian or Alaska Native alone	Asian alone	Native Hawaiian or Pacific Islander alone	Other Race alone	Two or More Races	Hispanic or Latino	Total Population	**Minority Population	Percent Minority
422.0	2008	236	60	--	7	--	13	7	23	323	110	34%
422.0	2000	176	40	--	--	--	--	4	4	220	48	22%
422.0	2018	273	14	3	--	--	--	11	4	301	32	11%
422.0	2007	46	15	1	4	--	--	6	--	72	26	36%
422.0	2010	21	8	--	2	--	2	2	8	35	22	63%
424	3030	161	11	--	--	--	2	4	3	178	20	11%
422.0	2011	30	8	--	1	--	--	--	7	39	16	41%
422.0	2013	36	14	--	1	--	--	1	--	52	16	31%
422.0	2016	21	6	--	--	2	--	--	6	29	14	48%
424	3005	60	10	--	--	--	--	1	--	71	11	15%
422.0	2012	20	2	--	--	--	--	8	--	30	10	33%
424	3025	41	9	--	--	--	--	--	--	50	9	18%
424	3023	37	7	--	--	--	--	--	--	44	7	16%
424	3028	8	2	--	--	--	2	--	2	12	6	50%
424	3029	60	4	--	--	--	--	--	1	64	5	8%
422.0	2009	42		--	2	--	--	--	--	44	2	5%
424	3001	19		--	2	--	--	--	--	21	2	10%
424	3026	41	1	--	--	--	--	--	--	42	1	2%
422.0	1020	5	--	--	--	--	--	--	--	5	--	>1%
422.0	2014	9	--	--	--	--	--	--	--	9	--	>1%
422.0	2015	0	--	--	--	--	--	--	--	0	--	>1%
422.0	2019	0	--	--	--	--	--	--	--	0	--	>1%
424	3027	12	--	--	--	--	--	--	--	12	--	>1%
424	3031	10	--	--	--	--	--	--	--	10	--	>1%
424	3032	21	--	--	--	--	--	--	--	21	--	>1%
424	3033	5	--	--	--	--	--	--	--	5	--	>1%
TOTALS:		1,390	211	4	19	2	19	44	58*	1,689*	357*	21%

Notes: Lighter gray shading on table is provided to make totals for each census block group more visually discernable among other records which have no totals.

*Hispanics may be of any race and people may consider themselves of multiple races and therefore summing the Hispanic or Latino and Minority populations may be greater than the actual minority population.

**Minority Population is the sum of minority race and Hispanic or Latino persons.



SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

Project Area

Census Blocks

Census Tract 422.02

Census Tract 424

Existing Communities

Minority Population

0 - 2

3 - 12

13 - 22

23 - 33

34 - 110

Figure III-3
Environmental Justice

0 1,000 2,000
Feet

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Federal Highway Administration

The High Point subdivision had the greatest concentration of minority population within the Project Area. It is contained within Census Tract 422.02 and the census blocks shown in **Table III-5,** which consist of 248 minority individuals, or 79% of the minority population within the Project Area living in that community. Census Block 2017 is not within the Project Area. Two residences would need to be relocated in order to add an entrance along Buffalo Road**.** No adverse impacts are anticipated based on these access improvements.

Table III-5: High Point Community Census Block Groups

	Geography		Race							Ethnicity	Totals		
Rank	Census Tract	Census Block	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Pacific Islander	Other Race	Two or more Races	*Hispanic	**Minority	Population	Percent Minority
1	422.02	2008	236	60	--	7	--	13	7	23	110	323	35%
2	422.02	2018	273	14	3	--	--	--	11	4	32	301	10%
3	422.02	2007	46	15	1	4	--	--	6	--	26	72	8%
4	422.02	2010	21	8	--	2	--	2	2	8	22	35	7%
6	422.02	2013	36	14	--	1	--	--	1	--	16	52	5%
7	422.02	2011	30	8	--	1	--	--	--	7	16	39	5%
8	422.02	2016	21	6	--	--	2	--	--	6	14	29	4%
11	422.02	2012	20	2	--	--	--	--	8	--	10	30	3%
15	422.02	2009	42	--	--	2	--	--	--	--	2	44	1%
21	422.02	2014	9	--	--	--	--	--	--	--	--	9	>1%
25	422.02	2015	--	--	--	--	--	--	--	--	--	--	--
26	422.02	2019	--	--	--	--	--	--	--	--	--	--	--
		Totals:	734	127	4	17	2	15	35	48	248	934	79%

Notes: Lighter gray shading in the table is provided to make totals for each census block group more visually discernable among other records which have no totals.

*Hispanics may be of any race and people may consider themselves of multiple races.

**Minority Population is the sum of minority race and Hispanic or Latino persons.

4. Land Use/Land Cover

a. Existing Land Use/Land Cover

The SR 1, Little Heaven Project Area is dominated primarily by agricultural and residential land uses with commercial land uses adjacent to SR 1, as shown in **Figure III-4.** Residential land use occurs throughout the Project Area. The neighborhoods and communities are discussed in Section III.5. There are approximately 259 land parcels totaling 153,876 acres with at least a portion of them overlapping the Project Area boundary. Of the 259 total parcels 193 of them are in residential uses, 50 are agricultural uses and 16 are business uses. **Table III-6** shows the acreage and percentage of each land use present within the Project Area.

Table III-6: Existing Land Use/Land Cover in the Project Area

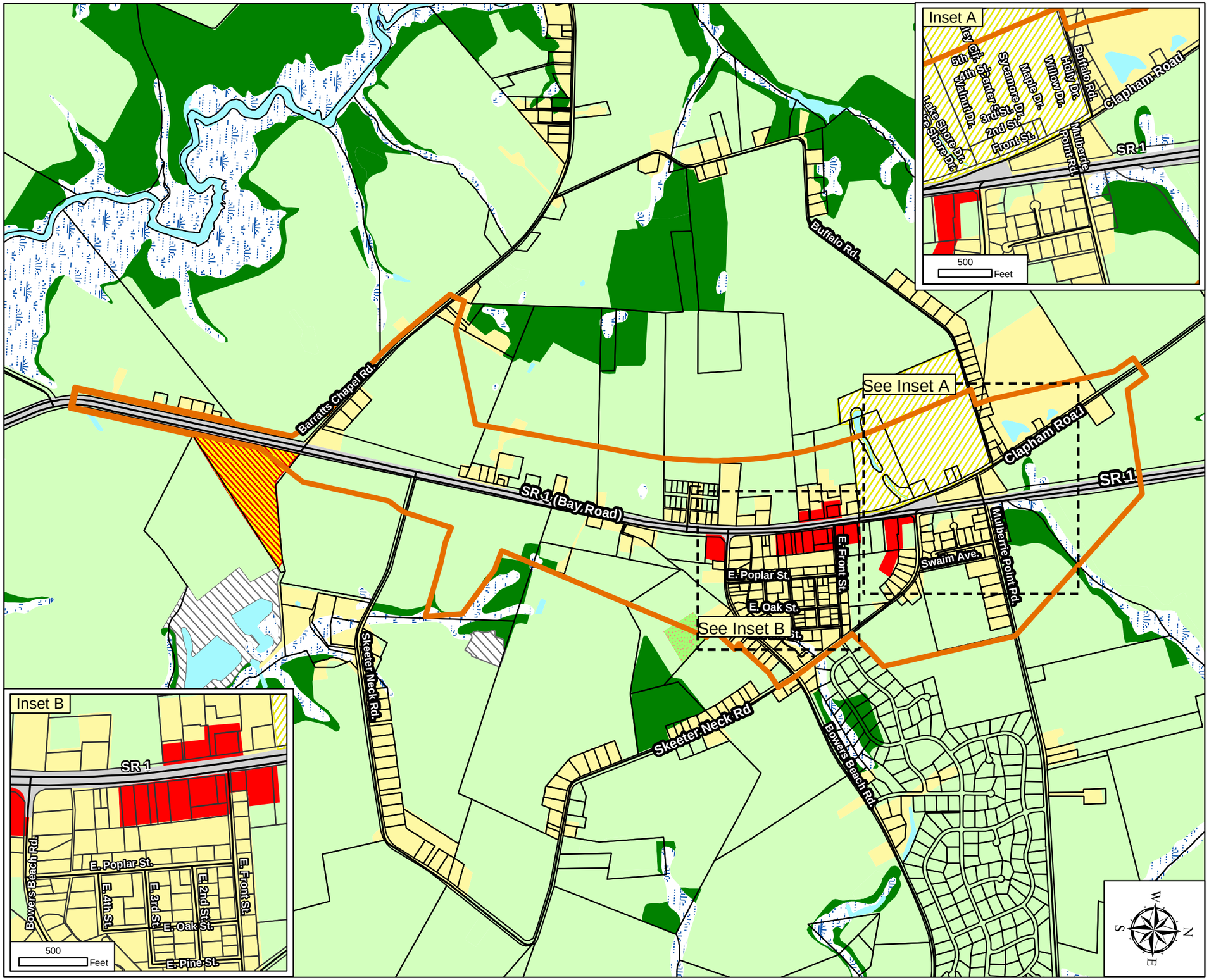
Land Use/Land Cover	Acres (approximate)	Percent of Total
Residential	217	33%
Commercial	19	3%
Agricultural	346	53%
Forests	10	2%
Shrub/Brush Rangeland	8	1%
Recreational	2	0%
Wetlands	8	1%
Water	2	0%
Public Roads	47	7%
Total:	659	100%

b. Future Land Use/Land Cover

Some changes will occur at the parcel-level for the purchase of right-of-way for the improvements, however generally, future land use will not be affected in the Project Area. Future land use within the Project Area will be primarily influenced by the recommendations of existing master plans and zoning ordinances. With the implementation of the build alternatives an alternative future land use may need to be developed based on the changes to access to SR 1. Several new developments are proposed in the vicinity of the study area. Based on current zoning and development practices, land use within the Project Area is expected to become more urban, particularly in the area designated for growth west of SR 1. Future land uses, proposed development and the LDI Investment Level Areas are shown in **Table III-7** and on **Figure III-5**.

Table III-7: Future Land Use/Land Cover in the Project Area

Land Use/Land Cover	Acres (approximate)	Percent of Total
Neighborhood Business	46	7%
Multi-Family	7	1%
Single Family	3	0.5%
Residential Manufactured Home	119	18%
Agricultural Residential	66	10%
Agricultural Conservation	272	41%
Agricultural Preservation District	57	9%
Area of Roads	89	13.5%
Total:	659	100%



SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

Legend

- Project Area
- Single Family Residential
- Multi-Family Residential
- Mobile Home Parks
- Retail
- Other Commercial
- Industrial
- Transportation/Communication
- Utilities
- Urban/Built-up
- Institutional/Gov't
- Agricultural
- Recreational
- Forestland
- Clear Cut
- Water
- Wetlands
- Beach/River Bank/Sandy Areas
- Extraction
- Transition

Source: Delaware Office of State Planning Coordination, 2002

Figure III-4
Existing Land Use

0 1,000 2,000
Feet

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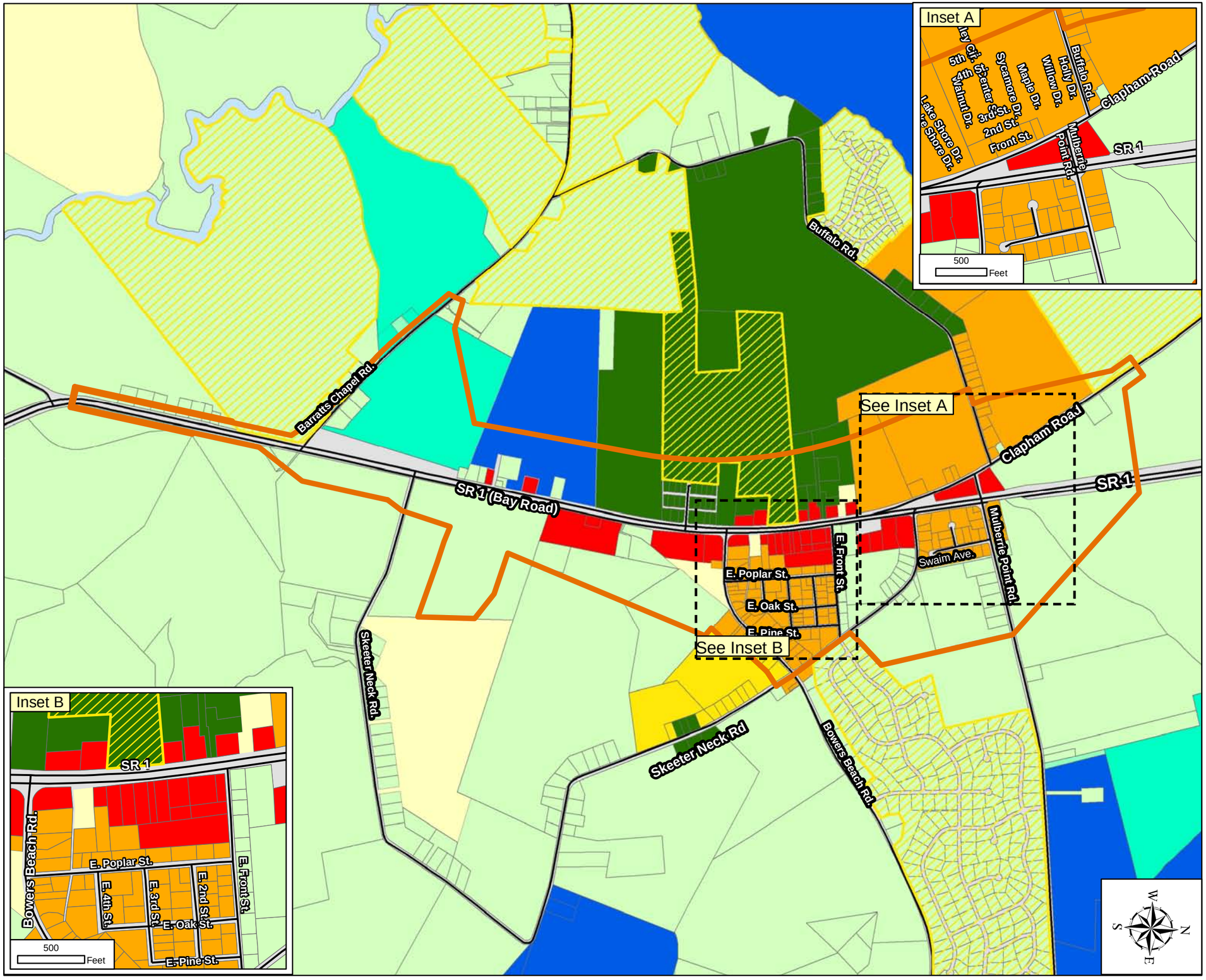
SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment



Legend

- Project Area
- Proposed Major Subdivision
- Right of Way

***Kent County Zoning Code**

- Neighborhood Business (No maximum density)
- Multi-family Residential
- Single Family Residential (3.5 units/1 acre)
- Residential Manufactured Home
  - -2 units/1 acre (growth zone major subdivision);
  - -1 unit/1 acre (outside growth zone major subdivision);
  - -4 one acre (minimum) units with a remainder of 1 unit per 10 acres (minimum) (minor subdivision);
  - -2 units/1 acre single family) or (5 units/1 acre in Manufactured home subdivision)
- Agricultural Conservation
  - -1 unit/1 acre (major subdivision);
  - -4 one acre (minimum) units with a remainder of 1 unit per 10 acres minimum (minor subdivision);
  - -3 units/1 acre (on central sewer and water)
- Agricultural Residential (AR)
  - -3 units/1 acre (on central sewer and water)
- Agricultural Preservation Overlay District
- Agricultural Preservation District with Purchased Development Rights

Source: Delaware Office of State Planning Coordination, 2002

*NOTE: Only zoning represented within the mapped area are shown in the legend.

Figure III-5
Future Land Use

0 1,000 2,000
Feet

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Federal Highway Administration

c. Livable Delaware Initiative

On March 28, 2001, Governor Minner signed an EO formalizing the LDI. The LDI is a State strategy for directing future growth to areas with existing or planned infrastructure in order to curb sprawl and to preserve agricultural lands and open space throughout the state and target development in and around established communities. **Figure III-6** shows that LDI Investment Level Areas 2, 3 and 4 are located in the Project Area. The Investment Levels are as follows:

Investment Level 1 Areas:

- are often municipalities, census designated places, etc.
- may be an area with a density generally higher than in surrounding areas
- may have a variety of transportation opportunities available
- may have mixed building uses
- may be characterized as having a sense of place, character and shared identity
- may be considered as Transfer of Development Rights (TDR) receiving areas

Investment Level 2 Areas:

- may be less developed areas within municipalities
- may be rapidly growing areas in the counties that have or will have public water and wastewater services
- may be considered as TDR receiving areas
- may be generally adjacent to or near Investment Level 1 Areas

Investment Level 3 Areas:

- may be areas susceptible to leapfrog development that is not contiguous with existing infrastructure
- may be high priority agricultural lands directly adjacent to natural areas
- may be environmentally sensitive areas adjacent pro-development areas
- may be areas that are experiencing some development pressure
- may be areas with existing but disconnected development
- may be areas planned for long term growth, but where development within the next five years may not represent proper and efficient phasing of development
- may be considered as TDR sending or receiving areas

Investment Level 4 Areas:

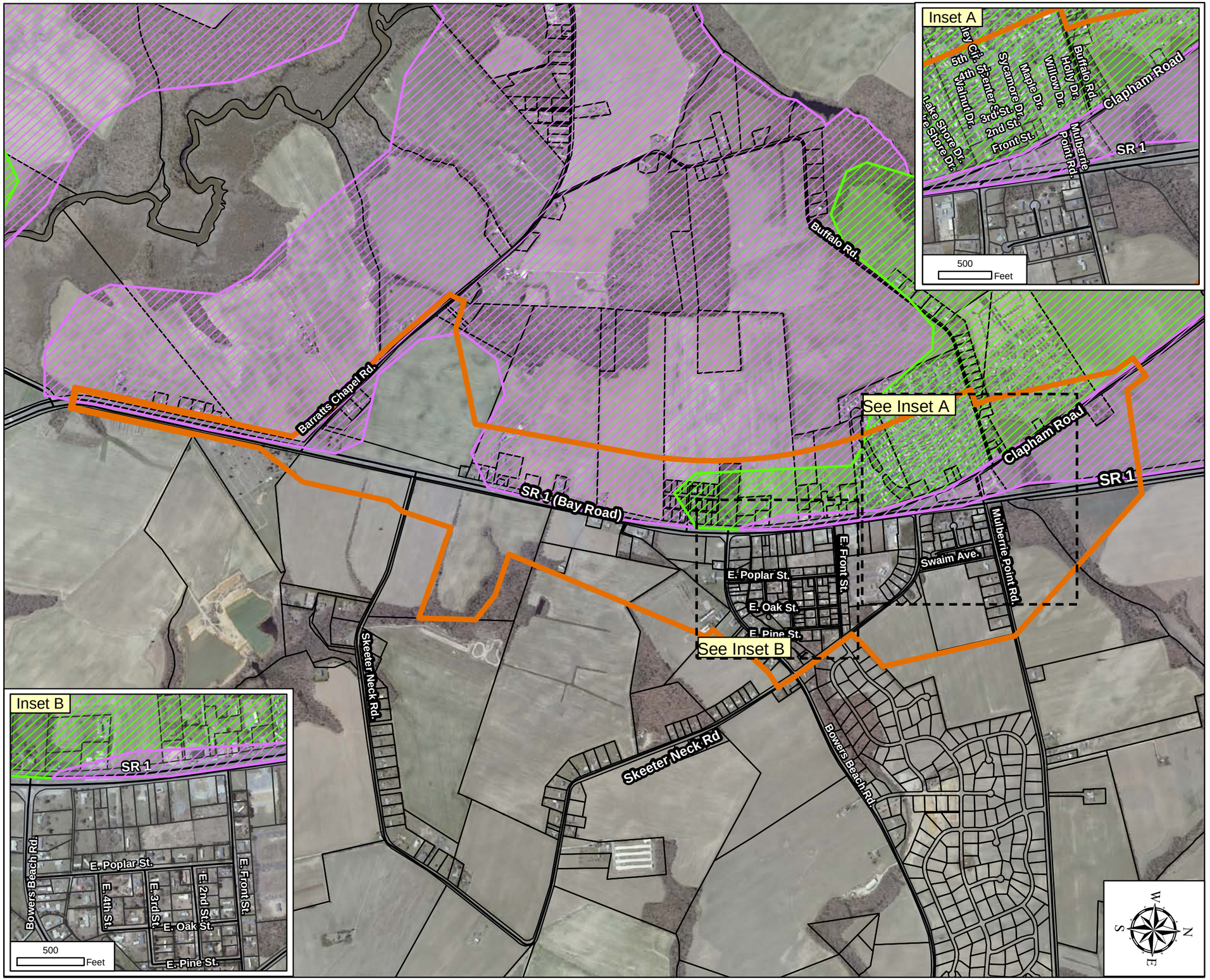
- Areas where development is not currently preferred and where the State will make investments that will help preserve a rural character, such as investments to promote open space and agriculture.

Out-of-Play Areas:

- Lands that generally cannot be developed for reasons that might include: they are Federal-owned or State-owned protected parkland, their development rights have been purchased, State or local regulations prohibit development on them.

d. Land use/Land Cover Impacts

There are no plans for future development that would be impacted by the No-Build Alternative. The build alternatives would convert developed (either residential or commercial) and agricultural land to transportation land use, however the project is not anticipated to adversely impact existing or future planned land use.



SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

- Project Area
- Investment Level 1
- Investment Level 2
- Investment Level 3
- Investment Level 4 (no shading)

Figure III-6
Livable Delaware

0 1,000 2,000
Feet

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5. Agricultural Preservation

Delaware Agricultural Preservation District (APD) are established under the Delaware Agricultural Lands Preservation Program to preserve agricultural lands in Delaware from being re-zoned to any use other than agricultural and primary residential use of the owner of the property and those lands shall not be subject to any major subdivision. This is a voluntary incentive program that allows eligible landowners to receive tax benefits, right-to-farm protection and an opportunity to sell their preservation rights to the State that keeps the land free from development permanently through a process known as Purchase of Development Rights (PDR), if the property qualifies.

The connection between SR 1 and the Barratt's Chapel Road proposed under Alternatives C, D, E and F would impact a portion of the Somy Expansion of the Miller APD which is located north of Barratt's Chapel Road, west of SR 1 as shown in **Figure III-7** on page III-16. The Preferred Alternative will not contribute to the development of this land because the APD designation for the unused portion still designates only agricultural or agricultural-related land uses for the property.

6. *Community Institutions, Facilities and Services*

A variety of community institutions, facilities and services exist in and around the Project Area as shown on **Figure III-8** on page III-17 and as discussed in the sections below. The improvements will have a benefit to the public because they provide improved travel time to these facilities by eliminating existing traffic signals along SR 1 in the Project Area. The Project also improves access to and from SR 1 from side streets. The project replaces existing bus stops where needed and provides sidewalks at pedestrian locations.

a. Schools and Libraries

There are no schools or libraries located within the Project Area boundary, however the Preferred Alternative will allow for safer school bus routes throughout the community and will provide sidewalks at various locations. The preferred alternative separates the north/south SR1 through traffic from the local traffic.

b. Churches and Cemeteries

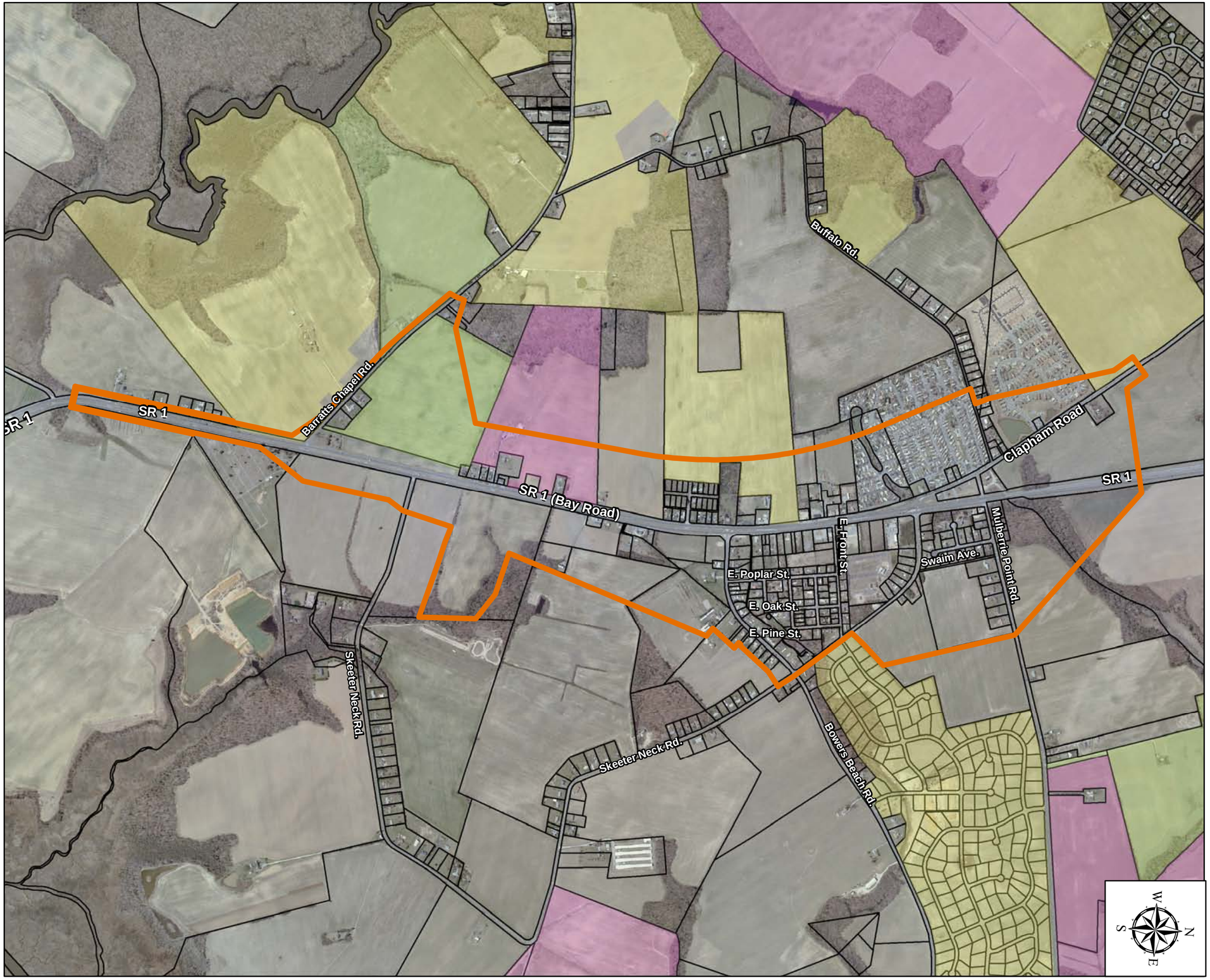
The Mount Olive Church, located east of the proposed roadway improvements on Skeeter Neck Road and Barratt's Chapel and Cemetery are located in the Project Area. No right-of-way would be acquired from either facility. Trees would be planted as part of the Preferred Alternative to provide screening of SR 1 from the Barratt's Chapel. A commemorative bell in the right-of-way adjacent to northbound SR 1 will be relocated onto the Chapel's property. No impacts to either property would result from the implementation of the Preferred Alternative. The Preferred Alternative will also improve access to Barratt's Chapel by increasing the shoulder width prior to the entrance to the Cemetery.

c. Parklands and Recreational Facilities

There are no parklands or recreational facilities located within the Project Area.

d. Health Care Facilities

There are no health care facilities located within the Project Area. The nearest hospital is Milford Memorial Hospital, located in Milford and Kent General Hospital in Dover.



SR 1,Little Heaven
Grade Separated Intersection
Environmental Assessment

Legend

- Project Area
- Proposed Subdivisions
- Development Right Purchased
- State Agricultural Preservation District

Figure III-7
Agricultural Preservation

0 1,000 2,000
Feet

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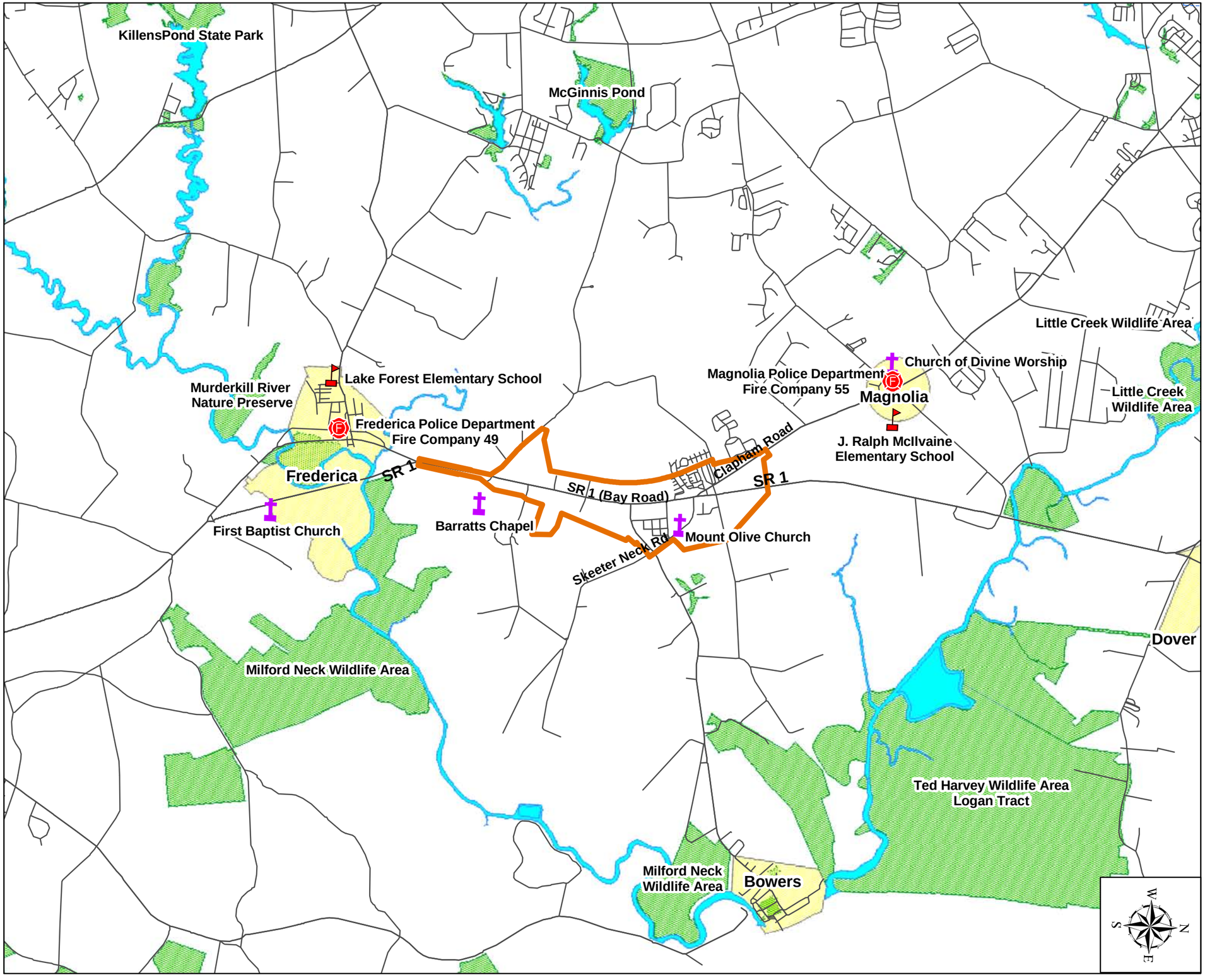

SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

- Project Area
- Schools
- Libraries
- Cemeteries
- Churches
- Fire and Police
- Parkland/Open-Space
- Water
- Municipalities

Figure III-8
Community Facilities

0 4,000 8,000
Feet

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e. Emergency Services and Law Enforcement

Three (3) fire districts are located around the Project Area: Magnolia, to the north (Fire Company 55); Bower's Beach, to the east (Fire Company 40); and Frederica, to the south (Fire Company 49). All three of these fire districts converge in the Project Area. Additionally, Frederica and Bower's Beach share an ambulance service. Both Magnolia and Frederica police departments respond to the Project Area. It should be noted that the Preferred Alternative has been refined based on comments received from the various emergency services agencies and the Project Area and they concur with the Preferred Alternative which are are beneficial to provide better travel times for emergency and law enforcement to destinations in the Project Area.

f. Public Utilities

There are existing electric and communications utilities throughout the project limits that would be relocated under the build alternatives. A cell phone tower is located near the intersection of SR 1 and Mulberrie Point Road. There is no impact to the cell phone tower under any of the build alternatives. The water supply to portions of the area is supplied by Artesian Water Company, Inc. There are no anticipated impacts to the water infrastructure supplying water to the residents.

g. Independent Utilities

There are existing electric and communications utilities throughout the project limits that would be relocated as part of the project. A cell phone tower is located near the intersection of SR 1 and Mulberrie Point Road. There is no impact to the cell phone tower under any of the build alternatives. The water supply to portions of the area is supplied by Artesian Water Company, Inc. There are no anticipated impacts to the water infrastructure supplying water to the residents.

h. Multi-modal Transportation Facilities and Services

In Kent County, local bus transit is only available in the Dover area, with some intercity services between Dover and points to the north and southeast. The DART First State intercity transit operation provides Kent County service with stops in Smyrna, Dover, Milford, Harrington and in the Project Area, in Little Heaven. The preferred alternative upgrades the existing DART bus stops and includes sidewalk along Clapham Road from Buffalo Road to Bowers Beach Road.

Paratransit and special transit services are available throughout Kent County for elderly and disabled residents. DART First State Paratransit provides door-to-door shuttle service for residents aged 60 years or older who are physically or mentally disabled. The Senior Citizen Affordable Taxi (SCAT) offers 50% discounted taxi services to senior citizens and disabled persons. In Kent County, City Cab of Dover and Watkins Cab of Milford provide these services.

Kent County offers facilities and services to promote ridesharing, which includes Park-and-Ride lots and a Statewide Employees Vanpool Program. The average usage of the Park-and-Ride lots is approximately 20 vehicles per weekday. These lots are mostly located within a few miles of downtown Dover and therefore may not be well utilized by residents of the Project Area. There are no Park-and-Ride lots located in the Project Area.

Kent County has seven public aviation facilities, the biggest of which is located at the DAFB. The DAFB permits limited public use at a civil terminal, the Central Delaware Commuter Air Facility. Approved flights may use the facilities at DAFB in limited numbers (not to exceed 37 flights per day and 13,500 per year). Flights in excess of 37 per day are permitted only on NASCAR race days. None of the other public aviation facilities are located within or adjacent to the Project Area.

B. Cultural Resources

1. Methodology

Architectural surveys and evaluations and Phase IA and Phase IB Archaeological Surveys were performed in accordance with Section 101(b) (4) of the NEPA*;* Section 1 (3) and 2 (b) of *Executive Order 11593;* Section 106 of the *National Historic Preservation Act of 1966, as amended in 1999;* 23 CFR 771; the guidelines developed by the Advisory Council on Historic Preservation (November 26, 1980) and currently being revised; and the amended "Procedure for the Protection of Historic and Cultural Properties," as set forth in 36 CFR 800 (1991). These statutes and regulations requires that the effect of any federally assisted undertaking on historically significant buildings, structures, objects or sites be taken into account during the project planning process. Significant sites are those listed in or eligible for listing in the National Register of Historic Places (National Register). All survey and evaluations were also undertaken in accordance with the DE SHPO Guidelines for Architectural and Archaeological Surveys in the State of Delaware (1993).

The methodology used for the Phase IA and Phase IB archaeological surveys and the historic architectural identification and evaluation included background research, field surveys and report preparation. The background research included examination of the National Register files, survey reports and maps related to the Delaware Register of Historic Places and National Register and cultural resource surveys and historic site surveys at the DE SHPO. Individual property research was conducted at the Kent County Courthouse in Dover, Delaware and references to archival materials were obtained from the University of Delaware Library. Other repositories visited for property-specific research included the Hagley Eleutherian Mills Museum and Library in Wilmington, Delaware and the Delaware State Archives in Dover, Delaware.

Based on plan concepts of the Preferred Alternative C, an overall Area of Potential Effect (APE) was later established and confirmed for both archaeological and architectural studies to identify historic and archaeological properties that may be involved with the project. For the purposes of Section 106 and NEPA compliance, the project APE is defined as "the geographic area within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist and included resources directly or indirectly impacted by project activities, including acquisition of property, property easements and/or visual and audible effects" (36 CFR Part 800: Protection of Historic Properties).

2. Archaeological Resources

For archaeological resources, a Phase IA Survey was used to assess prehistoric and historic archaeological sensitivity of the APE to archaeological deposits based on the *potential* for archaeological sites to exist or to have been formed in a given area and the *sensitivity* of that area for intact cultural resources. In areas where no sites were documented, the potential presence of prehistoric resources was based primarily on environmental setting – topography, proximity to water and soil quality. The potential presence of historic resources was determined through documentary research. The potential for prehistoric or historic cultural resources to exist in a given area was measured on an ordinal scale as low, moderate, or high. The archaeological potential of 19 parcels was assessed between the years 2007 and 2008.

A Phase IB survey was conducted in 2004/2005 within the initial Archaeology APE. A Phase IB Archaeology Survey Management Summary (Emory 2005) was prepared in 2005 documenting the results of the survey. An addendum to the 2005 Phase IB report was prepared in February 2008. A Phase IB Management Summary that overviews the findings in the surveys that were

conducted in the summer and autumn of 2008 and in the winter of 2008-2009 were submitted to DelDOT in March 2009. A Comprehensive Phase IB Archaeological Survey Report was completed in 2009.

A Phase IB Archaeological Survey of the SR 1, Little Heaven Grade Separated Intersection project was ultimately completed in 2009. Parcels 1-7 have been surveyed; this work took the form of a Phase IB Survey Management Summary Report (Emory 2005) and a Phase IB Addendum report (Lenert 2008). Parcels 8, 10, 12, 14, 16-20 and 23-26 were surveyed in mid-to-late 2008 and early 2009. This work is reported in a Phase IB Management Summary Report (March 2009) and in the Comprehensive Phase IB Archaeological Report (May 2009). The remaining parcels (9, 11, 13, 15, 21-22) constitute areas that were dismissed as a result in changes to the construction plans or were not tested because in consultation with DelDOT Archaeology staff and DE SHPO they were determined to contain no-to-low potential for containing historic or prehistoric archaeological resources.

The current archaeological studies and coordination with the DE SHPO are based on the proposed limits of construction for the Preferred Alternative C. This also includes all areas of stormwater management and wetland mitigation. To date, the archaeological studies consists of 26 parcels containing areas of low, moderate and high potential for prehistoric and historic archaeological resources as listed in **Table III-8.** The historic properties and archaeological sites depicted in **Figure III-9** are listed in **Table III-9**.

a. Impacts to Archaeological Resources

The Comprehensive Phase IB Archaeological Report presents the findings in each of the 26 parcels and the details of the recommendations for additional archaeological investigations. Recommendations for further work were based on finding artifact concentrations that suggest the presence of historic or pre-contact archaeological sites. Specifically, potential archaeological sites have been identified in nine parcels: Parcels 1, 2 (three separate sub-parcels), 5, 7, 18, 25 and 26. The additional work would allow archaeologists to better characterize the nature and integrity of the archaeological deposits, prior to being disturbed by the transportation improvements. DelDOT and DE SHPO will determine the need for any additional investigations.

Provisions for additional archaeological investigations are better prescribed in the Memorandum of Agreement (MOA) can be found in **Appendix A.** The MOA between the FHWA, DelDOT, and the State Historic Preservation Office (SHPO) outlines final steps to be taken to complete the Section 106 consultation process with regards to archaeological sites and disposition of any excess property in the future. Ultimately, archaeological data recovery, public outreach, preservation in place, consulting party protocol with the Native American Federally Recognized Tribes, and other mitigation measures are discussed and administered under the MOA.

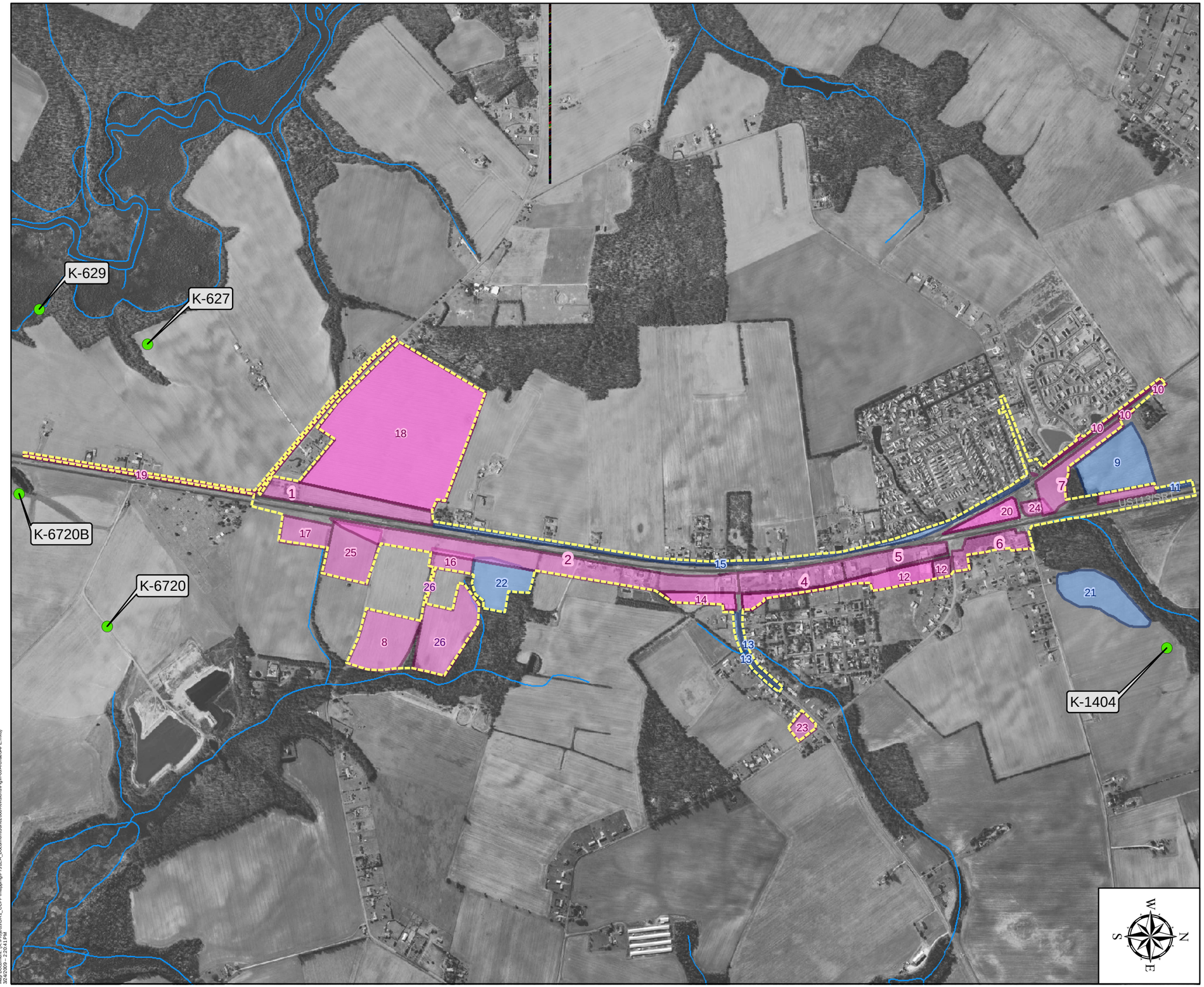
Table III-8: Potential Prehistoric and Historic Archaeological Resources in the APE

Parcel Designation	Project APE (Acre)	Archaeological Resource Potential	
		Prehistoric	Historic
1	11.9	L	M to H
2	27.3	M	M to H
3 and 4	9.7	L	M
5	3.3	L	M to H
6	2.8	M	M to H
7	4.9	H	H
8	5.0	H	L
9	5.0	H	L
10	1.1	L	H
11	0.4	L	L
12	7.4	H	H
13	3.4	L	L
14	3.0	H	L
15	5.8	L	L
16	1.7	H	L
17	4.3	L	L
18	63.8	H	H
19	1.4	H	H
20	2.6	H	H
21	6.0	H	H
22	6.0	H	L
23	2.0	L	H
24	1.2	L	M to H
25	8.0	H	H
26	11.5	H	L
Test Intervals: (M) Medium - 75.0 feet, (H) High - 50.0 feet.			

Table III-9: Key to CRS Numbers for Archaeological Resources in APE and Surrounding Project Area

CRS #	Resource Name; Street Address or Location	Resource Type	Age (approximate)	Comments
West Side				
K-627	Sipple Farm #2 Site 7K-F-54	Precontact site	Unknown	--
K-629	Robbins Farm #2 Site 7K-F-44	Precontact site	Woodland	--
East Side				
K-1404	7K-F-92	Precontact site	Unknown	--
K-6720	Southeast of Barratt's Chapel, east side SR 1, near Frederica	Precontact/Historic site	Unknown	"prehistoric / historic scatters"
K-6720B	South of Barratt's Chapel, east side of SR 1	Precontact/Historic site	Unknown	"prehistoric / historic scatters"

Source: CRS files and Photographic Identification Cards; on file at DE SHPO, Dover, Delaware.



SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

- Archeological Site
- Area of Potential Effect (APE)
- Agreed Not Tested
- Tested Area
- Stream

Figure III-9
Archeological Areas
of Potential Effect (APE)

1,000 0 1,000
Feet

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3. Historic Architectural Resources

Within the defined APE, historic architectural resource surveys were first conducted in 2003 and continued until 2008. They included examination of all buildings within the APE. Historic maps were used to determine approximate dates of construction for resources and properties previously evaluated for National Register eligibility.

As part of the historic identification for architectural resources, all properties dated through 1960 on the east side of SR 1, and properties primarily dating through 1954 on the west side of SR 1 were surveyed for the National Register of Historic Places.

In all, a series of separate reports or supplements (see links below) were generated to help identify historic properties. Results of eligibility assessments and other boundary clarifications were all confirmed by the DE SHPO and DelDOT in a series of stages or different volumes.

http://www.deldot.gov/archaeology/little_heaven/architectural/index.shtml
http://www.deldot.gov/archaeology/little_heaven/vol2/index.shtml
http://www.deldot.gov/archaeology/little_heaven/architectural/addendum_2007/index.shtml
http://www.deldot.gov/archaeology/little_heaven/bowers_beach_rd/index.shtml
http://www.deldot.gov/archaeology/historic_pres/north_frederica/index.shtml
http://www.deldot.gov/archaeology/barratts_chapel_rd/index.shtml

Based on background research efforts and coordination with the DE SHPO, five (5) individual cultural resources with properties listed in or eligible for the NRHP were confirmed, as shown on **Table III-10** and **Figure III-10**. Please see the Section IV of this EA for a a detailed description and evaluation of impacts to these resources.

Table III-10: Surveyed Historic Architectural Resources in the APE

CRS No.	Resource Name/Address/Location	Resource Type	Age (approximate)	National Register Status
K-137	Jehu Reed House, 7585 Bay Rd.	Residence/mansion; former farmstead	circa 1770	Listed (Criteria A & C)
K-103	Barratt's Chapel and Cemetery, 6416 Bay Rd.	Church and Cemetery	circa 1780	Listed (Criteria A & C)
K-2686	Thomas James House, 628 Clapham Rd.	Residence; former farmstead	circa 1845	Eligible (Criterion C)
K-2685	Mt. Olive Colored School, 288 Clapham Rd.	African American School	circa 1923	Eligible (Criteria A &C)
K-01689	W. C. Fountain Agricultural Complex 4988 Barratt's Chapel Road	Residence; former farmstead	circa 1730	Eligible (Criteria C & D)

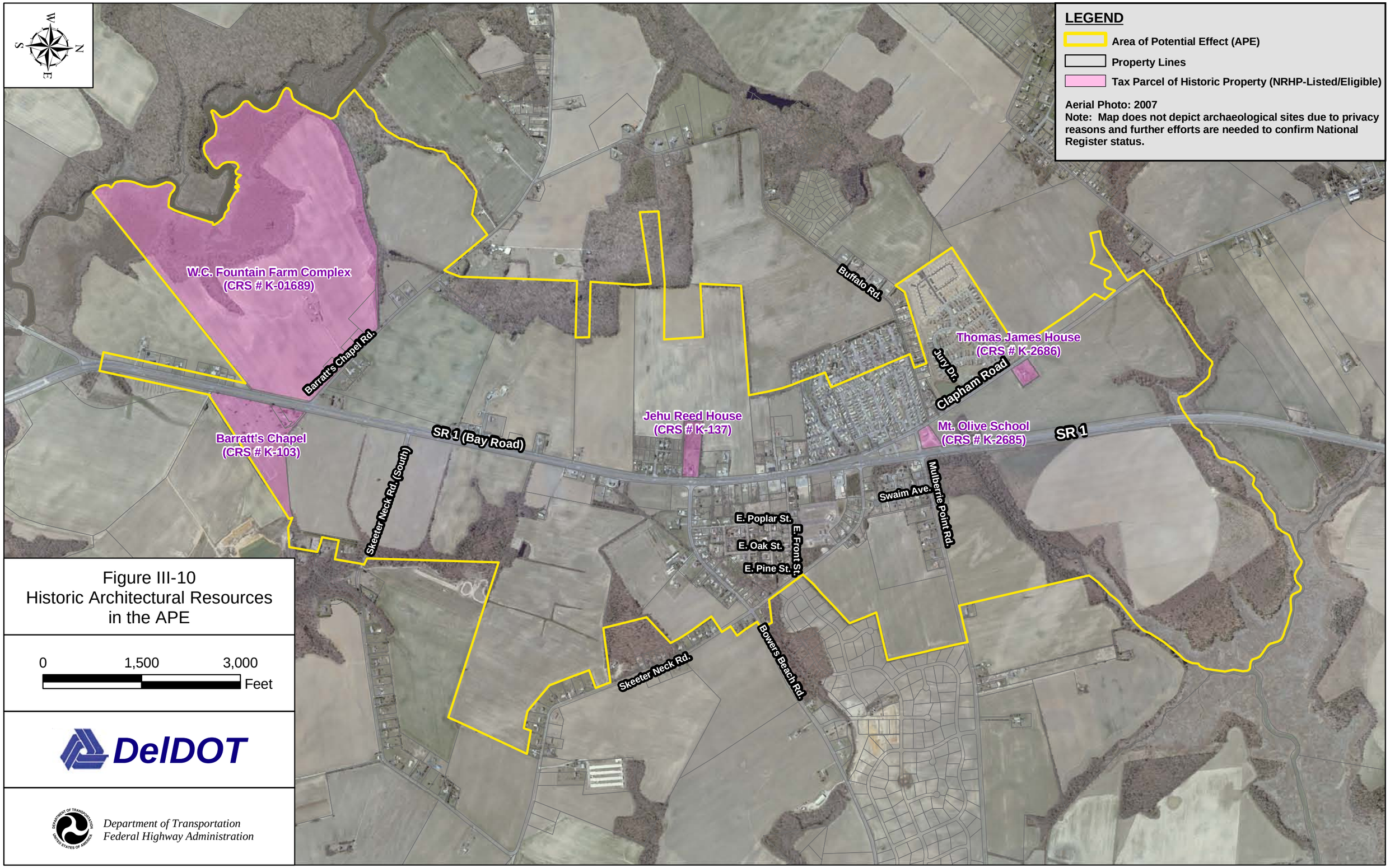
a. Impacts to Historic Resources

A Determination of Effects Report has been prepared for Section 106 compliance and is included on DelDOT's Archaeology/Historic Preservation Website: http://www.deldot.gov/archaeology/little_heaven/doe/index.shtml.

The project would have an adverse effect on the following resources:

- Jehu Reed House (CRS No. K-137)
- Mt. Olive Colored School (CRS No. K-2685)

The Section 4(f) Evaluation chapter of this Environmental Assessment discusses the avoidance, minimization and mitigation of these properties in detail. The project as an undertaking would experience some adverse effects and therefore a Memorandum of Agreement (See **Appendix A)** between FHWA, DelDOT and the DE SHPO was developed to resolve any adverse effect s that may occur as a result of implementing the project.


W
N
S
E
LEGEND
Area of Potential Effect (APE)
Property Lines
Tax Parcel of Historic Property (NRHP-Listed/Eligible)
Aerial Photo: 2007
Note: Map does not depict archaeological sites due to privacy reasons and further efforts are needed to confirm National Register status.
W.C. Fountain Farm Complex
(CRS # K-01689)
Barratt's Chapel
(CRS # K-103)
Barratt's Chapel Rd.
SR 1 (Bay Road)
Skeeter Neck Rd. (South)
Jehu Reed House
(CRS # K-137)
Buffalo Rd.
Thomas James House
(CRS # K-2686)
Jury Dr.
Clapham Road
Mt. Olive School
(CRS # K-2685)
SR 1
Swaim Ave.
Mulberrie Point Rd.
E. Poplar St.
E. Oak St.
E. Pine St.
E. Front St.
Skeeter Neck Rd.
Bowers Beach Rd.
Figure III-10
Historic Architectural Resources
in the APE
0
1,500
3,000
Feet
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C. Natural Environment

1. Open Waters and Wetlands: USACE and DNREC Jurisdictional Resources

A brief description of the open waters and wetlands follows and a summary of their functions and values are summarized in **Table III-13** and their locations shown on **Figure III-11**. A summary of the history of the wetland and waterway delineation, started in 2004 and revised in 2008 and 2009, follows. A detailed discussion of the five jurisdictional wetlands and eight waterways identified in the Project Area is provided under a separate cover in a report entitled SR 1, Little Heaven Grade Separated Intersection Project *Waters of the U.S Identification and Delineation Report (February 2004, Revised December 2008, Addendum September 2009).*

This Identification and Delineation of Waters of the U.S. Report is based on readily available secondary source information as well as detailed field reconnaissance. The Routine On-Site Determination Method in accordance with the Corps of Engineers Wetlands Delineation Manual (USACE, 1987) was used to identify and delineate the wetlands within the Project Area. The presence of hydric soil, hydrophytic vegetation, and wetland hydrology was documented for each area determined to be a wetland. Federal and state permits will be necessary prior to initiating any fill or encroachment (e.g. filling, draining, crossing, etc.) activities in the identified wetlands.

a. History of Project-level Open Water and Wetland Delineation

Surface water and wetland inventories, field investigations and delineations were conducted in the Project Area in 2003/2004 and 2008. The inventories included a review of the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) Mapping, the Natural Resource Conservation Service of the United States Department of Agriculture Soil Survey of Kent County, Delaware Natural Resources and Environmental Control's (DNREC) System-Wide Monitoring Program (SWMP) wetland mapping (Frederica, DE) and field reconnaissance surveys.

Field investigations and delineations of water and wetland resources were conducted throughout the Project Area to satisfy the requirements of the U.S. Army Corps of Engineers (USACE), which has jurisdictional authority over the Waters of the U.S., including wetlands, under the purview of Section 404 of the Clean Water and the requirements of DNREC under the purview of Chapter 72 Subaqueous Lands Act of Title 7. These field delineations, completed on October 29, November 3 and 17, December 17, 2003 and June 9, 2004, determined that six wetland areas exist within the project study area. Following the November 2004 USACE Jurisdictional Field view, two of the six wetlands areas were determined to not meet jurisdictional determination criteria and were removed from the plan, leaving four jurisdictional wetland areas (Wetland 1, 3, 5 and 6) and three waterways (WA 1, WA 2 and WA 3) located in the Project Area.

The project was placed on-hold until 2007 due to budgetary constraints. In September 2007, the Project Area was re-evaluated for compliance with new waterways guidance. In addition, new areas associated with an expanded project study limit were surveyed in January 2008 for additional wetlands and waterways as shown on **Figure III-11**. This survey did not identify any additional wetland areas and eight waterway areas, bringing the total wetlands identified to four and the total waterways identified to eleven. However, during a USACE Jurisdictional Field Review of the resources in the expanded Project Area conducted in July 2008, one previously identified wetland (Wetland 5) was determined to not meet the three wetland criteria; therefore there are only three Jurisdictional wetlands within the Project Area, those consisting of Wetlands 1, 2 and 6.

2. Jurisdictional Open Waters

The field delineations of the Project Area identified eight additional waterways, three along Barratt's Chapel Road (WA 6, 7 and 8), four waterways associated with the extended portion of WA 2 (WA 9, 10, 11 and 12) and a waterway located adjacent to the Skeeter Neck Road/Bower's Beach intersections (WA 13). Combined with the previous survey results, there were 11 waterways identified in the Project Area, including the previously identified WA 1, WA 2 and WA 3. Seven of these are relatively permanent waterways (RPW), which are defined as waterways that have relatively permanent waters at least three months of the year. All seven RPW waterways were reviewed in the field by USACE on July 31, 2008 and determined to be jurisdictional, including WA 2, 3, 9, 10, 11, 12, 13 from the 2004 delineation.

WA 1, a previously identified waterway, and the three non-RPW waterways, as well as a portion of WA 3 were identified as non-jurisdictional by the USACE representative and are depicted as non-jurisdictional wetlands and waterways on **Figure III-11**. These waterways have been removed from the following discussion. The seven jurisdictional waterways within the Project Area are WA 2, 3, 9, 10, 11, 12 and 13.

A final identification and delineation of "Waters of the U.S." was conducted for this project on April 16, 2009 for the area in the vicinity of the wetland mitigation site (See **Figure III-11)**. There were not any non-jurisdictional ditches were identified on the site, beyond the portion of the farm field ditch, identified by the USACE, during a previous field visit. The field reconnaissance identified two palustrine wetlands (WL and WM) and two open water channels potentially regulated by Section 404 of the Clean Water Act.

a. Impacts and Avoidance/Minimization Efforts

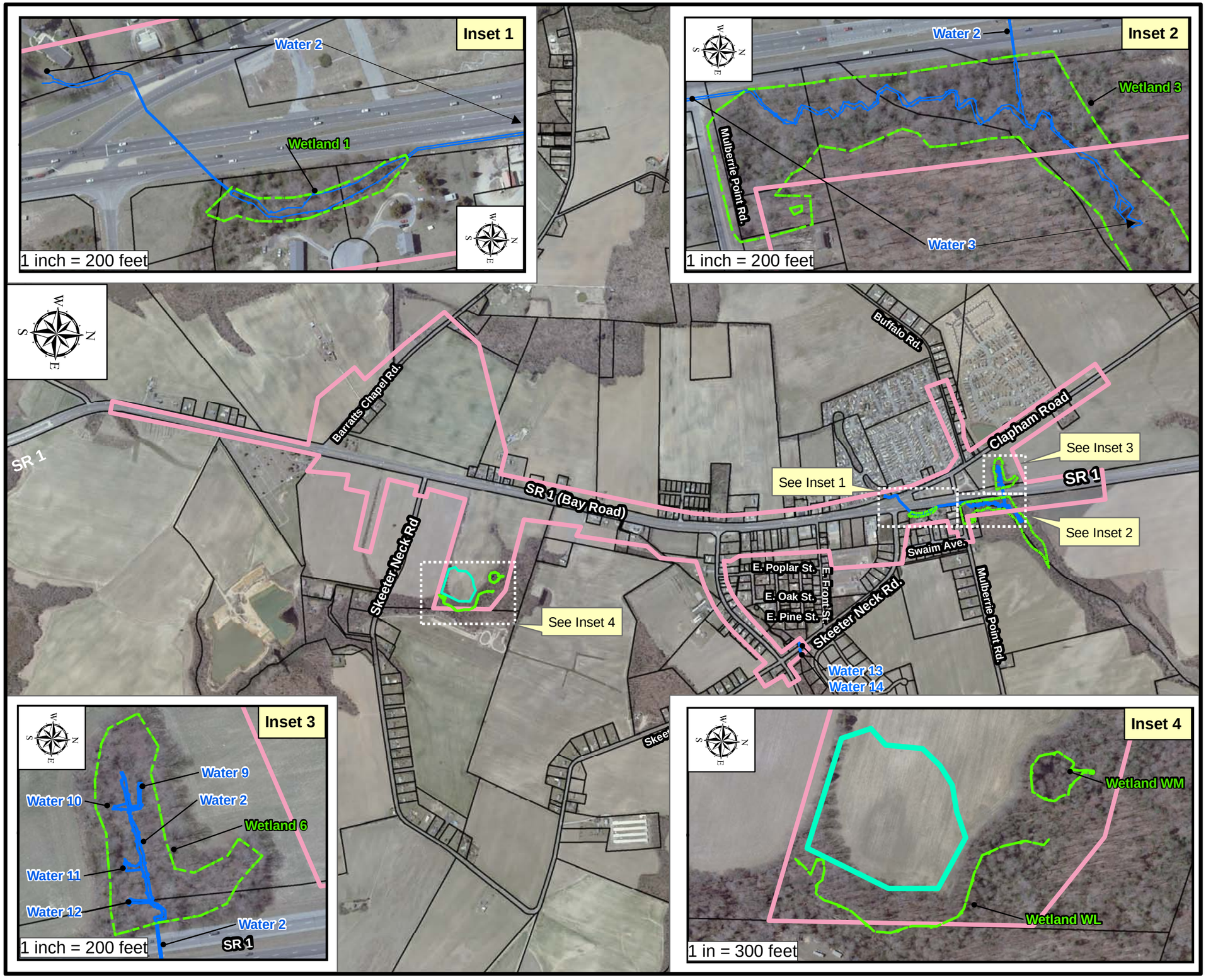
Throughout the project development process measures to avoid and minimize waterway impacts were pursued; however, it would be necessary to encroach on approximately 782 linear feet of waterway (**Table III-11**).

Table III-11: Impacts to Jurisdictional Open Waters in Linear Feet (LF)

	Jurisdictional Waters								
Alternatives	**WA 2**	**WA 3**	**WA 9**	**WA 10**	**WA 11**	**WA 12**	**WA 13**	**WA 14**	**Total**
A	115	624	--	--	--	--	--	--	739
B	115	644	--	--	--	--	--	--	759
*C	146	624	--	--	--	--	12	--	782
D	--	344	--	--	--	--	--	--	344
E	--	624	--	--	--	--	--	--	624
F	--	344	--	--	--	--	--	--	344

Note: *Alternative C is the Preferred Alternative

Additional measures to minimize impacts would continue through final design as grading and stormwater management needs are finalized. Potential water quality impacts associated with construction activities would be managed with erosion and sediment control practices, such as sediment traps, silt fences and biofiltration swales to prevent water quality problems. Sedimentation impacts should be minimal and would not have an adverse effect on the wetlands so long as strict adherence to the project's erosion and sediment control plan is carried out. Roadway pollutant impacts would also be minimized through proposed stormwater management facilities.



SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

- Wetland Study Area Boundary
- Delineated Wetlands (Jurisdictional)
- Jurisdictional Waters (Jurisdictional)
- Wetland Mitigation Site

Figure III-11
Jurisdictional Waters and Wetlands

0 1,400 2,800
Feet

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3. Jurisdictional Wetlands

There are five jurisdictional wetlands located within the project study area: Wetland 1, 3, 6, WL and WM. **Table III-12** provides a summary of the jurisdictional wetlands classification and functions.

Table III-12: Summary of Wetland Characteristics

Wetland ID	Cowardin Classification System	Dominant Vegetation	Primary Functions
Wetland 1	PFO	black gum, spicebush, royal fern, arrowwood viburnum, red maple	GWD, S/TR, NR/T, WD /A
Wetland 3	PFO	ostrich fern, American holly, summersweet, sensitive fern, greenbriar, white oak, persimmon	GWD, S/TR, NR/T, WD/A R, VQ/A, U
Wetland 6	PFO	red maple, sensitive fern, greenbriar, Japanese honeysuckle, arrowwood	GWD, S/TR, NR/T, WD /A
Wetland WL	PFO	red maple, skunk cabbage, willow oak	FA, S/TR, NR/T, WD/A
Wetland WM	PFO	red maple, silver maple	GWD, FA, S/TR, WD/A
Notes: PEM=Palustrine Emergent; PFO=Palustrine Forested; GWD=Groundwater Discharge; S/TR=Sediment & Toxicant Retention; FA=Floodflow Alteration; N R/T=Nutrient Removal & Transformation; W D/A=Wildlife Diversity & Abundance; R=Recreation; U=Uniqueness;V Q/A=Visual Quality & Aesthetics			

Wetland 1 – A PFO classified wetland located along the eastern edge of SR 1 between Mulberrie Point Road and Skeeter Neck Road. A perennial waterway bisects the wetland and continues under Mulberrie Point Road into Wetland 3. Functions and values for Wetland 1 are groundwater discharge, sediment/toxicant retention, nutrient removal and wildlife habitat.

Wetland 3 – A PFO classified wetland located in a heavily wooded area along the eastern edge of SR 1, north of Mulberrie Point Road. The wetland extends beyond the Project Area boundary to the northwest. The same perennial stream bisecting Wetland 1 traverses through Wetland 3 and is hydrologically connected to Wetland 6 via a drainage pipe under SR 1. Functions and values for Wetland 3 are groundwater discharge, sediment/toxicant retention, nutrient removal, wildlife habitat, recreation, uniqueness and visual quality/aesthetics.

Wetland 6 – A PFO classified wetland located in a wooded area along the northern edge of the Project Area between Clapham Road and SR 1. It is hydrologically connected via a pipe under SR 1 to Wetland 3. Functions and values are groundwater discharge, sediment/toxicant retention, nutrient removal and wildlife habitat.

Wetland WL – A PFO classified wetland that is seasonally flooded by the unnamed tributary that flows through the system. The wetland system is located on the outer limits of the project study area both along the east and north edge of the site. Wetland WL is hydrologically connected to the stream that flows through the system.

Wetland WM – A PFO classified wetland that is a seasonally inundated system, with strong vegetative morphological adaptations of the tree species and sparse ground cover. Wetland WM is a broadleaf deciduous forested wetland (PFO1C) that is seasonally flooded and is hydrologically connected to the unnamed tributary flowing through Wetland WL via a single outlet to the channel.

a. Impacts and Avoidance/Minimization Efforts

The following is a discussion of the wetland impacts resulting from the alternatives analysis as well as avoidance and minimization efforts taken to reduce impacts to the Project Area wetlands and waterways. **Table III-13** shows the wetland impacts associated with each build alternative.

Table III-13: Individual Wetlands: Impacts in Acres (ac.)

Alternative	Wetland Number/Existing Wetland Size within Project Area (Acre)					
	W1	W3	W6	WL	WM	Total
A	0.14	3.57	0.20	0.00	0.00	3.91
B	0.18	3.49	0.20	0.00	0.00	3.87
*C	0.276	0.472	0.241	0.00	0.00	0.989
D	0.01	0.21	0.00	0.00	0.00	0.22
E	0.276	0.21	0.00	0.00	0.00	0.486
F	0.01	0.21	0.00	0.00	0.00	0.22
*Note: Alternative C is the Preferred Alternative						

(1) No-build

Implementation of the No-Build Alternative would have no effect on the wetlands or streams in the project study area.

(2) Alternative Analysis

Alternatives A and B were evaluated for impacts to wetlands during the initial alternatives analysis as shown in **Table III-13**. Alternative A would impact approximately 3.91 acres of wetland in the Project Area, including 0.14 acres of Wetland 1, 3.57 acres of Wetland 3 and 0.20 acre of Wetland 6. Alternative B would impact 3.87 acres of wetland including 0.18 acres of Wetland 1, 3.49 acres of Wetland 3 and 0.20 acres of Wetland 6. In both cases, the alternatives would result in impacts to approximately half of Wetland 1, severely affecting the functions it provides.

In response to the significant wetland impacts associated with Alternatives A and B, these alternatives were no longer pursued and Alternatives C through F were further developed and analyzed. Their design and impact on wetlands were evaluated and presented in public workshops. The following describes these alternatives.

The Preferred Alternative, Alternative C, was originally modified in 2007 to include a portion of Barratt's Chapel Road and extensions of the Project Area along Mulberrie Point Road and Bower's Beach Road. The Preferred Alternative has been refined since the initial impact evaluation as the project was carried forward through the project development process. Modifications include the widening of the median within the northern portion of SR 1 as it approaches the intersection of Skeeter Neck at Buffalo Road and the addition of deceleration lane in the northbound lane of SR 1. These modifications result in additional wetland impacts, including 0.241 acres of Wetland 6 and an increase (0.21 acres to 0.472 acres) of impacts to Wetland 3. The entire Wetland 1 area would be eliminated by the proposed project. Overall wetland impacts increased from 0.486 to 1.026 acres.

Alternative D would involve locating the proposed bridge over SR 1 to the south in order to avoid over 3.36 acres of impacts to Wetland 3. Alternative D proposes a cul-de-sac at Skeeter Neck Road and a right-in/right-out at Mulberrie Point Road where it intersects with SR 1. This modification separates the community along Mulberrie Point Road and the Tara subdivision. Feedback obtained at a public workshop indicated that the local community was opposed to Alternative D, due to the lack of connectivity between the community and the roadway system. Additionally, Alternative D does not meet the project needs for improved transportation safety

and does not completely address the overall SR 1 Corridor Capacity Preservation Program (CCPP) initiatives. Alternative D results in 0.22 acres of wetland impacts, including 0.01 acres of Wetland 1 and 0.21 acres of Wetland 3.

Alternative E is similar to Alternative C; however, Alternative E does not provide Mulberrie Point Road with either a connection to SR 1 or the east service road. Based on feedback obtained at a public workshop, the local community stated they were opposed to Alternative E due to the lack of connectivity between the community and the roadway system. Additionally, Alternative E does not meet the project needs for improved transportation safety and does not completely address the overall SR 1 CCPP initiatives. Alternative E results in 0.486 acres of wetland impacts, including 0.276 acres from Wetland 1 and 0.21 acres from Wetland 3.

Alternative F is similar in design to Alternative C. The SR 1 overpass would be relocated to the south of the existing Bower's Beach Intersection, avoiding over 3 acres of wetland impacts to Wetland 3. Feedback obtained at a public workshop indicated that the local community was opposed to Alternative F, due to the lack of connectivity between the community and the roadway system. Additionally, Alternative F does not meet the project needs of improved transportation safety and does not completely address the overall SR 1 CCPP initiatives. Alternative F results in 0.22 acre of wetland impacts, including 0.01 acres from Wetland 1 and 0.21 acres from Wetland 3.

Although Alternatives D and F result in fewer impacts, Alternative C is proposed for further study as the Preferred Alternative because it offers a design that provides interconnectedness of the roadways, separates local and regional traffic, provides adequate access for emergency response vehicles and is the best alternative for addressing safety concerns and community cohesiveness. In addition, Alternative C was the preferred alternative design of the local community.

As noted above, the implementation of the Preferred Alternative C would result in the direct loss of approximately 1.03 acres of wetlands. As shown in **Table III-13**, the impacts would occur to three of the five wetlands within the Project Area.

Throughout the project development process, measures to avoid and minimize wetland impacts were pursued. Based on the current preliminary design it would be necessary to encroach on approximately 0.276 acres from Wetland 1, 0.472 acres from Wetland 3 and 0.241 acres from Wetland 6. Additional measures to minimize impacts would continue through final design, including the use of increased slopes or retaining walls**,** wherever practical.

The potential water quality impacts associated with construction activities would be managed with current construction practices, such as sediment traps and silt fencing, to prevent water quality problems. All of the alternatives have the potential to adversely impact water quality caused by sedimentation during construction. Prior to construction, project activities would obtain the necessary construction authorizations: sediment and erosion control, stormwater management and water quality certification. To manage the water quality impacts, DelDOT would follow standard procedures contained in the most recent *Delaware Erosion and Sediment Control Handbook* (1989), the *Delaware Sediment and Stormwater Regulations* (1991) and *DelDOT's Standard Erosion Control Details and Specifications* (2001). These procedures may include stream diversion and temporary water crossings, if necessary. For the Preferred Alternative, a detailed sequence of construction, along with an extensive erosion and sediment control plan would be developed. This erosion and sediment control plan would be included in the project documentation and approved by the Department's Stormwater Engineer.

The proposed project also has the potential for indirect impacts that could affect wetlands in the Project Area. Because the project would alter existing topography and most of the wetlands rely on surface water to provide at least some hydrologic support, there is the potential for altering the hydrologic support for the wetlands. There is also the potential of wetland impacts occurring as a result of sedimentation deposition during construction and the release of roadway pollutants (i.e. automotive oils, road-deicing agents) once the new roads are opened to travel. The extensive exposure of soil during construction activities could create sedimentation deposition in adjacent wetlands.

b. Wetland Mitigation

Throughout the project development process, measures to avoid and minimize wetland impacts were pursued; however, based on the current preliminary design, it will be necessary to encroach on 0.989 acres of wetlands. Additional measures to minimize impacts will continue through final design, including use of increased slopes and/or retaining walls where necessary. In addition, the potential water quality impacts associated with construction activities will be managed with routine construction practices, such as sediment traps and silt fences, to prevent water quality problems.

As part of the USACE permitting process, the acreage and function of the impacted wetlands will require mitigation. Wetland replacement requirements are based on the area of wetlands lost, the type of wetlands lost, and the functions and values of the wetlands and other aquatic resources impacted by the proposed project. The overall design goal for the replacement of impacted wetlands would be to replace the functions lost and the total wetland area impacted.

Three mitigation sites were identified, evaluated and later discussed with the USACE at the July 31, 2008 Jurisdictional Determination Field Review. Ultimately a preferred site was selected at a location on the east side of SR 1 in an agricultural field located between Skeeter Neck Road and a forested windbreak/drainage ditch. The site is located in the Murderkill River watershed upstream from the area of tidal influence. Existing conditions at the proposed site consists of active agricultural fields adjacent to a drainage ditch and woodland. A PFO wetland and associated perennial stream system is located on the east and southeast edge of the proposed mitigation area. Soils at the proposed mitigation site include Hammonton-Fallsington-Mullica Complex soils (HoA), zero to two percent slopes, Hammonton Sandy loam (HnA), zero to two percent slopes, Ingleside loamy sand (IeA), zero to two percent, and Fallsington loam (FgA), zero to two percent slopes. The mitigation site soils are Ingleside series, a well drained soil with a seasonal high water table at a depth of 48 to 72 inches from January to May. The Fallsington soils, located in the adjacent wetland, have a seasonal high water table within six inches of the soil surface. More detailed evaluations will be performed to determine whether site conditions are conducive for wetland replacement at Site #1. These evaluations may include the installation of groundwater monitoring wells, on-site soil testing and preparation of water budgets.

The proposed wetland mitigation may be combined with other mitigation strategies for the project, such as required mitigation for tree impacts under Delaware's *Senate Bill #324*. Coordination with the regulatory agencies in selecting the most appropriate mitigation strategies for the project will continue through Final Design. If adequate mitigation cannot be achieved with a 1:1 replacement ratio, the 1:1 wetland replacement design can be combined with a mitigation package potentially including stream restoration, wetland enhancement, riparian buffer enhancement or mitigation at a higher ratio.

c. Wetland Permits

No permits would be required for the No-Build Alternative. Approximately 0.989 acres of wetlands and 782 feet of waterways would be encroached upon as a result of implementing Preferred Alternative C. These impacts would require the following permits: Coastal Zone Management (CZM) consistency determination, an individual Section 404 Permit from the USACE, a Subaqueous Lands Permit from DNREC if impacts are within an area greater than 800 acres and a Section 401 Water Quality Certification.

4. Floodplains

There are no one-hundred-year floodplains that occur in the Project Area, therefore resulting in no impacts under any of the build alternatives. The closest one-hundred-year floodplains are located outside of the Project Area along an unnamed tributary of Trunk Ditch, northeast of the Project Area and along a tributary of Murderkill River, approximately 1,600 feet east of the SR 1/Bower's Beach Road intersection on Bower's Beach Road, east of the Project Area; and 3) along a tributary of Double Run, approximately 1,800 feet west of the SR 1/Bower's Beach Road, west of the Project Area, as shown on **Figure III-12** on page III-33.

5. Threatened and Endangered Species

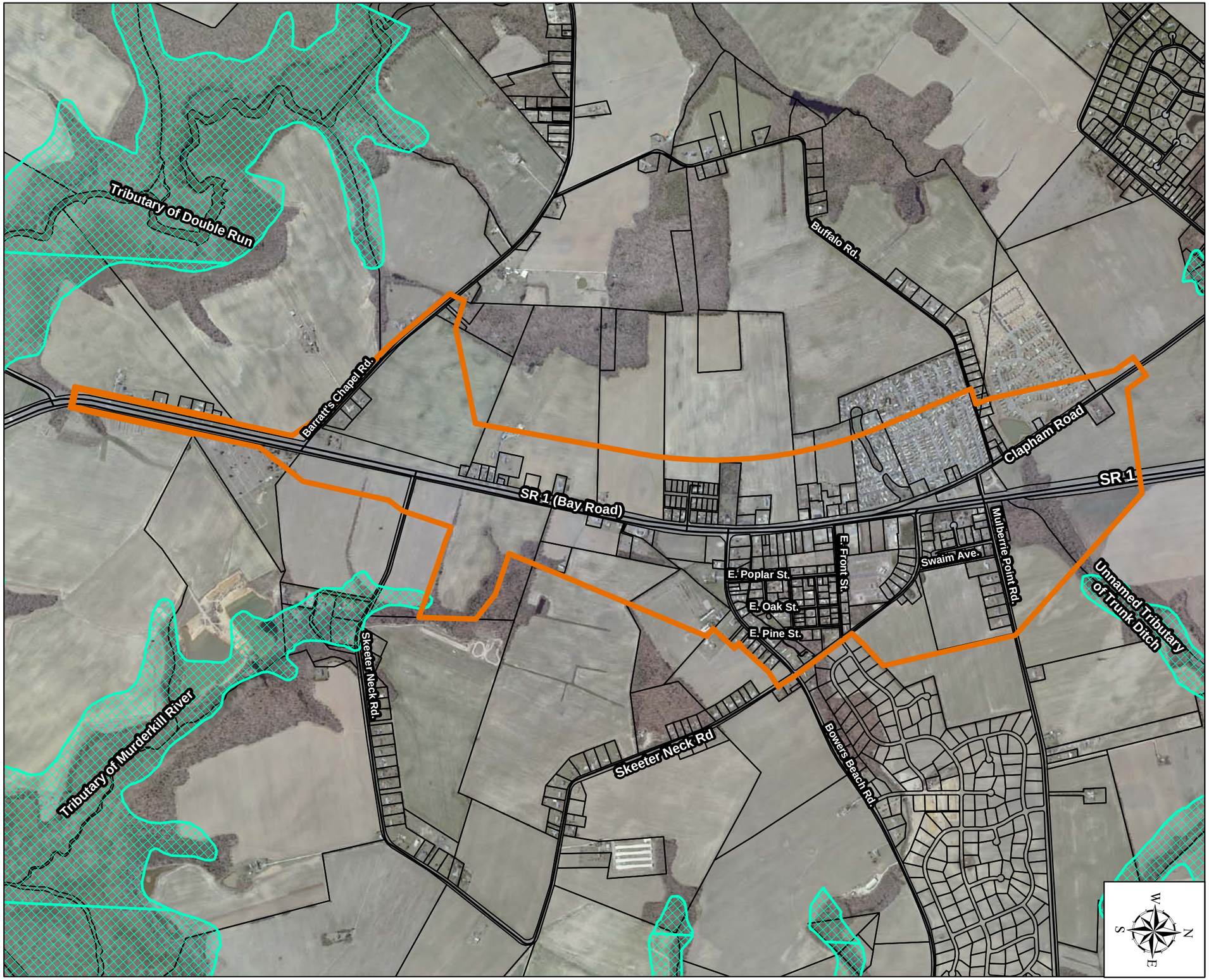
The DNREC, United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have been contacted regarding the presence of threatened and endangered species located in the Project Area. Responses have been received from all three of the regulatory agencies. According to the agencies, except for occasional transient species, there are no known threatened or endangered species that would be affected by the project (**Appendix B**).

6. Air Quality

The SR 1 Little Heaven Grade Separated Intersection is located within the United States Environmental Protection Agency (USEPA)-designated Kent County, Delaware Non-attainment Area for Ozone. This project is a safety project and the proposed construction parameters of this project will not add any vehicle miles traveled in the Project Area. This project was deemed "Not Regionally significant" by the Delaware Interagency Transportation Conformity Consultation Workgroup and therefore would not trigger a new regional analysis under the rules for transportation conformity. In concurrence with the USEPA and the DNREC, FHWA and FTA have determined that the Air Quality Conformity Determination - Kent County Portion of the 2008-2013 Delaware Capital Transportation Program for the Kent County, Delaware Ozone Non-attainment Area adequately address and meet the requirements as specified in the November 1993 Federal Conformity Rule and it's subsequent amendments. The existing Air Quality Conformity determination for Kent County, Delaware will stay in effect until Jan 9, 2010 or until such time as a new regional analysis is deemed necessary.

At a project level, there will be no meaningful changes in traffic volumes, vehicular mix, location of the existing facility or any other factor that would cause an increase in emissions or impacts relative to the no-build alternative. As such, this project will generate minimal air quality impacts for the Clean Air Act criteria pollutants and has not been linked with any special Mobile Source Air Toxics (MSAT) concerns. Consequently, this project is exempt from an analysis for MSATs.

SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment



Project Area

100 Year Floodplain

Figure III-12
Floodplains

0 1,000 2,000
Feet

DelDOT

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a. Air Quality Impacts

The project is located within the USEPA designated Kent County, Delaware Non-attainment Area for Ozone. Due to the relatively small area the proposed project covers, it is unlikely the roadway improvements will have a stand-alone affect on statewide air quality. Because a grade separated intersection lane will eliminate traffic idling, vehicle emissions concentrations in the vicinity of the project study area will be decreased and therefore the overall air quality will be improved.

Therefore, at a project level, there will be no meaningful changes in traffic volumes, vehicular mix, location of the existing facility or any other factor that would cause an increase in emissions impacts relative to the no-build alternative. As such, this project will generate minimal air quality for the Clean Air Act criteria pollutants and has not been linked with any special Mobile Source Air Toxics (MSAT) concerns. Consequently, this project is exempt from an analysis for MSATs.

Some temporary degradation of air quality may result from construction activities. This condition will be remedied at the completion of the project.

7. Noise

a. Noise Fundamentals

The descriptor selected for analysis of existing and potential noise impacts on the Project Area is the Hourly Equivalent Sound Level ($L_{eq}1h$). L_{eq} is defined as the equivalent steady state sound level, which in a designated time period (normally one hour) would contain the same acoustic energy as the time-varying sound level during the same period. The unit of measure for L_{eq} is the decibel (dB) measured on the "A" scale, commonly referred to as dBA. The dBA scale is the accepted standard measure used in assessing community noise exposure because this scale closely approximates the frequency level of the human ear.

b. Noise Abatement Criteria

Noise Abatement Criteria (NAC) for various land uses have been established by the FHWA in Title 23 of the Code of Federal Regulations, Part 772 (23 CFR, Part 772), Procedures for Abatement of Highway Traffic Noise and Construction Noise. These categories and criteria are presented in **Table III-14**. The NAC for land uses occurring in the project are included within Activity Category B.

According to the procedures described in *23 CFR, Part 772*, noise impacts occur when predicted traffic noise levels for the design year approach or exceed the NAC prescribed for a particular land use category, or when the predicted noise levels are substantially higher than the existing ambient noise levels. Noise levels are considered to be approaching the NAC when they are within one dBA, which would equate to 66-dBA for Category B land uses.

TABLE III-14: Noise Abatement Criteria (NAC), 23 CFR, Part 772
Hourly A-Weighted Sound Level in Decibels (dBA)*

Activity Category	$L_{eq}(h)$	$L_{10}(h)$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A or B above
D	--	--	Undeveloped lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

* Either $L_{eq}(h)$ or $L_{10}(h)$ (but not both) may be used on a project.
Note: These sound levels are only to be used to determine impact. These are the absolute levels where abatement must be considered. Noise abatement should be designed to achieve a substantial noise reduction - not the noise abatement criteria.

c. Data Collection

Noise monitoring for this project was conducted in 2004. Field measurements of ambient noise levels were performed for use in determining existing and future noise levels via FHWA's Traffic Noise Model (TNM) Version 2.5. Ambient noise describes the current existing noise environment. Noise measurements were performed using Metrosonics dB 308 and Metrosonics dB 3080 Noise Monitors, which recorded noise levels at one-minute intervals during a 20-minute session. Classified traffic counts and vehicle speeds were recorded during the same periods.

Noise Sensitive Areas (NSA), as defined as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals were identified in the Project Area. Receptors were selected within the NSAs to represent the overall noise environment and to determine locations where residences may be impacted by traffic noise. Seven NSAs and thirty-four receptor locations were identified in the Project Area (see **Figure III-13** on page III-37). A description of each NSA is provided below. The receptor locations along with the measured noise levels are shown in **Table III-15**.

NSA 1 consists of manufactured homes within the High Point subdivision, located west of Clapham Road in the northwest quadrant of the Project Area. NSA 1 is represented by Receptors 1, 2, 3, 4, 11 and 14.

NSA 2 consists of single-family residences, located east of SR 1 along Mulberrie Point Road and Skeeter Neck Road in the Bower's Landing Community, in the northeast quadrant of the Project Area. NSA 2 is represented by Receptors 5, 6, 7, 8, 9, 10, 12 and 13.

NSA 3 consists of single-family residences and businesses, located within the town of Little Heaven, west of SR 1. NSA 3 is represented by Receptors 16, 19 and 26. Receptor 19 was located at the National Register-listed Jehu Reed House, on SR 1 across from the intersection of SR 1 and Bower's Beach Road.

NSA 4 consists of single family residences located east of SR 1 in the Bakers Choice Community. NSA 4 is represented by Receptors 17, 18, 20, 21, 22, 23, 24 and 25.

NSA 5 consists of single family residences located west of SR 1, south of the intersection of SR 1 and Bower's Beach Road. NSA 5 is represented by Receptors 28 and 30.

NSA 6 consists of single family residences along Barratt's Chapel Road, west of SR 1. NSA 6 is represented by Receptor 33, located at the intersection of Barratt's Chapel Road and SR 1.

NSA 7 consists of the National Register-listed Barratt's Chapel and cemetery, located at the intersection of Barratt's Chapel Road and SR 1, east of SR 1. NSA 7 is represented by Receptor 34. Receptors 15, 27, 29, 31 and 32 were used to determine the 66-dBA noise impact contours.

Table III-15: Field Measured Noise (L_{eq}) in the Project Area

NSA	Receptor #	Location	Field Measured Noise L_{eq} 20 minutes
1	1	Clapham Road @ Jury Drive	64
1	2	Clapham Road	68
1	3	145 Willow Drive	62
1	4	Clapham Road @ Mulberrie Point Rd.	64
1	11	117 Clapham Rd.	67
1	14	195 Lake Shore Drive	66
2	5	SR 1 @ Mulberrie Pt. Rd.	72
2	6	SR 1 @ Mulberrie Pt. Rd. (Pump Station)	70
2	7	17 Swaim Ave.	54
2	8	223 Mulberrie Pt. Rd.	49
2	9	380 Mulberrie Pt. Rd.	49
2	10	55 Swaim Ave.	59
2	12	3040 Skeeter Neck Rd.	60
3	16	Flea Market on southbound SR 1	74
3	19	Jehu Reed House	68
3	26	7421 SR 1 (Bay Road)	72
4	17	Abandoned lot (adjacent to SR 1)	57
4	22	171 Bower's Beach Rd.	61
4	23	226 Bower's Beach Rd.	55
4	24	299 Bower's Beach Rd.	58
4	25	264 Bower's Beach Rd.	60
5	28	7137 SR 1 (Bay Road)	72
5	30	Residence along southbound SR 1 (Bay Rd.)	72
6	33	Corner of SR 1 @ Barratt's Chapel Road	73
7	15	Abandoned lot (adjacent to SR 1)	62
7	27	Abandoned lot (opposite Receptor # 26)	63
7	29	Abandoned lot (opposite Receptor # 28)	65
7	31	Agricultural Field across from Receptor # 30)	67
7	32	Agricultural Field across from Receptor # 30)	62
7	34	Barratt's Chapel	65

Note: Receptor numbers 13, 20 and 21 are not listed in the table due to recording equipment errors during data collection.

SR 1, Little Heaven
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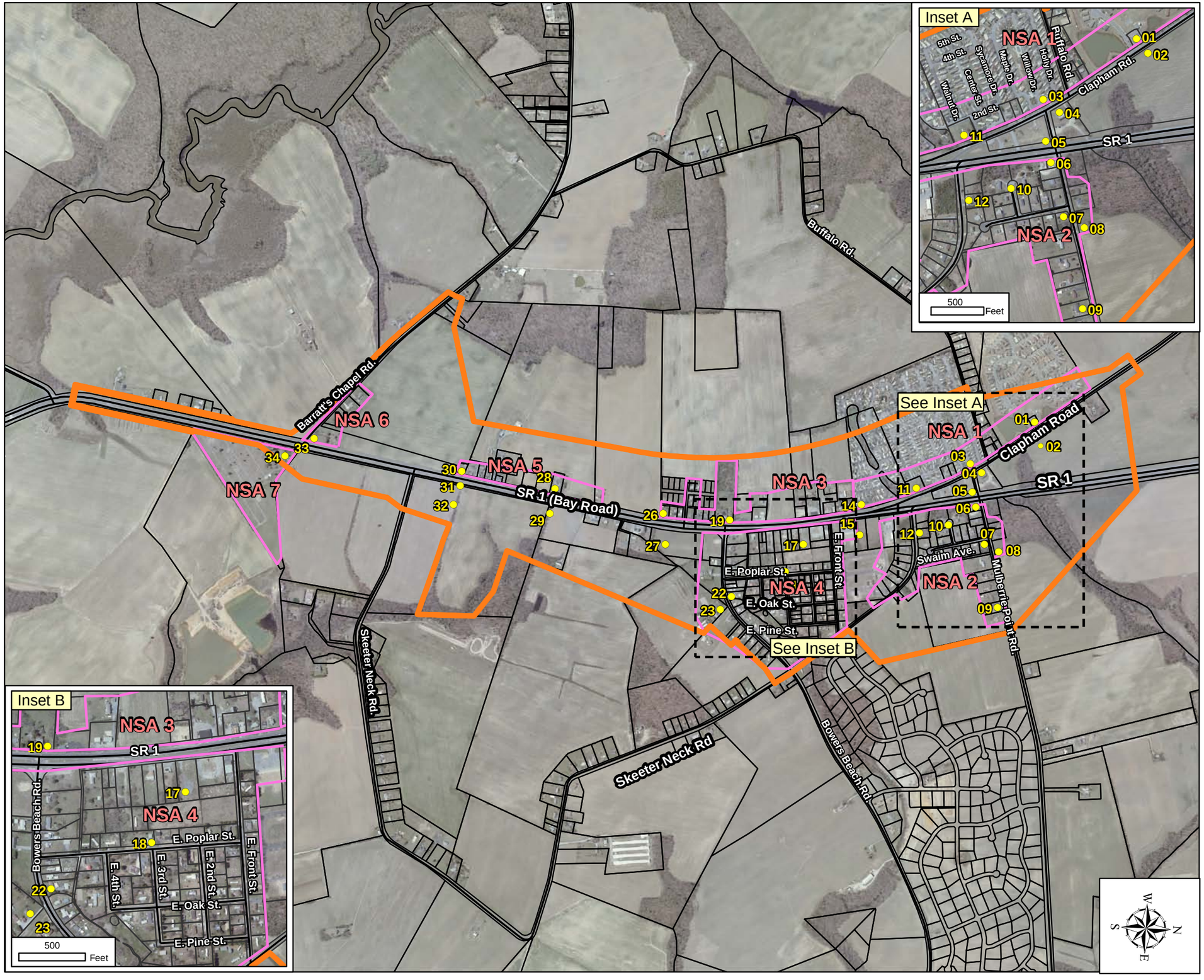

Project Area

Noise Sensitive Area (NSA) Boundary

Field Receptor

Figure III-13
Noise Sensitive Areas

0 1,000 2,000
Feet

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d. Model Calibration

A noise prediction model was created using FHWA's computer modeling software TNM Version 2.5. The model was calibrated using the locations of the field receptors, along with traffic volumes and traffic speeds measured concurrently with the noise measurements were all entered into the model. A calibrated model is expected to produce reasonably accurate noise levels anywhere within the study area under whatever traffic conditions are entered into it. A control or No-build model was developed along with models for existing noise levels and the design year 2030 no-build and build scenarios utilizing the Preferred Alternative.

e. Existing Noise Levels

To represent the existing noise environment within the entire Project Area, baseline peak noise hour conditions, statistically derived traffic volumes obtained from DelDOT were entered into the model, replacing the field-counted data. Theoretical or "virtual" receptor sites were then placed within the model in a grid pattern that included the entire study area. The model was run and noise levels were obtained for all virtual receptors. From interpolation of the model-predicted noise levels at these receptors, the 66-dBA impact contour was determined and drawn on a map of the study area. **Figure III-14** shows the 66-dBA impact contours predicted for the baseline 2004.

f. Design Year 2030 Noise Environment

The traffic data used for analysis of Design Year 2030 noise impacts were from statistical projections provided by DelDOT. Using the Summer Peak Annual Average Daily Traffic (AADT) predicted in that report for 2030, the Summer Peak Average Hourly Traffic was derived and entered into the model as the 2030 Design Year Volume (DHV), replacing the field-counted data. Since the traffic projections were only directionally distributed and not categorized by vehicle type or by its distribution across individual lanes, the traffic was assumed to have the same distribution proportions as the field-counted traffic. After adjusting the statistical traffic volumes to take into account that distribution, the traffic data was entered into the model.

Using the 2030 Peak Hour traffic volumes discussed above, the model was run and noise levels were obtained for all receptors for the No-build and Preferred Alternative models. From interpolation of the model-predicted noise levels at these receptors, the 66-dBA impact contours were determined for both sides of SR 1. **Figure III-14** shows the no-build and build conditions' 66-dBA impact contours predicted for the Design Year 2030, compared to the 66-dBA impact contours for Baseline Year 2004.

g. Impact Assessment and Mitigation

Based upon the TNM Model results, the Project Area can expect to experience a one to three dBA increase in traffic noise as a result of constructing Alternative C, the Preferred Alternative. **Figure III-14** shows the two 66-dBA impact contours as predicted for Design Year 2030, compared to the 66-dBA impact contours for Baseline Year 2004. The 66-dBA contours for 2004 and 2030 No-build are almost identical, indicating that, even with an expected increase in traffic volume, the noise environment would not change for the Project Area under No-build conditions. The 66-dBA contour for the 2030 Build generally follows the other contours; however the northbound SR 1 service road is shifted about 185 feet to the east of the existing SR 1. Since the alignment of SR 1 is shifted farther east, it is expected to have a decrease in noise levels at NSAs 3 and 5. Due to the shifting alignment, NSA's 2 and 4 will have an

SR 1, Little Heaven
Grade Separated Intersection
Environmental Assessment

- 2004 67 dBA Contour (No-Build)
- 2030 67 dBA Contour (No-Build)
- 2030 67 dBA Contour (Build - Preferred Alternative)
- Noise Sensitive Area (NSA) Boundary
- Alternative C (Preferred Alternative)
- Proposed Right-of-way

Figure III-14
Noise Impacts for 2004 No-Build and 2030 No-Build and Build

0 1,000 2,000 Feet

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increase in decibels. NSAs 1, 6 and 7 will remain about the same regardless of whether the Preferred Alternative is constructed.

The 2030 Build 66-dBA contour extends further east into the Bakers Choice Community (NSA 4) and (NSA 2); however, all of the properties within the 66-dBA contour that front existing northbound SR 1 are being relocated due to the need to acquire them for right-of-way in which to construct the relocated northbound SR 1 lanes.

NSA's 1 and 6 would exceed the 66-dBA under the existing and future build and no-build conditions; however, the 2030 Build condition's 66-dBA noise contour would recede slightly to the east due to the shift in the alignment of SR 1. Noise mitigation in the form of constructing structural walls or earthen berms would not be possible due to the numerous driveways entering onto the new west service road, nor would using them effectively reduce noise due to the number of drive-way breaks that would be needed to maintain access to the properties. Furthermore, the access provided by these driveways is essential for community mobility and, therefore, must be retained.

NSA 7, the Barratt's Chapel and Cemetery property, would experience a year 2030 Build 66-dBA noise contour that is nearly identical to its existing No-Build condition location. Mitigation will be provided to this property in the form of landscaping and tree plantings along the property's frontage.

h. Construction Noise

Temporary increases in noise levels may be attributed to construction activities. This condition would be remedied at the completion of the project. Several mitigation procedures can be followed to assist in minimizing the temporary impacts of construction noise. Adjustments to the equipment, the provision of temporary noise barriers, varying the construction activity areas to redistribute noise events, public involvement and financial incentives to contractors are alternates to decrease temporary noise impacts. These mitigation measures will be considered during final design to minimize public exposure to short-term noise impacts.

8. Hazardous Materials

To identify properties with environmental issues regarding compliance with state and federal solid and hazardous waste and underground storage tank regulations, an Environmental Site Assessment (ESA) was conducted for the Project Area, completed in April 2003. The ESA consisted of the following: a review of historical aerial photographs; a thorough inspection of the properties located within the Project Area; an examination of records of relevant federal, state and local environmental agencies; and a review of the DNREC UST Branch's project files for active LUST sites located within the project limits.

A screening of properties in the Project Area revealed that seven LUST sites were present within the Project Area. Three of the sites, Shore Stop #245 (DNREC Facility ID #1-000209), Del Gas (DNREC Facility ID #1-000154) and the William Roop Property (DNREC Facility ID #1-000490) were identified as active facilities, indicating that they are still undergoing investigation or remediation. The four other facilities, Kamar Bus Service (DNREC Facility ID #1-000283), Appel's Marine Incorporated (DNREC Facility ID #1-000321), Cain's Furniture (DNREC Facility ID #1-000475) and the Little Heaven Pump Station (DNREC Facility ID #1-000619), have been issued "No Further Action" letters from DNREC indicating that all investigative and remedial activities at these properties have been completed. A low concentration, residually contaminated soil may still be present in the subsurface at the Cain's Furniture Property, at the

Appel's Marine Property, at the Del Gas Property and at the Shore Stop #245 Property. No additional investigative or remedial work has been performed on the Roop Property since 1994; therefore, it is likely that residually contaminated soil still exists in the subsurface at the site.

The following are potential environmental conditions present within the Project Area:

Numerous properties located along the northbound side of SR 1 use individual residential water supply wells located on the individual properties for their drinking water. According to Delaware Water Well regulations, the wells would need to be properly abandoned by a Delaware-licensed well driller during any property development activities. The properties on the northbound side of SR 1 use on-site septic fields for their sewage waste disposal.

The Del Gas (Tax Parcel #SM-00-122.00-02-37.01), Conley (Tax Parcel #SM-00-122.00-02-21.00), Roop (Tax Parcel #SM-00-122.15-01-05.00) and Appel's Marine (Tax Parcel #SM-00-122.15-01-11.00) properties potentially have residually contaminated soil and groundwater related to the former presence of leaking underground storage tanks, which may be encountered during construction activities. The potential that contaminated soil or groundwater would be encountered increases with the depth of disturbance required to construct the new roadway with its associated utilities.

At the Little Heaven Towing property (Tax Parcel #SM-00-122.11-01-09.00), auto salvage material was observed on the eastern portion of the site. This is an environmental concern because oil and lubricating oils could have leaked from the salvaged cars into the subsurface at the property.

At Tax Parcel #SM-00-122.11-01-19.00, two vent pipes associated with UST's were observed on the north side of the building. On the DelDOT 1973 photo-log, the property had been a Mobil gas station. The property is not listed on DNREC's databases for UST or LUST sites. Therefore, it is likely that the property was formerly an old retail gas station that went out of business prior to 1989 when the current UST regulations were enacted. It is also likely that at least two UST's are still present in the subsurface at the site and the potential exists that soil and groundwater at the site have been contaminated as a result of releases from them.

At Tax Parcel #SM-00-122.15-01-12.00, the footprint of a former gasoline dispenser island was observed. This observation is consistent with the observation of active gasoline dispensers on the property on the DelDOT 1973 photo-log. The property is not listed on DNREC's databases for UST or LUST sites. Therefore, it is possible that the property was formerly an old retail gas station that went out of business prior to 1989. It is also possible that UST's from the former gasoline station are still present at the property.

Based on these findings, there is increased potential for encountering petroleum contaminated soil and/or groundwater, or buried solid waste during the installation of underground utilities and installation of building footers. The recommended contract item and specifications to remove and dispose of any contamination has been added to the contract in accordance with all Occupational Safety and Health Administration (OSHA), USEPA, and DNREC requirements.