2.0 ENVIRONMENTAL SETTING

Environmental factors such as geology, topography, relative elevation, soils, vegetation, and water resources are important in determining where precontact and historic period archaeological sites are likely to be located. These variables influenced what types of resources were available for utilization in a given area. This, in turn, influenced decisions regarding settlement location and land-use patterns. Because of the influence of the local environmental factors upon the precontact period populations, a discussion of the effective environment is included.

2.1 Project Location

The Wekiva Parkway corridors are located in multiple sections of Township 19 South, Ranges 27, 28, 29, and 30 East; Township 20 South, Ranges 27 and 28 East; and Township 21 South, Range 27 East (USGS Apopka, Fla. 1960, PR 1980; Sanford, Fla. 1965, PR 1988; Sanford SW, Fla. 1965, PI 1970; and Sorrento, Fla. 1960, PR 1980). The project corridor will connect I-4 on the east to US 441 just south of Mount Dora and another corridor will connect I-4 with US 441 in Apopka.

2.2 Physiography and Geology

The general PD&E Study project area is within the mid-peninsular geomorphic zone which is characterized as having discontinuous highlands forming sub-parallel ridges separated by broad valleys that roughly parallel the coast (Scott 1978, 1979; White 1970). More specifically, the project corridor traverses, from east to west, the Osceola Plain, Marion Upland, and Mount Dora Ridge. The Osceola Plain is situated between the western scarp of the Eastern Valley and the Mount Dora and Lake Wales Ridges to the west. The topography is undulating to flat, with elevations between 35 and 90 feet (Scott 1978). White (1970) suggests that the plain once consisted of a large beach and a broad lagoon. The Kissimmee River may have formed because of the drainage pattern the developed in the lagoon as the sea levels dropped. The Marion Upland rises gradually to the Mount Dora Ridge, which shares the outcrop area of Miocene rocks that are largely insoluble clastics. White (1970:128) suggests that their higher elevation may be due to their resistance of solution. These features are part of the Central Highlands.

Geologically, the area is underlain by several stratigraphic units (Scott 2001; Scott et al. 2001). The Pliocene Cypresshead Formation is a shallow marine, nearshore deposit, and is generally exposed at levels greater than 30 m (100 ft) above mean sea level. Around the Wekiva River is a zone of undifferentiated sediments from the Pleistocene/Holocene era. In addition, a portion of the central project area is underlain by the Miocene Hawthorn Group, Coosawhatchie Formation. In general, the surface lithology consists of clayey sands, medium to fine sands and silts, and shelly sand and clay (Scott 1978, 1979).

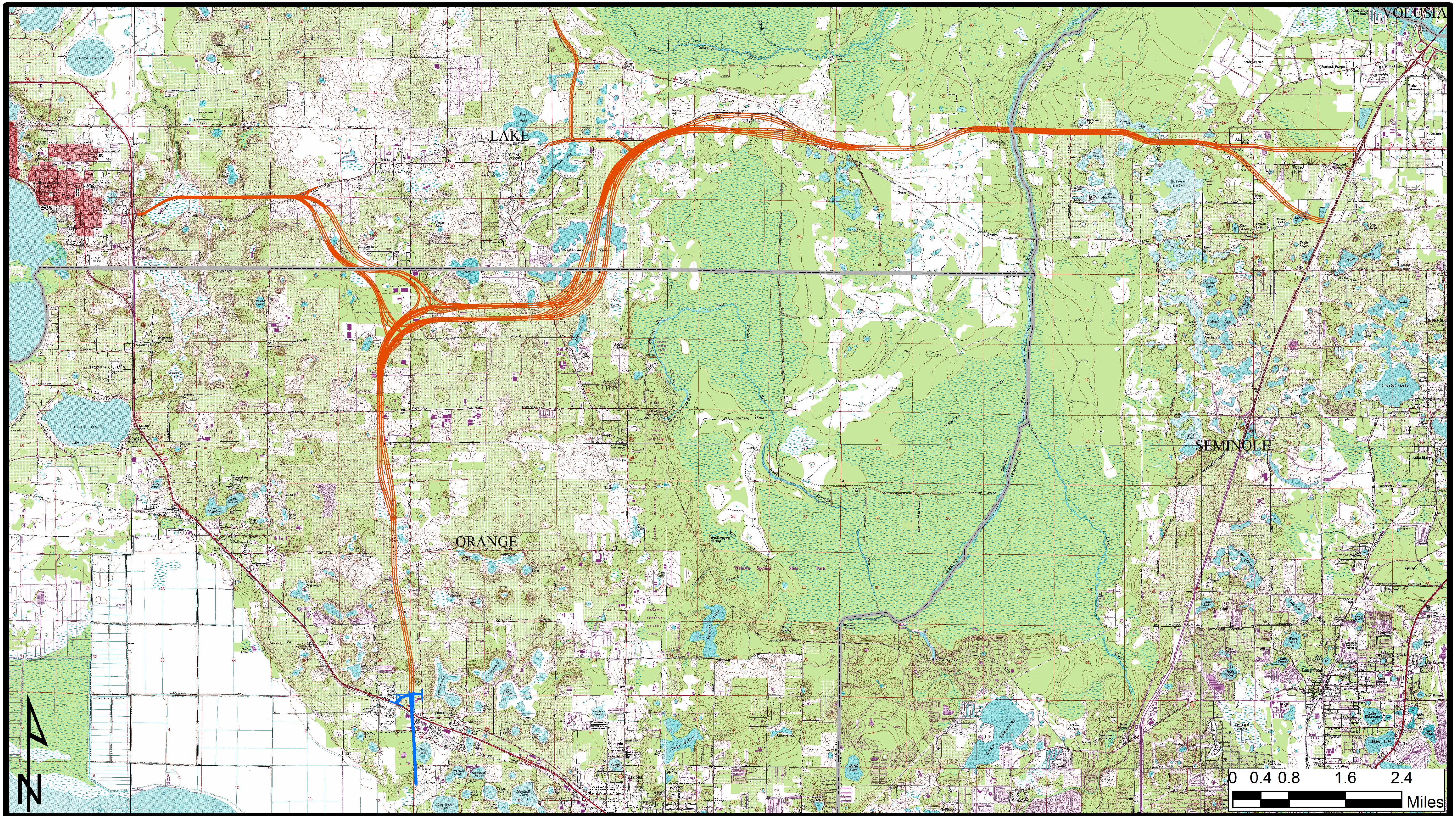

Figure 2.1. Environmental setting of the Wekiva Parkway(SR 429)/SR 46 Realignment Study in Orange, Lake and Seminole Counties, Florida (USGS Astatula, Fla. 1962, PR 1970, PI 1984; Eustis, Fla. 1966, PR 1980; Sorrento, Fla. 1960, PR 1980; Forest City, Fla. 1959, PR 1980; Apopka, Fla. 1960, PR 1980; Casselberry, Fla. 1962, PR 1980; Sanford, Fla. 1965, PR 1988; Sanford SW, Fla. 1965, PR 1970). Blue corridor is the John Land Apopka Expressway.

CRAS
WEKIVA PARKWAY (SR 429)/
SR 46 REALIGNMENT
PD&E STUDY
Orange, Lake and Seminole Counties

2.3 Lithic Resources

Stone played an important role in the lifeways of the precontact period people that lived in this part of Florida. Due to the highly acidic nature of the Florida soils, preservation of organic cultural material is quite poor. Thus, stone tools and the debris from their manufacture are by far the most prevalent archaeological material present at inland sites. Besides providing the medium which implements used in hunting, butchering, and hide processing were produced, stone was also used in the production of tools for working bone, wood, shell, and vegetal fiber (Purdy and Beach 1980).

Two kinds of lithic raw material were utilized by precontact populations in Florida, namely silicified limestone, known by archaeologists and geologists as chert, and silicified coral. Chert and silicified coral are the result of silicification of two host materials, i.e., Miocene limestone and coral, respectively (Upchurch et al. 1982).

Over the past several decades, researchers have attempted to isolate and identify the origins of specific types of chert based on physical properties, e.g., trace elements, and chemical, mineralogical, and petrological properties (Austin and Estabrook 2000; Purdy 1976; Purdy and Blanchard 1973; Upchurch et al. 1982). The most successful efforts have been produced by Upchurch and his colleagues, whose work focused on the identification of quarry clusters. Quarry clusters are defined as geographical areas containing outcrops of chert that are uniform in fabric, composition, and fossil content and which were visited and utilized by early humans (Upchurch et al. 1982). Nineteen quarry clusters were identified in Florida, as well as several subareas within quarry clusters (Upchurch et al. 1982).

The identification of quarry clusters has allowed archaeologists to recognize variation in regional cherts and place them into a spatial framework with respect to location of archaeological sites. Austin (1997) has suggested that several of the clusters be combined into 16 mega-clusters due to the lack of unambiguous criteria for assigning cherts derived from silica replacement of the Ocala Limestone to specific source areas. Estabrook, however, suggest additional work needs to be done to better define the clusters (Estabrook 2005).

The project area lies outside the boundary of any defined quarry cluster (Upchurch et al. 1982). The closest quarry clusters (QC) are the Ocala, Lake Panasoffkee, and Upper Withlacoochee located to the west. The Ocala QC cherts are obtained from the Eocene Crystal River Formation and are generally white to yellowish brown, pale grayish orange, or very pale orange. The host rock fabric is a packstone that contains large Orbitoides and Miliolids. In addition, molds of Pecten and other large pelecypods are common (Upchurch et al. 1982:125). The Lake Panasoffkee QC cherts are derived from the Alachua, Hawthorn, and/or Crystal River Formations. These are light gray or very light gray to very pale orange in color. These are identified by the large and abundant Orbitoides, the common Miliolids, and the pecten molds (Upchurch et al. 1982:127).

The Upper Withlacoochee QC cherts were formed when the Crystal River and Suwannee Limestones were replaced with various silicates. They are grayish black, medium gray, very light gray, pale yellowish orange, and/or grayish orange in color. When heat-treated, the chert becomes a moderate reddish brown (Upchurch et al. 1982:134). Miliolids are also common in these cherts. This QC also is a significant source of silicified coral.

Silicified coral is the product of the replacement of the original coral aragonite skeletal material with silicates. Such replacement often preserved the fabric of the coral resulting in the distinctive “star” pattern in the stone if it is broken perpendicular to the plant's axis. The fossil genus most common is *Siderastrea*, a fossil found in Miocene and Oligocene formations of Florida and southern Georgia (Upchurch et al. 1982). Silicified coral cannot yet be identified as to source location. Known outcrops occur in the Green Swamp and along the Hillsborough and Suwannee Rivers (Upchurch et al. 1982). Prehistoric humans frequently thermally altered silicified coral in order to improve its workability. Silicified coral that has been thermally altered often appears deep pink/red in color, possesses a waxy luster, and occasionally exhibits spalling in the form of potlid fractures, as well as small fissures known as crazing.

2.4 Soils and Vegetation

The project APE crosses through eight soil associations (USDA 1962, 1989, 1990). These associations are made up of a number of different soil types, which are presented in Table 2.1 by county. The soils associations are generally linked to an environmental setting such as sand ridges, flatwoods, and floodplains/swamps. A soil association map is not included within the Lake County Soil Survey (USDA 1975) and so the association data was obtained from the General Soil Map of Florida (USDA 1962). The APE in Lake County crosses the Lakeland-Eustis-Blanton association, the Leon-Pomello-Plummer association, and Fresh Water Marshes. The Lakeland-Eustis-Blanton association is characterized by areas of well drained to moderately well drained soils and the Leon-Pomello-Plummer association is characterized by somewhat poorly drained soils.

The project APE within Seminole County transects three soil associations. From west to east, these consist of Myakka-EauGallie-Urban land, Urban land-Astatula-Apopka, and St. Johns-Malabar-Wabasso. The Myakka-EauGallie-Urban land and St. Johns-Malabar-Wabasso associations consist of mineral soils on the flatwoods and in sloughs and depressions. These are generally nearly level and poorly drained. The former is associated with flatwoods and the latter is associated with flatwoods and sloughs. The native vegetation consists of slash pine with an understory of palmetto, grasses, and forbs. Cypress and hardwoods are in the depressions and sloughs (USDA 1990:13-14). The Urban land-Astatula-Apopka association is characterized as nearly level to strongly sloping, excessively and well-drained soils of the uplands. The natural vegetation consists of bluejack, live, and turkey oak with an understory of chalky bluestem, indiangrass, panicum, pineland threeawn, and annual forbs (USDA 1990:11-12).

Table 2.1. Soil types, environmental setting, and habitat suitability along the APE.

Soil Type and Slope	Drainage[1]	Environmental Setting	Open[2]	Wood[2]	Wet[2]
LAKE COUNTY					
Anclote fine sand, depressional	VP	depressions	VP	VP	G
Anclote, Delray, and Hontoon soils	VP	depressions, freshwater swamps and marshes on the flatwoods	VP/P	P	G
Anclote, Myakka, and Felda soils, depressional	VP	depressions and poorly defined drainageways on the flatwoods	VP	VP	G
Apopka sand, 0-5 %	W	uplands and knolls on the flatwoods	F	P	VP
Apopka sand, 5-12 %	W	uplands and knolls on the flatwoods	F	P	VP
Arents		reworked			
Arents-Urban land complex		reworked			
Bluff and Manatee soils, frequently flooded	VP	flood plains	P	P	G
Candler sand, 0-5 %	E	uplands	P	P	VP
Candler sand, 5-12 %	E	uplands	P	P	VP
Candler sand, 12-25 %	E	uplands	P	P	VP
Candler-Urban land complex, 0-5 %	E	uplands	P	P	VP
Candler-Urban land complex, 5-12 %	E	uplands	P	P	VP
Cassia sand	SWP	low ridges in the flatwoods	P	P	VP
Ellzey sand	P	broad low flats	F	F	F
Everglades muck, depressional	VP	depressions, freshwater marshes and swamps	F	VP	G
Immokalee sand	P	broad plains on the flatwoods	P	P	P
Myakka and Placid sands, 0-8 %	P/VP	broad plains on the flatwoods	F/VP	P/VP	P/G
Myakka sand	P	broad plains on the flatwoods	F	P	P
Ocoee mucky peat, frequently flooded	VP	depressions, freshwater marshes and swamps	VP	VP	G
Orlando fine sand, 0-5 %	W	ridges and knolls	P	P	VP
Orsino sand	MW	low flat ridges and low side slopes of higher sandhills	P	P	VP
Paola sand, 0-5 %	E	upland ridges	P	P	VP
Pits-Water Complex					
Placid and Myakka sands, depressional	VP	low, wet depressions and swamps in the flatwoods	VP	VP	G
Placid sand	VP	low, wet depressions and swamps in the flatwoods	VP	VP	G
Pomello sand, 0-5 %	MW	low ridges and knolls on the flatwoods	P	P	VP
Pompano sand	P	broad, low flats and in poorly defined drainageways on the flatwoods	P	P	F
Pompano, Felda, and Ocklawaha soils, depressional	VP	depressions and drainageways	VP	P/VP	G
Seffner sand	SWP	broad, low ridges and knolls on the flatwoods	F	G	VP

Table 2.1. Soil types, environmental setting, and habitat suitability along the APE.

Soil Type and Slope	Drainage[1]	Environmental Setting	Open[2]	Wood[2]	Wet[2]
Sparr sand, 0-5 %	SWP	seasonally wet uplands and knolls on the flatwoods	F	F	P
St. Lucie sand, 0-5 %	E	uplands	P	P	VP
Wauchula sand	P	low, broad areas on the flatwoods	P	P	P
		ORANGE COUNTY			
Arents		excavated soils			
Basinger fine sand, depressional	VP	shallow depressions and sloughs and along the edges of freshwater marshes and swamps	VP	VP	
Candler fine sand, 0-5%	E	uplands	P	P	VP
Candler fine sand, 5-12%	E	uplands	P	P	VP
Candler-Apopka fine sand, 5-12%	E & W	uplands, Candler sand on summit and lower side slopes, Apopka sand on upper side slopes	F	P	VP
Candler-Urban land complex, 0-5%	E	uplands	P	P	VP
Candler-Urban land complex, 5-12%	E	uplands	P	P	VP
Florahome fine sand, 0-5%	MW	uplands	F	F	VP
Immokalee fine sand	P	broad flatwoods	P	P	P
Ona fine sand	P	broad areas on the flatwoods	F	F	F
Pits		excavated areas			
Pomello fine sand, 0-5%	MW	low ridges and knolls on the flatwoods	P	P	VP
Sanibel muck	VP	depressions, freshwater swamps and marshes	VP	VP	G
St. Johns fine sand	P	broad flats on the flatwoods	F	F	F
St. Lucie fine sand, 0-5%	E	uplands	P	P	VP
Tavares fine sand, 0-5%	MW	low ridges and knolls on the uplands	F	F	VP
Tavares-Millhopper fine sands, 0-5%`	MW	low ridges and knolls on the uplands and on the flatwoods	F	F	VP
Tavares-Urban land complex, 0-5%	MW	low ridges and knolls on the uplands and on the flatwoods	F	F	VP
Urban land					
		SEMINOLE COUNTY			
Adamsville-Sparr fine sands	SWP	low ridges on the uplands and on low knolls on the flatwoods	P/F	F	P
Astatula fine sand, 0-5%	E	hillsides and ridges on the uplands	P	P	VP
Astatula-Apopka fine sands, 0-5%	E/W	hillsides and ridges on the uplands	P	P	VP
Astatula-Apopka fine sands, 5-8%	W/E	hillsides on the uplands	P	P	VP
Basinger and Delray fine sands	P/VP	sloughs and poorly defined drainageways	P	P	F/G
Basinger and Smyrna fine sands, depressional	VP	depressions	VP	VP	G
Basinger, Samsula, and Hontoon soils	VP	swamps and depressions	VP	VP/P	G

Table 2.1. Soil types, environmental setting, and habitat suitability along the APE.

Soil Type and Slope	Drainage[1]	Environmental Setting	Open[2]	Wood[2]	Wet[2]
Brighton, Samsula, and Sanibel mucks	VP	depressions and freshwater marshes and swamps	G/F		G
EauGallie and Immokalee fine sands	P	broad plains on the flatwoods	P	P	P
Immokalee sand	P	broad plains on the flatwoods	P	P	P
Myakka and EauGallie fine sands	P	broad plains on the flatwoods	F/P	P	P
Paola-St. Lucie sands, 0-5%	E	upland ridges	P	P	VP
Pomello fine sand, 0-5%	MW	low ridges and knolls on the flatwoods	P	P	VP
Pompano fine sand	P	flood plains	VP	P	F
Seffner fine sand	SWP	broad, low ridges and knolls on the flatwoods	F	G	VP
Tavares-Millhopper fine sands, 0-5%	MW	low ridges and knolls in the uplands	F	F	VP
Urban land, 0-12%					
Wabasso fine sand	P	broad plains on the flatwoods	P	F	P

1) E = excessively, MW = moderately well, P = poorly, SWP = somewhat poorly, VP= very poorly, W = well

2) Openland/Woodland/Wetland -- F = fair, G = good, P = poor, VP = very poor

The project corridor crosses two soil associations in Orange County. Both the Candler association and the Tavares-Zolfo-Millhopper association are associated with uplands and low ridges. The former consists of nearly level to strongly sloping excessively drained sandy soils. These soils are situated in broad upland areas and on ridges. The natural vegetation consists of bluejack oak, live oak, and turkey oak with an understory of chalky bluestem, lopsided indiangrass, hairy panicum, and pineland threeawn (USDA 1989:11). The Tavares-Zolfo-Millhopper soils are nearly level to gently sloping, moderately well drained and somewhat poorly drained. These are situated on low ridges and knolls in the uplands areas and on the flatwoods, and in slightly higher areas adjacent to the flatwoods. The natural vegetation consists of bluejack, turkey, live, water, and laurel oak with slash and longleaf pine. The understory consists of creeping bluestem, lopsided indiangrass, grassleaf goldaster, and pineland threeawn.

The county soil surveys provide information on the soil's ability to support various wildlife habitats (USDA 1975: Table F; 1989: Table 8; 1990:Table 8). These include openland, woodland, and wetland (see Table 2.1). Openland consists of cropland, pasture, meadows, and areas overgrown with grasses, herbs, shrubs, and vines. This area attracts a variety of bids, rabbit, and red fox. None of the soils is considered good for this wildlife habitat. The woodland wildlife habitat consists of areas of deciduous and/or coniferous plants with associated legumes, grasses, and herbaceous plants. Wildlife attracted to these locales includes turkey, other birds, squirrels, gray fox, raccoon, deer, and bear. Only the Seffner soils are ranked good for this wildlife habitat. The wetland habitats are open, marshy, or swampy shallow water areas. Wildlife associated with these locales includes ducks, geese, herons, egrets, shore birds, otter, mink, alligator, and beaver. All of the very poorly drained and depressional soils are well suited to wetland habitats.

2.5 Local Hydrology

One of the major hydrological features near the project corridor is the Wekiva River, which separates Seminole from Lake and Orange Counties. Its headwaters begin at the confluence of Wekiwa Spring Run and Rock Spring Run. The Wekiva is a major tributary of the St. Johns River. Waters forming the upper reaches of the Wekiva River arise from both the Floridan aquifer in the form of clear, natural springs and from the drainage of approximately 130 miles of watershed (FDEP 2006). Numerous lakes, ponds, wetlands, and swamps occur along the corridor.

2.6 Paleoenvironmental Considerations

Ten to twelve thousand years ago, sea levels were much lower, the climate was drier, and potable water was scarce. Dunbar (1981:95) notes that due to the arid conditions during the period 14,500 to 10,500 B.C., "the perched water aquifer and potable water supplies were absent." Pollen analyses from lake sediment cores suggest that a mosaic landscape of herb prairie and oak savanna covered central Florida prior to the arrival of the first human groups (Watts 1969, 1971, 1975, 1980). Rosemary (*Ceratiola ericodes*), ragweed

(*Ambrosia* sp.), grass species, and other composites covered the dune ridges. Scattered stands of sclerophyllous oak scrub grew in the lower, riparian areas. Pine species were rare in Florida 35,000 years ago, but increased in abundance toward the end of the Pleistocene (Watts 1975:345, 1980:400). Drier conditions are suggested by hiatuses in lake sediment cores obtained from lakes in north and west central Florida and southern Georgia (Watts 1969, 1971; Watts and Stuiver 1980). The rise of sea levels severely reduced xeric habitats over the next several millennia.

Bloom (1983) developed an approach for viewing factors involved in sea level change by emphasizing the change from water weight being tied up within the glaciers to the weight once the glaciers melted and the water returned to the ocean. Analysis of five eastern United States coastal sites support the hypothesis that post-glacial sea level rise has been sufficient to isostatically deform coastal areas. This has prompted research in the sea level records of oceanic islands as a means for testing theories of isostasy and research into the models of the Earth’s reaction to mass shifts and the subsequent effects this shifting had on sea levels (Cronin 1987). Through coastal archaeological site interpretation, Colquhoun and his colleagues (1981) present data for a gradual sea level increase by fluctuation. During the middle and late Holocene in the southeastern United States, sea level generally rose in the manner of the Shepard Curve, but through a series of fluctuations similar to the Fairbridge Curve (Colquhoun et al. 1981:147). Most researchers agree that, with minor temporal differences, the oscillation frequency is approximately 400 to 500 years and they are attributed to glacio-eustatic processes (Cronin 1987; Tanner 1992). Tanner (1992:302) states that within the last 3000 years, sea level has experienced four rises and three drops in the range of 1-3 m (3-10 ft).

Quaternary studies have shown that global sea level exceeded its present level only once during the last interglacial interval, at about 123,000 B.C. (Cronin 1987:231). Tanner's (1992:302-303) work on St. Vincent Island, Florida has shown that sea level was rising about 1000 years ago and by A.D. 1200 it began to fall. It reached its low level by A.D. 1400. That level represents the Little Ice Age (Lamb 1981). The sea level began to rise about A.D. 1750 and it continued to rise until at least A.D. 1900. Although sea level has not yet reached as high as it did on at least two previous occasions in the last 8000 years, it nevertheless now stands well above its average position for late Holocene time. Richards (1971) concluded that since the last interglacial, Florida has tectonically been stable. Studies in the Charlotte Harbor area agree in general within these conclusions (Stapor et al. 1987, 1991): from roughly A.D. 1 to 500 sea levels were roughly 1.2 m (4 ft) above today’s level and there was another “high” stand (ca. 0.3 m [1 ft] above present levels) from roughly A.D. 1000 to 1500.

According to studies by Watts and Stuiver (1980), inundation of lowland lake basins in central Florida occurred about 6500 B.C. Dunbar and Waller (1983) have noted that many Paleo-Indian sites are located near or adjacent to open karst areas (e.g. Little Salt and Warm Mineral Springs). This supports the theory that surface water was quite rare during the early human occupation of Florida (Dunbar 1981, 1991).

By 5000 years ago, a climatic event caused a brief return to Pleistocene environmental conditions that induced a change toward more open vegetation. Southern pine forests replaced the oak savannahs. Extensive marshes and swamps developed along the coasts and subtropical hardwood forests became established along the southern tip of Florida (Delcourt and Delcourt 1981). Northern Florida saw an increase in oak species, grasses, and sedges (Carbone 1983). At Lake Annie, in south-central Florida, pollen cores were dominated by wax myrtle and pine. The assemblage suggests that by this time, a forest dominated by long leaf pine, along with cypress swamps and bayheads, existed in the area (Watts 1971, 1975). By about 3500 B.C., surface water was plentiful in karst terrains and the level of the Floridan aquifer rose to 1.5 m (5 ft) above present levels. After this time, modern floral, climatic, and environmental conditions began to be established.

Faunal changes are more difficult to document due to the mixing of the species record and the lack of accessibility of sites containing faunal remains. Lists have been compiled of extinct mammal species that occupied the southeastern continent some 14,000 years ago (Webb 1981, 1990). These include giant land tortoise, giant ground sloth, mastodon, mammoth, camel, bison, giant beaver, wolf, jaguar, and horse. The predominant species were large grazers, some of which were herd ungulates (Carbone 1983:10). Within Florida, the presence of the long nosed peccary, spectacled bear, southern llama, and giant armadillo indicate that this region possessed a rich and diverse environment. Many of these animals migrated north from South America during the Great American Interchange some two million years ago (MacFadden 1997).