

CONSERVATION ELEMENT



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**Conservation Element
Data and Analysis
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CONSERVATION ELEMENT DATA AND ANALYSIS

Introduction

The purpose of the Conservation Element is to provide a guide for protection and wise use of the City's natural resources. Maintaining environmental quality is an integral part of preserving the public's health, safety, welfare. Acting in a way that is compatible with natural systems function is also important for practical reasons. For example, a better understanding of natural systems helps maximize efficiency in public infrastructure investment while minimizing cost. In Crystal River, economic benefits are significant products of resource conservation. Natural resource protection and stewardship supports overall quality of life in the community. For example, a 2002 economic impact assessment showed that Homosassa Spring Wildlife State Park in Citrus County delivered \$13.6 million worth of visitor expenditures, a level that supports 206 jobs in the County's economy. Beyond the development of recreation and eco-tourism business, there is also the prospect of further increasing the municipal tax base by attracting firms operating in emerging "green" industries. Therefore, it is clear that the challenge of effective natural resource management is a responsibility that is in the public interest. It is also an opportunity to make the City of Crystal River an even more desirable place to live and work.

To accomplish these overlapping aims, the Conservation Element works to identify, inventory and analyze the best available data about the city's landform, hydrology, natural communities, and other environmental factors. Special attention is paid to environmentally sensitive features such as hydric soils, wetlands, slopes, riparian corridors, and coastline. Once existing conditions for the area of jurisdiction are established, data and analysis develop a guide for the conservation practice and natural resource use consistent with adopted goals, objectives and policies of the local government comprehensive plan. Establishing a range of local conservation policies should have a beneficial role in implementing related comprehensive plan element content such as land use, transportation, coastal management and infrastructure. It should also increase value of planning tools used to achieve the vision of the comprehensive plan such as municipal development regulations, official maps, and building codes. While the conservation element covers many separate but interrelated topics, from air quality to wildlife habitat, the goals, objectives and policies of the element are simply intended to prevent adverse and irreversible impacts to the local environment while enhancing the natural beauty of the City. In short, the community's future prosperity depends on protection of natural resources integral to the quality of life.

It is useful to reference the definition of "conservation areas," provided in Chapter 9J-5 of the *Florida Administrative Code*. It reads:

"activities or conditions within land areas designated for the purpose of conserving or protecting natural resources or environmental quality, including areas designated for such purposes as flood control, protection of quality or quantity of groundwater or surface water, floodplain management, commercially or recreationally valuable fish and shellfish, or protection of vegetative communities or wildlife habitats."

Moreover, HB 697 (Chapters 2008-191, *Laws of Florida*) enacted changes requiring the local government comprehensive plan to implement energy efficient land use patterns and greenhouse gas reduction as part of Florida's system of growth management. Section 163.3177(6) (d) requires the conservation element to explicitly consider those factors as related to energy conservation. This means that increasing attention will need to be paid to identifying, conserving and protecting natural resources that affect energy consumption. [9J-5.013(1)]

Existing Conditions

Geographic Location

The City of Crystal River is located along the Gulf of Mexico in north-central Florida. It is sited about 60 miles north of Tampa Bay, 40 miles southwest of the Ocala National Forest, and less than 10 miles west of the Withlacoochee State Forest. It is surrounded on all sides by land in unincorporated Citrus County. [9J-5.013(1) (a) (1)]

The City comprises approximately 7.8 square miles of land area, or roughly 5,001 acres. Within its corporate limits, 0.95 square miles, or almost 12% of total area, consists of water. As suggested by that statistic, the physical setting of the City is one strongly characterized by an abundance of surface water bodies including rivers, natural springs, wetlands, and tidal marshes (see Map C-1). The overall drainage pattern in Crystal River flows to the gulf via natural water bodies. Historically, the waters of Kings Bay and Crystal River have supported shell fish harvesting in coastal areas (see Map C-2), while there has also been commercial fishing in Gulf of Mexico; and those activities continue into the present. Therefore, in all cases, it is clear that water quality is an issue with broad impact on quality of life in Crystal River. [9J-5.013(1) (a) (1)]

Moreover, Florida has the largest concentration of natural springs in the world, and there are about 40 individual springs in Citrus County alone. The Kings Bay Spring Complex is composed of more than 30 individual springs. Kings Bay Springs is a first magnitude spring delivering an average flow of more than 79.142 million cubic feet of water per day. The City of Crystal River is located adjacent to the spring head in Kings Bay. The Crystal River is entirely spring fed and forms the spring run where fresh water travels to Crystal Bay and ultimately discharges to the Gulf of Mexico. Outside the city to the south, Homosassa and Chassahowitska are remaining first magnitude springs in Citrus County. A number of smaller second and third magnitude springs exist in the vicinity of Crystal River, including the recently acquired Three Sisters Spring complex located within city boundaries. [9J-5.013(1) (a) (1)] Wetlands found in Crystal River are either associated with the Kings Bay spring complex and spring run or are isolated freshwater wetlands associated with poorly drained areas (see Map C-3). Riverine wetlands in Crystal River are associated with riverbanks that are flat to gently sloping. Water

access generally results from the construction of man-made end canals. The natural riverbank is characterized by the typical gently sloping banks (often submerged during the rainy season). The freshwater isolated wetlands include areas of poorly draining soils, or shallow ponding areas dug for drainage retention. [9J-5.013(1) (a) (1)]

Topographic Setting

The City of Crystal River is located in both Coastal Swamp and Gulf Coastal Lowlands physiographic regions. Both regions parallel the Gulf Coast of Florida. In Citrus County, Gulf Coastal Lowlands extend inland from the Gulf of Mexico with distances of between 15 and 30 miles, terminating at the western edge of the Brooksville Ridge. Elevations within this area range from mean sea level at the Gulf shoreline to about 60 feet above mean sea level near the Brooksville Ridge.

Land elevation in the coastal swamp tidal marshes ranges from mean sea level to about 10 feet above mean sea level. [9J-5.013(1) (a) (1)] Wetlands, in particular, play a vital part in the hydrology of Crystal River. Wetlands physically slow down the flow of water discharging into surface water bodies. The longer the water remains in the wetlands, the greater the amount that infiltrates the aquifer. Also, the water quality changes as it enters and passes through the wetland area to enter the bay. By decreasing the water flow velocity, the wetlands cause sedimentation of potential pollutants (e.g., suspended solids, toxic substances, and particulates) that can have a severe deteriorating effect on the surface waters.

As gravity carries runoff from higher elevations to Kings Bay, wetlands also provide stormwater treatment in the form of vegetative uptake of nutrients (nitrogen and phosphorus) in runoff that would otherwise promote eutrophication in the bay. Significant nutrient issues include the proliferation of invasive aquatic weeds such as hydrilla, which crowd out native sea grasses, the preferred forage for manatees. Excess nutrients entering Kings Bay also promote the growth of algae, such as lyngbya, in the water column. Lyngbya covers over sea grass beds but when suspended in the water column also diminishes water clarity, thus reducing sunlight needed by submerged aquatic vegetation. [9J-5.013(1) (a) (1)]

Climate

The climate of Crystal River is characterized by long, warm humid summers and mild winters. Climatological data was obtained from the National Oceanic & Atmospheric Administration (NOAA) through the National Climatic Data Center (NCDC). While there are no monthly station climate summaries for Crystal River, information is available for the nearest weather observation station located in Inverness.

Annual mean temperature in Crystal River is 70.3 F. In summer, average high temperatures range above 90 F with an average daily maximum temperature of 91.1 F and a daily low around 70.8 F. July is the hottest month with a mean temperature of 81.5 F. Winters in Crystal River are typically warm. It is possible for the City to experience cooler air from the north, but such events infrequently lead to actual ground freeze conditions. Average high temperature in winter months is 72.8 F contrasted with a low of around 60 F. January is the coldest month with a mean

temperature of 57 F. The City of Crystal River is located in USDA Plant Hardiness Zone 8b, which has a range of extreme winter low temperatures from 15 F to 20 F.

Rainfall occurs throughout the year, and precipitation is adequate to support agriculture. On rare occasions, hurricanes or coastal storms do occur in the area. The total annual mean precipitation is 51.77 inches. The months of July through September offer the most rainfall. For the period between 1971 and 2000, over half of the total annual precipitation occurred during these four months.

Aquifer System and Hydrology

The Upper Floridan Aquifer, the freshwater portion of the Floridan Aquifer, is the most important potable water source for Crystal River. The quality of water from the aquifer may vary depending on individual wells. Typically, it ranges from hard to very hard. In general, water quality deteriorates at depth, toward coastlines and in riverine and swampy lowland areas. The important indicators of groundwater availability are aquifer thickness and recharge potential.

Crystal River is located entirely within the Southwest Florida Water Management District's Coastal Rivers Basin. In generalized terms, the basin is comprised of sediment and limerock features, which form various confining layers. The Upper Floridan Aquifer is the sole source of potable groundwater for public supply in the basin. Within coastal locations, there is a range of salinity generally moving from saline to fresh water. The potentiometric surface, or the fluctuating shape of groundwater flows inside the aquifer, varies between 5 to 10 feet above mean sea level in the vicinity of Crystal River. Within the aquifer, potentiometric flow percolates from areas of comparatively high elevation to lower ones. Aquifer recharge takes place only in those areas where water can infiltrate the water table to reach the potentiometric surface. Otherwise, drainage occurs to surface water bodies.

This Upper Floridan Aquifer varies in thickness from 500 to 700 feet in the coastal areas to greater than 1500 feet in the eastern-most part of the basin. As found in Citrus County, the structure hydrogeology in the Floridan Aquifer lends to both productivity in terms of potential for groundwater discharge as well as vulnerability risk. The Floridan Aquifer ultimately consists of layers of porous limestone, where groundwater percolates, covered by sedimentary material nearer to the land surface. However, due to local geology, the surface of the aquifer is typically between 0-60 feet from the surface. This means that water may more directly infiltrate to the aquifer with less time spent in intermediate sedimentary layers consisting of sands on other soil types that remove dissolved solids to enhance water quality. More specifically, the Floridan Aquifer in Citrus County lacks the Hawthorne structure, which is a mixture of sand and clay soil layers that tends to function as a reserve of high quality water elsewhere in the state.

Geology

Like all of coastal Citrus County, the principal geologic unit underlying Crystal River is that of Eocene limestone, blanketed by layers of sand deposited by the Gulf of Mexico during past

geological eras. The irregular, highly solutioned limestone of the Eocene Age found in this area is covered by a layer of Pleistocene sands. Near the coast, the limestone shelf is covered by the coastal marshes. Inland, the limestone rises gently to an elevation of about 20 feet above sea level. This area may be forested. Numerous artesian springs flow from the near surface limestone, and during periods of heavy rainfall, much of the area floods to form a shallow swamp. Drainage is through natural channels, small creeks and sloughs, which empty into the coastal marshes. [9J-5.013(1) (a) (1)]

The Florida Department of Environmental Protection (DEP) provides the following definition of Eocene Ocala Group: “The Ocala Limestone consists of white to cream, Upper Eocene marine limestones and occasional dolostones. Generally the Ocala Limestone is soft and porous, but in places it is hard and dense because of cementation of the particles by crystalline calcite. The deposit is remarkable in that it is composed of almost pure calcium carbonate: shells of sea creatures and very tiny chalky particles. ...” Ocala limestone can occur relatively near the land surface at mean sea level with only a minimal depth of sand covering its structure. However, it is more typical that limestone bedrock is found at a depth of 10 to 20 feet. The extent of the Eocene Ocala Limestone ranges up to a maximum depth of 200 feet.

Below this level, the subsurface structure transitions to the Avon Park Formation. While still of the Eocene geological epoch, that strata is described as follows by the United States Geological Survey: “...The Avon Park Formation consists of cream to light-brown or tan, poorly indurated to well indurated, variably fossiliferous, limestone (grainstone, packstone and wackestone, with rare mudstone). These limestones are interbedded with tan to brown, very poorly indurated to well indurated, very fine to medium crystalline, fossiliferous (molds and casts), vuggy dolostones. The fossils present include mollusks, foraminifers, echinoids, algae and carbonized plant remains. Molds and casts of gypsum crystals occur locally. The Avon Park Formation is part of the Floridan aquifer system (FAS).”

Given this relative uniformity, the only notable commercially available mineral resource in the vicinity of Crystal River is Ocala limestone (see Map C-4). Ocala limestone is commercially mined for use in cement and as a road building material. Although Ocala limestone is common, underlying much of the state, it is found near the surface in a more limited number of places. Thus, sites where Ocala limestone is near the surface are more desirable but not necessarily more suitable for commercial mining. Site suitability is determined by applicable land use controls on a case-by-case basis. [9J-5.013(1) (a) (1)], [9J-5.013 (1) (a) (3)]

Soils

Numerous soil series are found in Crystal River and its vicinity. Best available data has been obtained from the U.S. Department of Agriculture’s Natural Resource Conservation Service (see

_Map C-5). The NRCS issued a soil survey for Citrus County in 1988. The Soil Survey of Citrus County, Florida provides a General Soils Map that provides an appropriate level of detail for planning purposes. According to the US Soil Conservation Service, there are no known erosion problems within the City limits. For the most part, soils are stable and are capable of draining adequately with improvement.

Based on that assessment, it is possible to summarize the distribution of soil types in Crystal River. Around King's Bay Bassinger-EauGallie-Myakka soils are found. These soils are nearly level in slope, poorly drained and sandy with loam material occurring at a depth of more than 40 inches.

Along US-19, north of Crystal River soils transition to Boca-Broward-Redlevel, which are soils characterized by being nearly level to gently rolling. They are found to be very poorly drained and somewhat poorly drained soils that are moderately deep to very deep bedrock; being loamy at the depth of 40 to 80 inches on the limestone shelf.

Throughout the eastern portion of Crystal River, north and south of SR 44, prevalent soils are of the Tavares-Adamsville type. These soils are generally level with the possibility of slight natural slopes. Drainage is moderate to poor. Overall, these soils have a sandy composition.

In western portions of Crystal River, north of Kings Bay, Homosassa-Weekiwachee-Durbin soils that characterize tidal marshes and coastal swamps soils are found outside of Kings Bay adjacent to Crystal River. The physical characteristics of this series are found to be nearly level, very poorly drained, mucky as well as sandy. In almost all cases, however, the soils present in the City are poorly suited for development of conventional septic systems.

Floodplain

A general definition of a "floodplain" would identify it as an area which has a one percent probability of being inundated in any year, as established by the Federal Emergency Management Agency (FEMA). Due to its location on the coast and proximity to riparian bottomland, it is not surprising that almost all of Crystal River exists in the 100-year floodplain as established by FEMA Flood Insurance Rate Maps (see Map C-6). Flood elevations and factors have been determined for flood prone areas in Crystal River.

To access the benefits the National Flood Insurance Program (NFIP), local governments are required to adopt a flood management ordinance. States also have a coordinating role. In Florida, the Department of Emergency Management acts as the state coordinating entity for the National Flood Insurance Program. As mandated by state and federal legislation, the City has adopted all necessary ordinances, through its Land Development Code (LDC) floodplain regulations. Section 3.00.00 of City code provides standards for floodplain management. The City has adopted a state required flood damage prevention ordinance. Its purpose is to minimize public and private losses by providing regulations designed to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion or in flood heights or velocities;

- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alternation of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters;
- Control filling, grading, dredging and other development which may increase erosion or flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

Clearly, the LDC is designed to minimize public and private losses due to flood conditions in areas of special flood hazard in the community. Development within the 100-year flood hazard zone, as designated in the Conservation Element, shall comply with the regulations set forth in the City's flood damage prevention regulations as also found in Section 3.00.00 of the land development code. The degree of flood protection required by the Code is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Development within floodplains will continue to be closely scrutinized to ensure compliance with established state and local regulations.

Environmental Quality

Surface Water

The City of Crystal River lies within the Southwest Florida Water Management District (SWFWMD) Coastal Rivers Drainage Basin, which extends from northern Citrus County through Pasco County. Under the federal clean water act, surface waters in Florida are classified as "Class III," meaning their quality must support recreation, as well as propagation and maintenance of a healthy well-balanced population of fish and wildlife. The Waters of Kings Bay and Crystal River classify as a Class III Surface Water and an Outstanding Florida Water. As previously noted, the Kings Bay complex includes over 30 springs within an interconnected and tidally influenced system.

In keeping with these standards of water quality, the City of Crystal River partnered with the Southwest Florida Water Management District through adoption of a Surface Water Improvement and Management (SWIM) plan beginning in 1989. A principal aim of the planning effort has been to protect surface water quality, respond to increasing nitrate concentrations, preserve natural system function, offset development as well as water access related impacts, and avoid degradation of existing conditions. In July 2000, the City enacted the currently adopted SWIM Plan that had a number of key goals that included adoption of a quantitative standard for water clarity in Kings Bay, action to address sedimentation impacting water quality, revegetation of the subaquatic zone, and habitat restoration.

There have been a number of successes to date. Continued intergovernmental coordination has successfully been organized through the inter-agency Kings Bay Working Group. To date, a six-year program of water quality monitoring has been implemented, Planning activities have also expanded to include a watershed management plan, which was completed in 2004. The Crystal River watershed management plan will address a range of water quality issues, but with a focus on helping achieve more effective floodplain protection and management. In addition, a Continuous

Deflection Separation device has been installed to intercept sediment carried in stormwater prior to discharge to Kings Bay. Finally, a wide variety of community outreach activities are coordinated on an ongoing basis to build awareness and understanding surface water quality and conservation issues.

Groundwater

As stated repeatedly and throughout this element, the Floridan Aquifer is the water supply source for municipal and private systems within Crystal River. Because the potentiometric surface is close to the land surface elevation the Floridan Aquifer is rapidly recharged, but this also means it is vulnerable to the risk of contamination. The deeper formations of the Floridan Aquifer are also a highly plentiful source of clean drinking water source for the City. In general terms, the SWFWMD Water Management plans identify the Floridan Aquifer of the northern planning district as maintaining comparatively higher ground water quality than other locations in the district’s area of jurisdiction. However, there is a need to define exact parameters when evaluating local potable water source quality.

It should be emphasized again that groundwater quality in Citrus County is typically good to excellent. But interaction of natural features of the landform with human activity has the capacity to impact groundwater resources. Many particular cases should be considered. Coastal areas may be subject to saltwater intrusion. Floodplains or wetlands may be vulnerable to elevated local levels of nitrates, sulfates, and other dissolved solids. A high rate of recharge brings proportional risk of pollutants entering the aquifer system. Given the scale of the Kings Bay Spring Complex and low coastal elevation, it is not surprising that most of Crystal River is located in an area of net aquifer discharge of between 1 to 5 inches per year. However, the pattern of discharge decreases rapidly with distance from the spring head. Much of western environs of Crystal River experience aquifer recharge up to 1 inch per year. In sum, onsite soil conditions matter when considering ground water impacts.

The Floridan Aquifer is the primary source of water for Crystal River. In Florida, potable water is regulated by the Department of Environmental Protection. Florida DEP has additional powers for monitoring and enforcement by agreement with the US Environmental Protection Agency. Potable water supply is of good quality and complies with the requirements of the Florida Safe Drinking Water Act, which establishes maximum contaminant levels for a variety of naturally occurring and man-made materials that commonly become dissolved in ground water. It is the desire of the City to work with the SWFWMD to complete update the LDR, during the first planning period, so as to implement wellfield protection standards consistent with water management district guidance. Table C-1 illustrates the quality parameters in the municipal system.

Table C-1. Ground Water Quality: Crystal River Municipal Water System

| Inorganic Contaminants | Sample Date | MCL Violation | Highest Result | MCLG | MCL |
|-----------------------------|-------------|---------------|----------------|------|-----|
| Nitrate (as Nitrogen) (ppm) | 9/2008 | No | 0.13 | 10 | 10 |
| Sodium (ppm) | 9/2008 | No | 30 | NA | NA |
| Fluoride (ppm) | 9/2008 | No | 0.53 | 4 | 4 |

Source: City of Crystal River, 2009 Annual Drinking Water Quality Report.

Note: Maximum Contaminant Level (MCL), Maximum Contaminant Level Goal (MCLG), Parts per Million (ppm), Parts per Billion (ppb)

Table C-2. Water Quality – Disinfectant or Contaminant Levels (Lead and Copper)

| Disinfectant/Contaminant | Sample Date | MCL/MRD L Violation | Level Detected (Range) | MCLG MRDLG | MCL MRDL |
|---------------------------------------|-------------|---------------------|------------------------|------------|----------|
| Chlorine (ppm) | 2009 | No | 1.2(0.5 to 1.4) | 4 (MRDLG) | 4 (MRDL) |
| TTHM (ppb) (Total Trihalomethanes) | 09/2009 | No | 1.71(1.7 to 1.72) | NA | 80 (MCL) |
| Copper (tap water) (ppm) | 10/2008 | No | None over limit | 1.3 | - |
| Lead (tap water) (ppm) | 10/2008 | No | None over limit | 0 | - |

Source: City of Crystal River, 2009 Annual Drinking Water Quality Report.

Note: Action Level (AL), Maximum Contaminant Level (MCL), Maximum Contaminant Level Goal (MCLG), Maximum Residual Disinfectant Level (MRDL), Maximum Residual Disinfectant Level Goal (MRDLG), Parts per Million (ppm), Parts per Billion (ppb)

Table C-3. Radiological Contaminants (Naturally Occurring from Erosion of Deposits)

| Secondary Contaminants | Sample Date | MCL/MRD L Violation | Level Detected | MCLG MRDLG | MCL MRDL |
|------------------------|-------------|---------------------|----------------|------------|----------|
| Alpha Emitters (pCi/L) | 9/2008 | N | 0.2 | 0 | 15 |

Source: City of Crystal River, 2009 Annual Drinking Water Quality Report.

Note: Action Level (AL), Maximum Contaminant Level (MCL), Maximum Contaminant Level Goal (MCLG), Maximum Residual Disinfectant Level (MRDL), Maximum Residual Disinfectant Level Goal (MRDLG), Parts per Million (ppm),

Historically, the SWFWMD has been active in studying and monitoring the groundwater quality throughout its area of jurisdiction. In 1998, SWFWMD published a document entitled *Origins of Nutrients in Groundwater Discharging from Kings Bay Springs*. This report studied the impact of chemical nutrient load identifying inorganic fertilizer and waste water systems as the primary cause of rising nitrate levels both in the aquifer as well as springs. The City has not discharged effluent to Kings Bay since 1992 and works to identify where improvements to water quality can be achieved, including prohibition against the use of septic tanks within the City.

Table C-4. Nitrate, Nitrite, and Ammonia Concentrations for Selected Named Springs in Kings Bay Spring Complex with Statewide Median Value (2006)

| Spring Name or Classification | Nitrate & Nitrite Concentration (mg/L) | | | Ammonia Concentration (mg/L) | | |
|---------------------------------|--|--------|---------|------------------------------|--------|---------|
| | Minimum | Median | Maximum | Minimum | Median | Maximum |
| Hunters Spring | 0.005 | 0.005 | 0.005 | 0.4 | 0.42 | 0.42 |
| Tarpon Hole Spring | 0.005 | 0.005 | 0.01 | 0.15 | 0.185 | 0.2 |
| Statewide Springs | - | 0.67 | - | - | - | - |
| Statewide 1st Magnitude Springs | - | 0.57 | - | - | - | - |

Source: *Florida Springs Initiative Monitoring Network Report and Recognized Sources of Nitrate*, Florida DEP (2010)

Ground water quality monitoring for springs in Florida is conducted by the Department of Environmental Protection. Since 1991, DEP’s Springs Monitoring Network has collected data relating to the presence of pollutants in spring waters. Nutrient over-enrichment has the potential to cause damage to the environmental quality of springs, and a variety of contaminants are tracked to help prevent impairment of subject waters. In particular, nitrogen compounds are of special concern due to their increasing concentration in surface water bodies statewide during the recent past. Known impacts resulting from elevated nitrate-nitrogen include algal or invasive aquatic plant growth leading to habitat loss. Ammonia is another nitrogen-based compound found in some springs, which tends to serve as a leading indicator of contamination problems. As a result of these concerns, the City recognizes that further action is required to safeguard the unique role springs and associated sensitive feature play in the function of natural systems. The City will utilize recommendations contained in DCA’s *Protecting Florida’s Springs: An Implementation Guidebook* to develop comprehensive plan objectives and policies as well as land development code provisions adequate to the task of protecting spring water.

Flora and Fauna

Habitat and Land Cover Summary

The physical environment of a place will determine what plant and animal communities will develop locally. A number of individual habitats, as expressed by land cover categories, may be found in

Crystal River. The following information will evaluate habitat as a function of soil type. It shows Crystal River, as a whole, is characterized by a wide mixed hardwood coniferous forest, marshes, and distribution of hardwood wetland forest. There are also notable pockets of Cypress, sandhill, freshwater and saltwater marsh classifications in the environs of Crystal River.

Plant Habitat

Soils are a critical factor in determining what variety of vegetative growth may be found in an area. Natural Resources Conservation Service *Soil Survey of Citrus County, Florida* provides a summary of the typical vegetation that may be supported by generalized soil types. It also classifies how suitable the generalized soils are for specific uses.

Additionally, data on existing vegetation was obtained from the Florida Natural Areas Inventory (FNAI) and Florida Fish and Wildlife Conservation Commission (FWC) joint Cooperative Land Cover Initiative. This effort has resulted in the broader use of local data documenting ecological conditions, yielding a framework for an integrated statewide classification structure. Results summarized below draw on this organization and are presented using the Florida Land Cover Classification System (see Map C-7).

Together NRCS soil survey and Florida Land Cover Classification System data give a complete picture of existing vegetative conditions. Yet, to gain a specific understanding of how soil relates to plant vegetation in and around Crystal River, it is necessary to establish how land cover classifications and soil types correlate. The discussion below gives a brief description of the vegetative potential of selected soils:

- Bassinger-EauGallie-Myakka: Natural vegetation consists of up to 50% slash pine and cabbage palm with an understory of saw palmetto, grasses and forbs. As improved, these soils are suitable for pasture land and residential development. Suitability for urban use should be determined on a site specific basis. These soils are located in that portion of central Crystal River which has been most heavily urbanized. Only wetland areas tend to retain either hardwood or marsh vegetation intact. However, in surrounding Citrus County, the

presence of these soils generally corresponds to Mesic Flatwoods, Sandhill, Mixed Hardwood Coniferous, Mixed Wetland Hardwoods, and Cypress Florida Land Cover Classifications.

- Boca-Broward-Redlevel: Natural vegetation consists mainly of cabbage palm and slash pine. The understory layer usually consists of saw palmetto, grasses and forbs. Cypress trees are commonly found in depressions. These areas are utilized as commercial timber or suitable for residential or pasture land development when improved. This soil type is most frequently found in association with the Mixed Hardwood Coniferous or Mixed Wetland Hardwoods classifications.
- Tavares-Adamsville: Natural vegetation consists mainly of turkey oak, live oak, water oak and longleaf pine, slash pine, scattered saw palmetto, and an understory consisting of forbs and grasses. As improved, these soils are suitable for pasture land and residential development. In Crystal River, this soil type is most associated with a range of vegetation including Mixed Wetland Hardwoods, Mixed Hardwood Coniferous and Sandhill land cover classifications.
- Homosassa-Weekiwachee-Durbin: Natural vegetation consists mainly of needlegrass rush, seashore salt grass, marshhay, cordgrass, and mangrove. Given the association of these soils with wetlands and tidal marshes, it is generally not feasible to develop urban use or impervious surface area without dredge and fill activity. This soil type is most frequently associated with Saltwater Marsh or Wetlands Forest Mix ecological community.

Animal Habitat

Located in coastal Citrus County, a diverse variety of wildlife is frequently found in or near the City of Crystal River. Common Florida wildlife found in similar locations includes bald eagles, rabbit, mink, raccoon, river otter, Virginia opossum, white tailed deer, bitterns, the Florida water rat, egrets, gallinules, heron, killdeer, limpkin, marsh hawk, rails, red-shouldered hawk, red-wing blackbird, sandhill crane, snipe, the swallow-tailed kite, American alligator, Florida brown snake, Florida cottonmouth, horn snake, southern ribbon snake, swamp snakes, water snakes, chicken turtle, Florida mud turtle, red bellied turtle, bullfrog, dwarf salamander, Florida cricket frog, and southern leopard frog.

Tidal marshes and associated estuarine areas provide habitat for gulls, brown pelicans, osprey, Florida duck and bald eagles. They also serve as a nursery and feeding area for many commercially important marine species, including oysters, blue crabs, mullet and a variety of game fish. The wetland communities have important hydrologic functions which affect water quality and quantity. Also, they absorb noise, reduce pollutants, and provide habitat for wildlife. In addition to Kings Bay and Crystal River, canals are another important category of surface water body providing habitat to aquatic species.

Because soil is a primary independent variable that helps determine what plant life may grow, soil composition plays an important role attracting animal species. Results from NRCS soil survey for Citrus County provide an explanation of the suitability of Crystal River's general location to host various types of wildlife.

Table C-5. Potential Habitat for Wildlife, Crystal River and Vicinity

| Soil Type | Openland Wildlife | Woodland Wildlife | Wetland Wildlife |
|-------------|-------------------|-------------------|------------------|
| Bassinger | Poor | Poor | Fair |
| EauGallie | Poor | Poor | Poor |
| Myakka | Fair | Poor | Poor |
| | | | |
| Boca | Fair | Poor | Fair |
| Broward | Poor | Fair | Poor |
| Redlevel | Poor | Poor | Poor |
| | | | |
| Tavares | Fair | Fair | Very Poor |
| Adamsville | Poor | Fair | Poor |
| | | | |
| Homosassa | Very Poor | Very Poor | Good |
| Weekiwachee | Very Poor | Very Poor | Good |
| Durbin | Very Poor | Very Poor | Poor |
| | | | |

Source: *Soil Survey of Citrus County, Florida*, NRCS, 1988.

Threatened, Listed and endangered species.

There is a variety of endangered and threatened species in the vicinity of Crystal River. The endangered species most commonly associated with Crystal River is the West Indian (Florida) Manatee, and the comprehensive plan's Manatee Protection Element gives a full treatment to planning for species protection. A complete table of listed, threatened and endangered species documented to be in the vicinity of the City was obtained from the Florida Natural Areas Inventory (FNAI) Biodiversity Matrix. That information follows in the Tables C-6 below:

Table C-6. Documented Occurrence of Rare Species in Crystal River

| FNAI Matrix ID | Focal Species | Scientific Name | FNAI Global Rank | FNAI State Rank | Federal Status | State Status |
|----------------|---------------|-----------------|------------------|-----------------|----------------|--------------|
| | | | | | | |

| | | | | | | |
|-------|----------------------------|---------------------------------|------|------|----|----|
| 23019 | Bald Eagle | <u>Haliaeetus leucocephalus</u> | G5 | S3 | N | N |
| 22771 | Little Blue Heron | <u>Egretta caerulea</u> | G5 | S4 | N | LS |
| 22771 | Snowy Egret | <u>Egretta thula</u> | G5 | S3 | N | LS |
| 22771 | White Ibis | <u>Eudocimus albus</u> | G5 | S4 | N | LS |
| 22771 | Wood Stork | <u>Mycteria americana</u> | G4 | S2 | LE | LE |
| 22771 | Yellow-crowned Night-heron | Nyctanassa violacea | G5 | S3 | N | N |
| 22771 | Black-crowned Night-heron | Nycticorax nycticorax | G5 | S3 | N | N |
| 22771 | Osprey | <u>Pandion haliaetus</u> | G5 | S3S4 | N | LS |
| 22284 | Bald Eagle | Haliaeetus leucocephalus | G5 | S3 | N | N |
| 22528 | Bald Eagle | Haliaeetus leucocephalus | G5 | S3 | N | N |
| 23017 | Bald Eagle | Haliaeetus leucocephalus | G5 | S3 | N | N |
| 23513 | Osprey | Pandion haliaetus | G5 | S3S4 | N | LS |
| 23264 | Manatee Aggregation Site | | GNR | SNR | N | N |
| 23512 | Sherman's Fox Squirrel | <u>Sciurus niger shermani</u> | G5T3 | S3 | N | LS |

Source: Florida Natural Areas Inventory, Biodiversity Matrix, 2010.

Largest potential for adverse impacts to existing animal species population typically results from habitat loss due to typical urbanization patterns. A primary consequence is division of local populations into smaller, more fragmented habitat pockets. To minimize the probability of future negative impacts, monitoring of the inventory of ecological communities is needed to ensure that vulnerable species are not inadvertently or needlessly impacted. Land development regulations should require monitoring and assessment to implement conservation management policies established in the comprehensive plan. While site suitability is part of the broader comprehensive planning policy, land development regulations should have a net positive impact that balances the need for growth with effective conservation and preservation of ecological communities, endangered or threatened species, and natural resource quality at large.

The municipal development review process can address landscaping and buffering requirements. Its purpose and intent is to protect and preserve the appearance, character and value of adjacent land uses. City requirements focus on landscape buffering to screen lower intensity uses from the sight, glare, light and noise intrusion of higher intensity. Hedging and buffering utilizing existing native vegetation can promote both the physical development pattern identified in the comprehensive plan and retain the natural character of the landform. Adherence to these standards contributes would not only enhance and preserve the native landscape but also provide valuable habitat areas and links at the site level.

Air Quality

Air pollution is not a problem in Crystal River or Citrus County, and Environmental Protection states that Agency Ambient Air Quality Standards have not been exceeded. The Florida Department of Environmental Protection (FDEP) has classified Citrus County as an *Attainment Area* which means that all controlling air quality criteria have been satisfied. Ambient air quality standards have been established to protect and enhance air quality in the state now and in the future planning timeframe. Chapter 62-2, FAC, sets forth policies that are encouraged by FDEP.

Commercial Uses of Natural Resources

There are no major extractive uses of natural resources in Crystal River. The scale of commercial fishing operations have declined following a statewide commercial net ban in the 1990s. Those existing commercial fishing operations are a welcome addition to the local economy, and fishing remains a productive enterprise locally. In 2004, almost 1 million pounds of fish and 1.49 pounds of shell fish were harvested by boats landing in Citrus County. The Florida Fish and Wildlife Conservation Commission closely monitor fish and shellfish populations to ensure viability. For the past several years scalloping restrictions were set in place. However, the return of scallop populations has allowed for the resurgence of this seasonal activity. Changes to management techniques are periodically needed to protect fisheries resources and maintain viable populations in Citrus County. Restrictions on fishing activity represent a short term economic loss but are clearly aimed at a sustainable fisheries economy.

Given the recent purchase of the Three Sisters Property, which hosts several natural springs, the City should consider re-inventory and evaluate all opportunities for use of nature-based tourism as part of its overall economic development planning. Kings Bay attracts over 70,000 visitors a year and is a major state recreation destination. In addition, in 2002, it was estimated that over 170,000 persons attended Homosassa Springs State Park from outside Citrus County. It is clear that Kings Bay currently functions well as a significant eco-tourism attraction not only because of its scenic beauty and high water recreation value, but principally because it is active West Indian (Florida) Manatee habitat. For all these factors, there is very real potential for dramatic improvement of the local economy through conservation activity and enhancements to existing facilities. That said, a realistic view of the challenges to new business development should be taken. Opportunities are promising, but it is equally true that most new, small businesses struggle to generate revenue. Therefore, there is a need to work with all interested stakeholders to the provide support systems for new independent eco-tourism businesses countywide.

Conservation and Recreational Uses of Natural Resources

One highly visible outcome of the conservation process is the assignment of preservation status to natural lands having high ecological value. Because conservation planning has been a required part of Florida's growth management system, it is likely that land areas deserving of conservation status already exist or have been identified. However, unmet needs may persist. At a minimum, it is always productive to confirm that policies adopted in the comprehensive plan support the role of designated conservation lands, or that new priorities identified in comprehensive plan development correspond to appropriate conservation related policies. Changing local conditions may also prompt the need to review how conservation element content in total interacts with ecosystem management and natural resource protection controls active in the City's area of jurisdiction.

Throughout much of the previous planning timeframe, the City of Crystal River has been working with Citrus County, the public, SWFWMD and other interested stakeholders in an attempt to finalize acquisition of the Three Sisters Springs. The Three Sisters Springs site is ecologically sensitive not only due to its role as part of the Kings Bay spring complex, but also in that spring waters provide winter habitat to the endangered West Indian (Florida) Manatee. Funding to purchase the Three Sisters site was assembled through an extended public and multi-agency effort with the purchase of the property completed in mid-2010. The preservation of Three Sisters Springs offers the prospect of economic as well as environmental benefits for residents.

The City of Crystal River is located near numerous conservation areas in Citrus County:

- Crystal River Preserve State Park
- Homosassa Springs Wildlife State Park
- Felburn Park
- Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area
- Waccasassa Bay Preserve State Park
- Withlacoochee State Forest
- Chassahowitzka National Wildlife Refuge
- St Martins Marsh Aquatic Preserve

Crystal River benefits from location by an abundance of conservation land that functions to offset emissions and other man-made impacts to the environment (see Map C-8). These positive effects can be enhanced by taking an area-wide approach to "green infrastructure development." Green infrastructure seeks to link managed conservation lands, surface waters, natural elements, working landscapes and open spaces into networks that maximize ecological value to a point where human populations also receive measurable benefit. Crystal River is well situated to pursue green infrastructure both as a means to ensure that quality of service is maintained for public facilities and to help achieve effective, lowest total cost solutions for infrastructure need. Green infrastructure development can deliver meaningful gains in energy conservation at all scales, from the individual building site to the region as a whole.

Multi-purpose trail development is one approach that helps provide physical connections necessary for development of integrated green infrastructure. These improvements enhance both the use and public access to conservation areas. Furthermore, they offer opportunities for pedestrian activity and biking local but function regionally to help create a connected regional network of conservation

lands. In the local context, there is also an opportunity to pursue development of “blueways” or water-based linkages. Developing connections between conservation areas is a necessary first step toward creating useful wildlife corridors that allow improved function of dedicated conservation lands and help sustain genetically viable populations of listed species.

Development Pressure

Traditionally, the relationship between real estate development and conservation stakeholders has been marked by conflict. In this familiar dynamic, the local government development review process becomes the forum through which both sides present arguments identifying the other as a barrier to realizing action consistent with the public interest. By contrast, smart growth practice recognizes the sustaining role environmental quality plays in realizing maximum efficiency and best outcomes from public investment infrastructure and services. Frequently, it is the case that the lowest total cost solution to growth related problems are also those that work most effectively with natural systems. In plain terms, smart growth is an attempt to deal with the unintended consequences of growth.

Smart growth concepts attempt to address many planning issues at once. Consequently, it is necessary here to focus on the specifics of conservation aims and development opportunities. One of the principal goals of smart growth practice, with respect to conservation, is to focus growth to environmentally suitable areas. In the City of Crystal River most of the lands in the coastal planning area have been developed, acquired by the public or are undevelopable, such as wetlands. Therefore, strategies for redevelopment need to play a significant role in mitigation of land use impacts on Kings Bay.

Although there has been a long-observed tendency for communities to promote growth on the urban edge through infrastructure development, it is equally possible to use infrastructure as the key variable to centralizing growth in areas that are appropriate and desirable from a conservation perspective, given overall conditions including environmental suitability. To this end, it may be in the common best interest of all residents of Citrus County to see the City of Crystal River pursue a moderate pace of annexation where necessary to continue to develop infrastructure capable of effectively directing growth to locations where it is suitable and to obtain physical development patterns that protect natural resources without changing the existing conditions of environmental quality.

Common smart growth strategies that reduce development pressures and integrate elements of conservation practice include establishing densities and intensities based on site suitability, designing new development with attention to its natural setting, clustering of development to preserve environmentally sensitive features onsite, compact physical development, and development of multimodal access to open space areas. Cumulatively, all these innovative land use techniques will help to support energy-efficient land use patterns and greenhouse gas reduction. The local planning agency will need to take the lead in identifying where opportunities for greater energy efficiency and conservation exist. This action may require future modification of land development regulations, or city codes and requirements may need to be modified to allow new types of land uses related to renewable energy and green technologies.

Conservation Issues

Pollution

Surface Waters

Direct point source impacts relating to suspected surface water pollution problems in Kings Bay have abated with the expansion of Crystal River's central municipal sewer service. Since 2000, the City has worked in partnership with the Southwest Florida Water Management District to implement the Surface Water Improvement and Management (SWIM) plan. Crystal River continues to participate at the intergovernmental level through the Kings Bay working group. Efforts to improve surface water quality in Kings Bay and Crystal River will continue through joint local, state and federal action in the future. Strategies used to support surface water quality in the present include use of pollution control technology to address issues of stormwater sedimentation in Kings Bay, revegetation plans, study of the factors surrounding algae and bacterial growth in the springshed, development of a citywide stormwater management plan, additional surface water monitoring tied to a measurable standard for clarity of spring waters, and community outreach and education efforts promoting the importance of conservation.

Sinkholes

There is a possibility that polluted runoff may flow directly into the Floridan Aquifer through open sinkholes. Any sinkhole open to the potable water aquifer can be a direct connection for surface water pollution. There are no known instances of groundwater pollution in Crystal River caused by sinkholes. While almost any location in the state of Florida is vulnerable to sinkhole development, many of those risks can be minimized through effective stormwater and floodplain management practice. Sinkholes in Citrus County are known and are managed to mitigate impacts to the Crystal River springs complex via groundwater interaction. In 2004, the City adopted a watershed management plan, and the Land Development Code may need to be revised to address subsidence factors as conditions change or new information becomes available.

Accidental Spills

It is not possible to eliminate the risk of accidental spilling of hazardous wastes. Nor is the City responsible for the activity of outside entities. However, through establishment of land use categories in the Future Land Use Map Series, the City has the ability to achieve land use suitability and compatibility to the degree permitted by existing conditions. Based on its location predominantly in the 100-year floodplain, most of Crystal River is not an ideal location for hazardous waste generators. Individual scenarios related to specific uses will need to be managed through implementation and enforcement of the land development code.

It may not be possible for the City to determine whether or not contamination has occurred on private property, but the City does work cooperatively with regulatory and enforcement agencies if problems are identified. Currently, there is a known occurrence of offsite contamination in the area of the Crystal Street Potable Water Supply Facility. The City has voluntarily stopped using one well onsite and is coordinating with the appropriate agencies to monitor the situation. Although clean-up is being evaluated at this time, no one option has been identified as being an appropriate solution.

The City anticipates that operations at subject well will not begin again for at least a period of 5-years.

Floodplains

Floodplains may experience higher nutrient levels due to their location in the landform, despite the success of local efforts to eliminate problematic septic tanks. Seasonal variation in the amount and frequency of precipitation may cause flooding, as can coastal storms. Drain fields become flooded by seasonally high water tables or may be impacted by various sources. Timbering, agriculture, urban lawns and yards or roads and streets are some local examples of sources that have the potential to impact the local environment. In 2004, the City of Crystal River adopted a watershed management plan, which should provide for more effective implementation of policies relating to overall floodplain management.

City codes and requirements ensure adequate floodplain management through the development review process as a participating local government in the National Flood Insurance Program. The City regulates the filling of floodplains and SWFWMD regulates water retention/detention and wetlands.

Dredge and Fill activities

A multi-jurisdictional approach is employed between FDEP, SWFWMD and the Army Corps of Engineers (ACOE). Jurisdiction is established in the early stages of permit review. Generally the ACOE steps in where navigable waters are affected. Typical permit activities in Crystal River consist of docks, seawalls and boat ramps. The City reviews all applicable parts of city codes with regard to any permit application, but jurisdiction for dredge and fill activities does not rest at the level of the city.

Natural Habitat Preservation

Some wetlands, floodplains and upland communities may suffer impairment as a direct result of land use impacts. Habitat preservation can be accomplished through land development techniques such as clustering, buffering, tree protection, habitat connectivity and limitations on impervious surfaces. The main tool employed in the City for habitat preservation is land acquisition. Land acquisition is commonly seen as the most effective technique. The location and arrangement of conservation lands is shown on the future land use map.

Aquatic habitat in the form of warm water refugia is critical to the winter survival of local populations of the West Indian Manatee. The Florida Fish and Wildlife Conservation Commission (FWC) is the primary agency for establishing protected areas and boating restrictions to preserve habitat for the Manatee. The City of Crystal River participates in a variety of manatee related initiatives that look toward habitat preservation as a primary goal.

Monitoring of environmental quality is a shared responsibility among a number of regulatory agencies. The watershed management plan will guide and help determine future policies relative to stormwater treatment and water quality. New development within the City has the potential to help address or exacerbate stormwater management problems, including water quality degradation. Existing state and local regulations are intended to prevent these problems from occurring.

SWFWMD also requires that projects treat a portion of the runoff generated. Treatment is accomplished in many cases by percolation or vegetative uptake; however, other processes such as skimming, filtration, and artificial wetlands may also be employed. [9J-5.013(1)(b)]

The City of Crystal River has committed to preserving the most ecologically sensitive areas through the comprehensive planning process. Land development regulations implement comprehensive plan policies developed to safeguard environmentally sensitive areas. The City of Crystal River works jointly at intergovernmental levels with local, state and federal agencies as well as interested stakeholders to ensure protection of environmental quality. Purchase of the Three Sisters spring site demonstrates that the City is willing to participate in direct action when necessary to acquire land for preservation of exceptional but vulnerable natural resources.

Regional Water Supply Planning

Infiltration of pollutants into the Floridan Aquifer could adversely impact groundwater supply. FDEP divides the contaminants from a potential source into two categories called *point source* and *non-point source* contaminants. A point source is defined as any discernible, confined and discrete facility that discharges pollution, e.g.; landfills, industrial plants, and service stations. A non-point source is defined as any discernible source of pollution not associated with point sources, e.g., agriculture, dense septic tank use, urban land use. [9J-5.013(1)(b)]

On December 1, 2006 the Southwest Florida Water Management District adopted a Regional Water Supply Plan (RWSP). That document assesses projected water demand and alternative sources of supply. However, the adopted RWSP did not apply to the northern planning area, which includes the City of Crystal River and Citrus County. The district's Initial Water Supply Assessment, conducted in 1998, identified the available water resources and evaluated the ability of those resources to satisfy anticipated demand. Although water resources within the northern planning area are generally in good condition, more active watershed management may be required in future years to avoid impacts to water resources. Presently, the district is working to coordinate water supply planning with Marion County and the Withlacoochee Regional Water Supply Authority (WRWSA).

In the district's northern planning area, the surficial aquifer is generally unconfined, meaning recharge varies with rainfall. The Upper Floridan Aquifer is unconfined, while the middle and lower portions are semi-confined to confined. Much of the drainage in the basin is internal to the aquifer as is typical for the karst landform. The 1998 Water Supply Assessment characterizes the northern planning district as having access to abundant fresh groundwater resources.

Having addressed the range of past action relating to water supply planning, it is likely that planning for groundwater supply will take renewed importance during the coming planning period. In 2010, the SWFWMD has been organizing the process to update its Regional Water Supply Plan. For the first time, this effort may result in a regional water supply plan for the northern planning area, which includes Crystal River. Should the Southwest Florida Water Management District adopt a regional water supply plan for northern planning area, then the City would be obligated to engage issues of water supply planning. Water management districts coordinate regional water supply planning processes statewide as needed. Acting in this capacity, water management districts evaluate water supplies first to determine if surplus resources are available to provide adequate supply for the analysis period; and, if they determine inadequate supply exists, then regional water supply plans are

developed to guide the use of water supply resources to meet need through a 20-year planning period.

Regional water supply planning efforts organized at the district-level rely on the participation of impacted local governments. Through this process, all local governments within a planning district are required to document that water supply is adequate to meet future demand. This is accomplished by developing 10-year water supply facilities work plans. Plan content includes options for alternative supply, reuse and conservation. Local governments must then subsequently incorporate work plan content into the comprehensive plan through adoption. Water supply planning issues are also a required part of local concurrency management programs.

The Florida Department of Environmental Protection's *Annual Report on Regional Water Supply Planning*, published March 2010, contains an update of regional water supply planning efforts. Excerpts of that information are included here for reference: "...The SWFWMD is updating its Regional Water Supply Plan (RWSP) with Governing Board approval scheduled for late 2010. The 2010 update will also include, for the first time, the northern planning area. .." (FDEP, 2010, p. 12)

Water Demand

Demand for potable water in the City averaged 0.7417 mgd in 2009 to 2010. The combined maximum flow capacity of the two main plants is 2.16 million gallons a day (MGD), which combines a 500 gpm (gallons per minute) design fire flow. Therefore, Crystal River only utilizes less than half of available potable water resources.

Projected demand for potable, commercial, agricultural and industrial water use is based on historical trends for average use. Any large-scale development in any land use classification could significantly alter potable water demand projections. The projections are the best indication of future use for average conditions. Table C-7 indicates the projected potable water demand through the year 2020. This table shows that current water resources will provide adequate water for projected growth in this planning period. 163.3167(13) was created to require local governments to identify adequate water supply sources to meet future demand.

Table C-7. City of Crystal River Projected Potable Water Demand, 2010 - 2020

| Year | City Potable Water Consumption (mgd) |
|------|--------------------------------------|
| 2010 | 0.7417 |
| 2016 | 0.8619 |
| 2020 | 0.9390 |

Source: Withlacoochee Regional Planning Council, 2010.

*Note: Data provided by the City of Crystal River [9J-5.013(1)(c)]

Although the City will continue to rely solely on the Floridan Aquifer for future needs, projected demand is not expected to overtax the capacity of this source. Between surplus capacity and natural recharge, there is more than enough available supply to meet future needs. The City is prepared to work with the water management district and all other interested stakeholders to plan for future use of water resources in the public interest.

Water Conservation

The City of Crystal River has an abundant water supply to serve a modest population. The City's water resources have not yet been jeopardized by drawdown due to either extreme drought conditions or excessive demand; yet the conservation of existing groundwater is a major issue. Further analysis is necessary to determine the ultimate safe yield of the region's resources, or the amount of water that can be withdrawn without causing environmental degradation. Given the City's growth projections, long-range planning on a regional basis is needed to optimize available water resources while minimizing potential impacts to associated natural resources. The SWFWMD Needs and Sources Plan identifies conservation as the first source to meet projected water demand for all major water users.

In times of severe drought conditions, the City implements all directives issued by SWFWMD. The Water Resources Act of 1972 mandated each water management district to promote the conservation, development, and proper utilization of surface and groundwater (Section 373.013,

FS). SWFWMD has incorporated water conservation policy and rule development, planning resource management, and public information. The District has a wealth of information regarding water conservation techniques for homeowners and other water consumers and is involved in a variety of water conservation initiatives to reduce demands on existing resources. These initiatives include public education and outreach programs, wastewater reuse, leak detection programs, and the promotion of water conserving landscapes such as xeriscaping.

Reuse of domestic wastewater is a beneficial water conservation measure to reduce the demand on groundwater and surface water withdrawals. Reuse in Florida has increased over the recent past. Chapter 62-610, FAC, governs the reuse of reclaimed water. Only wastewater treatment plants with a design capacity of at least 0.1 mgd can supply reclaimed water for public access reuse. Additionally, only facilities with a design capacity of at least 0.5 mgd can supply reclaimed water for residential irrigation or irrigation of edible crops.

Section 373.246, FS, enabled each water management district to formulate a plan for implementation during periods of water shortage, declare water shortage warnings, and implement water use restrictions. The intent of the plan is to provide for essential water uses (fire protection, hospitals, etc.) and ensure equity in all other uses. The SWFWMD Water Shortage Plan has a direct impact on local governments. When water plan directives are issued by SWFWMD, the City assumes enforcement responsibilities.

Hazardous Waste

Hazardous waste is defined in Rule 9J-5.003(34), FAC, as “solid waste, or a combination of solid wastes which because of its quality, concentration, or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or may pose a substantial present or potential hazard to human health or the environment when improperly transported, disposed of, stored, treated, or otherwise managed.” Wastes are generated not only by large industrial firms but by hundreds of small commercial operations, by various consumer services and by individual households. The management and control of waste problems are the concern of federal, state, regional, and local governments, ranging from federal laws addressing the disposal of nuclear wastes to local regulations banning disposal of certain wastes in incinerators.

The federal government regulates large quantity waste generators, although enforcement is carried out in Florida by FDEP. Small quantity generators are also regulated by FDEP. Because Crystal River functions as a commercial center, there are more than 100 waste generators located in its vicinity, although this figure is approximate, as the precise number is always fluctuating. However, it should be noted that most small businesses may begin and conclude operations without reporting to the state. There is always an opportunity to evaluate sites where there is the actual or perceived environmental contamination due to hazardous wastes to determine their brownfields status. Brownfields sites become eligible for a wide range of state and federal funding to support site assessment and cleanup. Currently, there are no storage/transfer facilities located within the City. The City presently utilizes the county landfill site to dispose of its conventional wastes. Although Florida Statutes prohibit disposal of hazardous waste onto the land, the Citrus County Landfill accepts small

quantities of hazardous wastes unknowingly on a regular basis. However, the landfill has established a full range of policies to effectively organize the handling of hazardous waste.

Radon Gas

Radon is an invisible, odorless, radioactive gas which occurs when uranium in phosphate deposits breaks down naturally, especially in areas where the soil has been disturbed by phosphate mining. The gas, which is found in the soil, penetrates structures through cracks in the foundation and around plumbing and electrical openings. Once inside the structure, gas continues to decay into particles which affix to dust. If inhaled, these particles can lodge in the lungs and cause lung cancer. Radon gas is able to enter structures due to the difference in air pressure between the ground and the inside of the structure. Generally, the lower pressure within a structure draws the gas into the structure.

The Florida Department of Community Affairs' Division of Housing and Community Development, Codes and Standards, has developed radon protection maps by county for the State of Florida. DCA maps identify the current incorporated limits of Crystal River as an area where passive or active radon controls are not necessary.

Conclusion

The City of Crystal River enjoys a unique position on the Gulf of Mexico, adjacent to the first magnitude Kings Bay Spring and associated spring complex. In the City of Crystal River, as elsewhere, environmental conditions and quality of life are linked. Moreover, the local economy benefits broadly from environmental attributes. Recreation and eco-tourism business attract thousands of visitors a year, create hundreds of jobs, and bring outside investment to the community. The City also depends on the function of natural systems to provide clean drinking water, minimize the risk posed by flooding and other natural hazards, maintain air quality, and enhance the aesthetic characteristics of the community. The city has a responsibility to manage its future growth in a manner that does not degrade natural systems function. Yet beyond that minimum standard, there is a larger opportunity. The City of Crystal River is strongly positioned to recognize where management of environment conditions is essential, while also using necessary ecological management processes to create a vision of urban development that is highly desirable and will compel the growth of the community into the future.

Conservation Element Goals, Objectives, and Policies

SEPTEMBER 12, 2011

Conservation Goals, Objectives, and Policies

GOAL 1: Crystal River will ensure that development does not endanger important natural resources.

OBJECTIVE 1.1 Consistent with non-degradation standard of the DEP rules for Outstanding Florida Waters, the current level of surface water quality of Crystal River and Kings Bay will be maintained and improved. Requirements for: treatment of stormwater runoff, the expansion of the City's central sewer system and service to waterfront areas, the preparation and implementation of the watershed management plan, a master drainage study, and land development regulations will be used to achieve this objective. The policies described below identify specific actions, strategies, and commitments of the City.

POLICIES

- A)** All development and redevelopment larger than a single family residence will provide treatment by best management practice prior to discharge from the site for the first one inch of sire stormwater runoff during a 24 hour rainfall event. Compliance with this requirement will be demonstrated through documentation of the selected treatment method and retained with the building permit application in the City's files.
- B)** All development and redevelopment adjacent to the Crystal River and King's Bay shall treat the first one and one-half inch of stormwater runoff. Compliance with this requirement will be demonstrated through documentation of the selected treatment method and retained with the building permit application in the City's files.
- C)** All new single family residences will provide stormwater retention in the form of swales or other basins (sufficient to retain the first one inch, or one and one-half inch on waterfront properties, of stormwater runoff) near the property boundary and landward of the mean high water line and wetland boundaries. Those single family residences within an engineered subdivision having a valid stormwater management permit and operating stormwater management system shall be exempt. Compliance with this requirement will be demonstrated through documentation and retained with the building permit application in the City's files.
- D)** The City will require waterfront lots to connect with central sewer as extended sewer lines become available.
- E)** All treatment or removal of aquatic weeds shall be consistent with Citrus County's Cooperative Agreement and State Aquatic Plant Control Program Work Plan for Crystal River and Kings Bay.
- F)** All new development will meet the standards of Chapter 62-25, F.A.C., and Chapter 40D-4, SWFWMD rules. Water quality, peak discharge, and rate of post-development runoff shall not exceed predevelopment runoff conditions. For properties which do discharge into Kings Bay or Crystal River, either directly or via

tributary or man-made structure, the volume of post-development runoff shall not exceed pre-development volume. Compliance with this requirement will be demonstrated through documentation and retained with the building permit application in the City's files.

- G)** The City shall continue to enforce regulations requiring marinas to provide pump-out facilities for boats and prohibiting the dumping of untreated sewage into surface waters of the City to require that these facilities be provided and used. In order to adequately enforce the Ordinance, the City shall carry out a program of monitoring to ensure that pump-out facilities are in place, working properly, and being used as required.
- H)** The City shall continue to implement land development regulations that apply to all "waterfront lots," defined as all property located within 150 feet of Crystal River or Kings Bay, as provided by the Land Development Code and providing for development restrictions which will provide greater environmental protection to Crystal River and Kings Bay. These will include: setback restrictions, stormwater retention standards, density restrictions, vehicular access restrictions, wetland protective measures, restrictions on the storage and disposal of hazardous materials, and impervious-to-pervious surface ratios. The purpose of the waterfront protection regulations is to ensure that all development and redevelopment is designed to maintain or improve the water quality in Crystal River and Kings Bay and ensure the protection of endangered species.

OBJECTIVE 1.2 Consistent with the stormwater LOS Standard adopted in the Plan, the City shall not issue a development order which will result in a degradation of water quality in Crystal River or Kings Bay.

OBJECTIVE 1.3 The City shall protect and conserve the natural functions of rivers, bays, wetlands, estuarine and marina habitats, in order to assure the protection of fisheries, native flora and fauna and associated habitat, and especially species designated as endangered, threatened or species of special concern under the Endangered Species Act of 1973, as amended, or the Florida Endangered Species Act of 1977, as amended. This objective is implemented through the following policies:

POLICIES

- A)** The City shall undertake the following actions in order to protect and preserve the natural functions and water quality of the rivers, bay, and associated wetlands at least to the level of quality present in 1989:
1. Continue to enforce the waterfront protection regulations contained in the Crystal River Land Development Code.
 2. Continue to enforce wetland protection regulations which define wetlands consistent with SWFWMD and which are sufficient to assure the continuing natural functions of wetlands. The ordinance should implement the following wetland policies of the City.

- a. Wetlands shall be classified as follows: Category I wetlands shall include wetlands of at least 40 contiguous acres and contain Strategic Habitat Conservation Area as identified by FGFWFC, or 50 percent wetland communities as identified on Figure 3-1 (Appendix 3). Category II wetlands shall include wetlands five (5) acres or larger, or any wetland which provides critical habitat for federal and/or state listed, threatened, or endangered species.
 - b. The City shall require identification of wetlands on any proposed development site prior to issuance of any development approval for a DRI, FQD, subdivision plat, or site plan.
 - c. The City shall not permit development within a Category I or II wetlands except for the following:
 1. clearing and/or construction of walking trails;
 2. construction of timber boardwalks/catwalks for direct access to water bodies; construction of wildlife management shelters, footbridges, observation decks and similar structures not requiring a dredging and/or filing for their replacement;
 3. developing an area that no longer functions as a wetland, provided that no wetland has been filled or altered in violation of any rule, statute or this comprehensive plan;
 4. Clearing and/or construction of electric utility infrastructure as needed to provide electric service.
 - d. New large scale commercial, highway commercial, or industrial development which occurs adjacent to Category I wetlands shall demonstrate that no significant adverse impact to the wetland will result, or that adequate mitigation/compensation will be provided to protect function and replace type for type, where such mitigation is allowable pursuant to this comprehensive plan.
 - e. The City shall require all wetland encroachments to be mitigated according to Chapter 62 and 40D-4 and Section 404, Clean Water Act, and monitored by DEP, SWFWMD and ACOE.
 - f. In combination with other goals, objectives, and polices of the comprehensive plan, the City shall protect and conserve wetlands by redirecting incompatible uses. The City shall not allow the installation of septic tanks; all development shall connect to the central sewer system.
3. Enforce the adopted Stormwater Management Ordinance to ensure that the water quality in Crystal River and Kings Bay is maintained or improved.
 4. Continue to enforce ground water protection regulations as part of the Wellfield Protection Ordinance.

5. The City of Crystal River shall maintain programs and regulations consistent with the findings and suggestions of the Crystal River/Kings Bay S.W.I.M. Plan.
- B)** The City shall protect environmentally sensitive lands and species which depend upon those lands. The City defines environmentally sensitive lands as wetlands (shown on Map C-1), coastal high hazard areas, and those lands used by endangered, threatened or species of special concern. In order to implement this objective, the City shall:
1. Maintain regulations to conserve, protect, and appropriately use environmentally sensitive lands as part of the City's land development regulations. The regulations shall apply to all land designated for Conservation on the Future Land Use Map, all wetlands, all undisturbed properties in the coastal high hazard area, and all other lands used by endangered, threatened or species of special concern. The regulations shall require field verification of wetlands with wetland boundaries based on vegetation, soils, hydrology, or some shall require completion and consistent with SWFWMD criteria. The regulations shall require completion of a survey of potential endangered, threatened or species of special concern by competent professionals as part of the development application process. The regulations shall require a determination by the City if there exists evidence of use by endangered, threatened, or species or special concerns for all undisturbed lands on which development orders are requested. For lands determined to be environmentally sensitive the regulations shall establish the maximum amount of bush-hogging, clearing and removal of trees, plants, and shrubs in sensitive areas and shall allow only that development consistent with maintaining the natural functions of these lands. [9J-5.013(3)(b)]
 2. Maintain regulations which regulate marina and dock size, location, construction, boat access. The regulations shall require an assessment of impact on endangered species. Standards for boating facility location shall include location where there is no impact on wetlands, where no dredging will be needed, and where there is no detrimental impact on the West Indian Manatee. Dry storage of boats will be given preference over wet storage. The regulations shall provide that new or expanded boating facilities will not increase the overlap of boat traffic and manatee travel, birthing, or feeding areas and will not reduce vegetation eaten by manatees.
 3. Cooperate and assist with enforcement of state and county speed regulations and the posting of educational and regulatory signs on the river and bay. Consider adoption of specific City regulations on boats speeds.
- C)** The City shall prohibit new point sources of pollution to its rivers, bays, and wetlands.

OBJECTIVE 1.4 The current level of groundwater quality will be maintained.

POLICIES

- A) No building permits will be issued for work in a wetland without prior approval from the U.S. Army Corps of Engineers, SWFWMD, and DEP.
- B) Development in wetlands will be limited to conservation, passive recreation, preservation, and elevated low density residential uses.
- C) Single-Family Homes that are permitted in wetlands will be built at or above the 100-year flood level on pilings without the use of fill material.
- D) Development in wetlands will be prohibited except where central water and sewer are available.
- E) Drainage of floodwater will not be obstructed on any portion of the 100-year floodplain.
- F) Development shall be directed away from wetland areas by clustering on the non-wetland portions of the site. The density or intensity of the clustered development shall be limited so as to not cause adverse impacts to the wetland portions of the site.

OBJECTIVE 1.5. No net loss of essential upland habitat for endangered or threatened species or species of special concern will be permitted. No loss of habitat for the West Indian Manatee will be allowed.

POLICIES

- A) All developments over four acres in total area must go through site plan approval by the City to determine if the development will prove detrimental to endangered or threatened species or species of special concern. If it is determined that the proposed development would create an adverse impact on endangered and threatened species, the City will not issue a development order for that site plan.
- B) A Habitat Mitigation and Relocation Program will be developed by 1990 to provide habitat mitigation and species relocation. Criteria for the program will include species, habitat type, and size, and size of development. The program shall be designed to ensure the continuing existence of the species to that end. The draft program shall be submitted to FFWCC, DEP, and USFWS for comment prior to adoption.
- C) Water quality sufficient to support all existing fish and wildlife species in Kings Bay and Crystal River will be maintained or improved.

OBJECTIVE 1.6 The current West Indian Manatee population in Crystal River and Kings Bay will be maintained or increased.

POLICIES

- A) The City will coordinate with U.S. Fish and Wildlife Service (USFWS) in establishing a Manatee Education Center in Crystal River.
- B) Educational materials on coastal and marine resource conservation and manatee in particular, will be displayed at all city boating and marine facilities. Such material will be developed in coordination with USFWS and DEP.
- C) The City shall include all springs, canals and other water bodies, whether natural or artificial, which connect to Kings Bay in the definition of Kings Bay for the purposes of prohibiting, restricting or regulating activities which may be detrimental to Crystal River and Kings Bay or the wildlife which inhabits these areas for the implementation of this comprehensive plan and its implementing land development regulations.
- D) The City shall coordinate with DEP and other appropriate agencies in adopting and enforcing speed zones on the river.
- E) The City shall develop a formal Interlocal agreement with Citrus County to allow each local government to comment on proposed development which may affect water quality or wildlife dependent upon Crystal River or Kings Bay.

OBJECTIVE 1.7 The City shall land development regulations that: provide for a review process to determine whether land uses will have a potential adverse affect on the manatee population, and provide procedures for protection of the manatee from the adverse effects of land use.

POLICIES

- A) Land development regulations will require that all land use within the waterfront protection zone and along adjacent tributaries and canals where the manatees travel, feed, birth or rest that may cause: degradation of water quality within the water bodies; a decline in or damage to aquatic weeds that are a preferred food source for manatees; increased boat traffic; or additional human/manatee interaction will undergo manatee protection review.
- B) The City will submit all requests for development orders that required manatee protection review to the USFWS, the Florida Department of Environmental Protection, and the Florida Fish & Wildlife Conservation Commission for comment prior to approval.
- C) The City will not grant approval of a development order to any land development that is shown by the manatee protection review to cause probable harm to manatees.

OBJECTIVE 1.8. The City will prohibit soil, water, or air contamination due to improper hazardous waste storage or disposal.

POLICIES

- A) The City will coordinate with Citrus County and the WRPC in the development and implementation of a regional hazardous waste transportation and disposal program.
- B) Hazardous waste shall be appropriately handled according to State and County regulations.

OBJECTIVE 1.9 Air quality will meet or exceed ambient air quality standards established by the Florida Department of Environmental Regulation.

POLICIES

- A) The land development code shall maintain regulations that provide for vegetative buffers along developments bordering arterial roads.
- B) ~~Proper~~ LOS standards for transportation will be maintained to regulate pollution from excess traffic flow.

OBJECTIVE 1.10 The present quantity of surface and groundwater entering Kings Bay and Crystal River will be maintained.

POLICIES

- A) No existing surface waterways entering Kings Bay and Crystal River will be altered in any way that may interfere with the amount of water entering Kings Bay and Crystal River.
- B) The City will coordinate with SWFWMD to enforce emergency water conservation will be consistent with existing SWFWMD regulations.
- C) Low Impact Development (LID) and best management practices shall be incorporated into the land development regulations for both new development and expansion of existing development to protect the quality of stormwater runoff and springshed protection.

OBJECTIVE 1.11 The City shall implement regulations for the Conservation land use classification and in the site plan checklist of the land development regulations requiring identification, management, and protection of environmentally sensitive lands, consistent with state and state and regional agency requirements.

POLICIES

- A) The designation, management, and protection of native vegetative communities and sensitive lands will be based on frequency, site, distribution, and relative importance of the identified areas.
- B) The City will coordinate with DEP and SWFWMD in gathering information for the identification of native vegetative communities and environmentally sensitive lands.

- C) The City will coordinate with DEP to develop part of the CARL property north of Kings Bay for passive recreation.

GOAL 2 Crystal River will conserve and enhance the natural beauty of the city.

OBJECTIVE 2.1 The existing urban forest will be maintained.

POLICIES

- A) Existing trees will be protected from unnecessary destruction. This will be accomplished by the adoption of a tree ordinance establishing guidelines for the protection of trees, with special attention given to protection of canopy streets.
- B) The thinning of trees in a dense forested area will be permitted under city supervision in order to improve the condition of remaining trees.

OBJECTIVE 2.2 All new development will provide landscaping.

POLICIES

- A) The City shall continue to implement landscaping requirements providing guidelines for residential and commercial landscaping.
- B) A landscaping plan will be required as a portion of the site plan review process for all non-residential projects, for all multi-family development projects, and for all residential subdivisions to ensure compliance with city ordinances.
- C) The City will landscape public properties.

OBJECTIVE 2.34 The City will identify appropriate means to increase coordination between the City and County on conservation and environmental protection issues in their respective comprehensive plans.

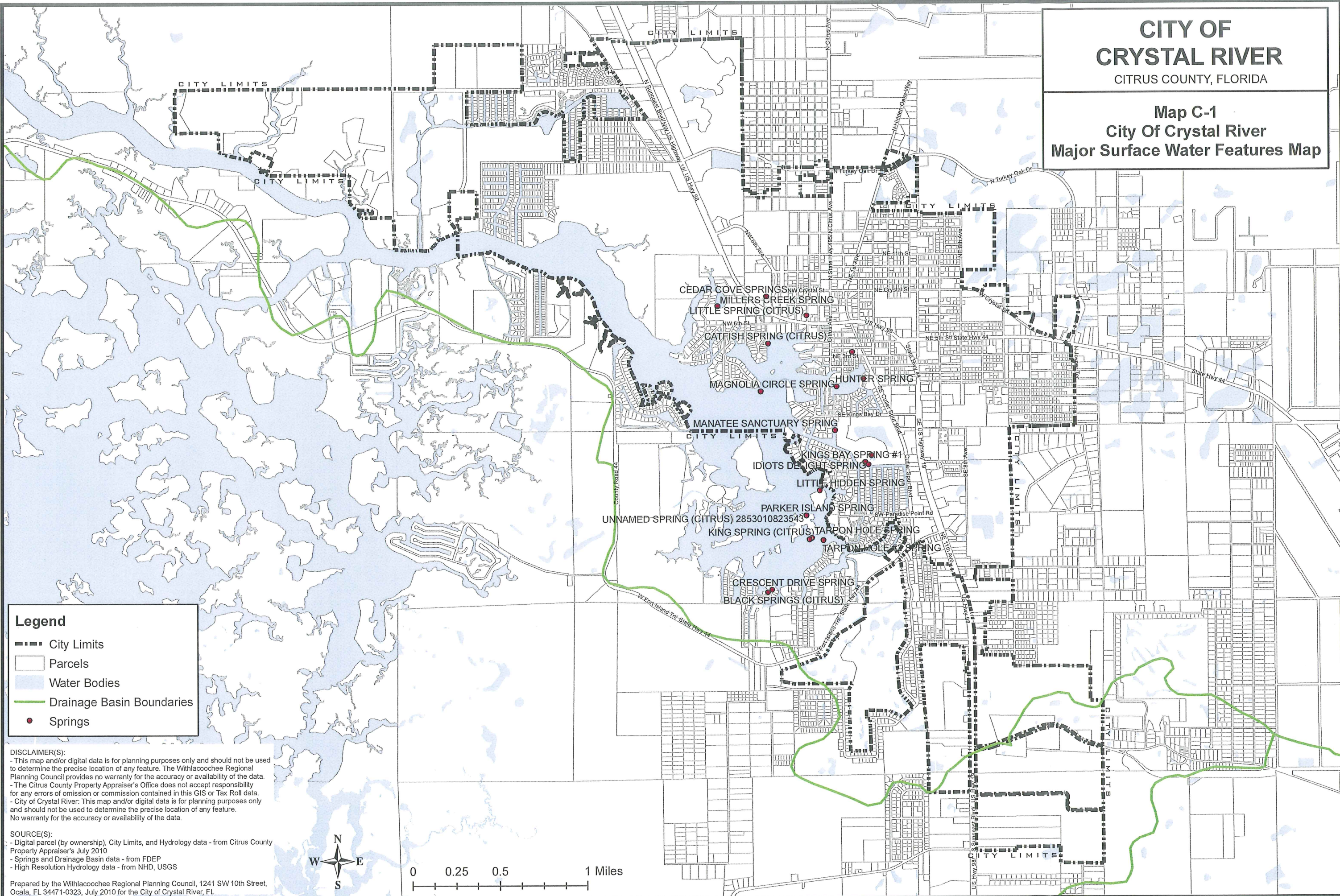
POLICIES

- A) Following final adoption of the revised Conservation Element by Citrus County, the City will review the County conservation goals, objectives, and policies, to consider further amendment to City goals, objectives, and policies, or possible adoption by reference of County goals, objectives, and policies.
- B) The City will review the County’s land development regulations regarding conservation and environmental protection to determine whether to adopt such regulations by reference, or otherwise ensure closer coordination of conservation and environmental protection issues between the City and the County.

CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-1 City Of Crystal River Major Surface Water Features Map

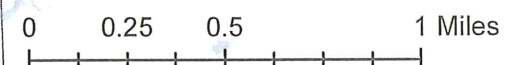


Legend

- City Limits
- ▭ Parcels
- Water Bodies
- Drainage Basin Boundaries
- Springs

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 - City of Crystal River: This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature.
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SOURCE(S):
 - Digital parcel (by ownership), City Limits, and Hydrology data - from Citrus County Property Appraiser's July 2010
 - Springs and Drainage Basin data - from FDEP
 - High Resolution Hydrology data - from NHD, USGS



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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-2 City Of Crystal River Shellfish Harvesting Area Map

Legend

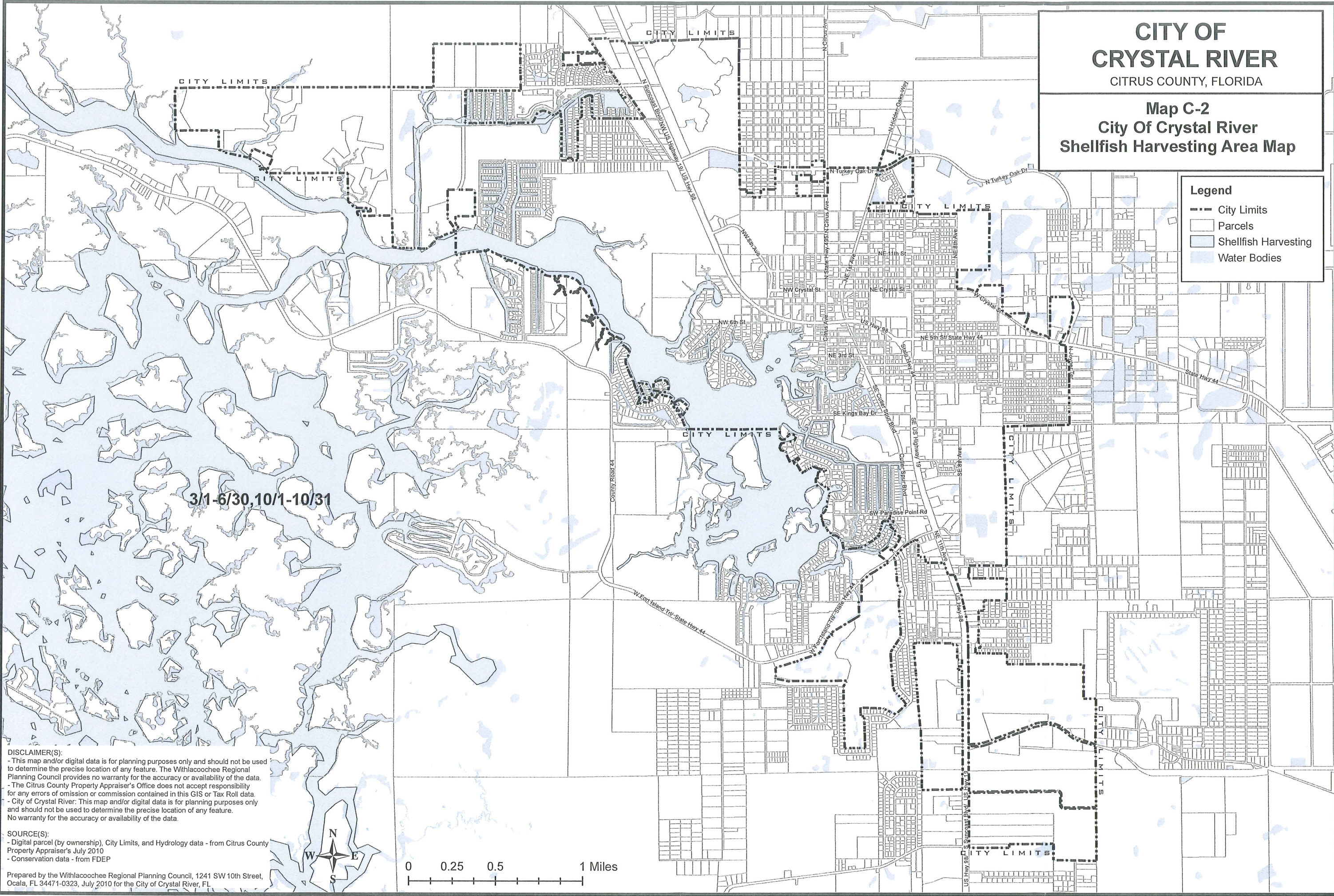
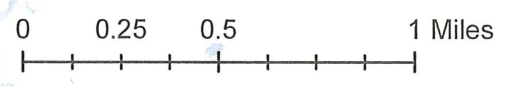
-  City Limits
-  Parcels
-  Shellfish Harvesting Water Bodies

3/1-6/30,10/1-10/31

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 - Conservation data - from FDEP

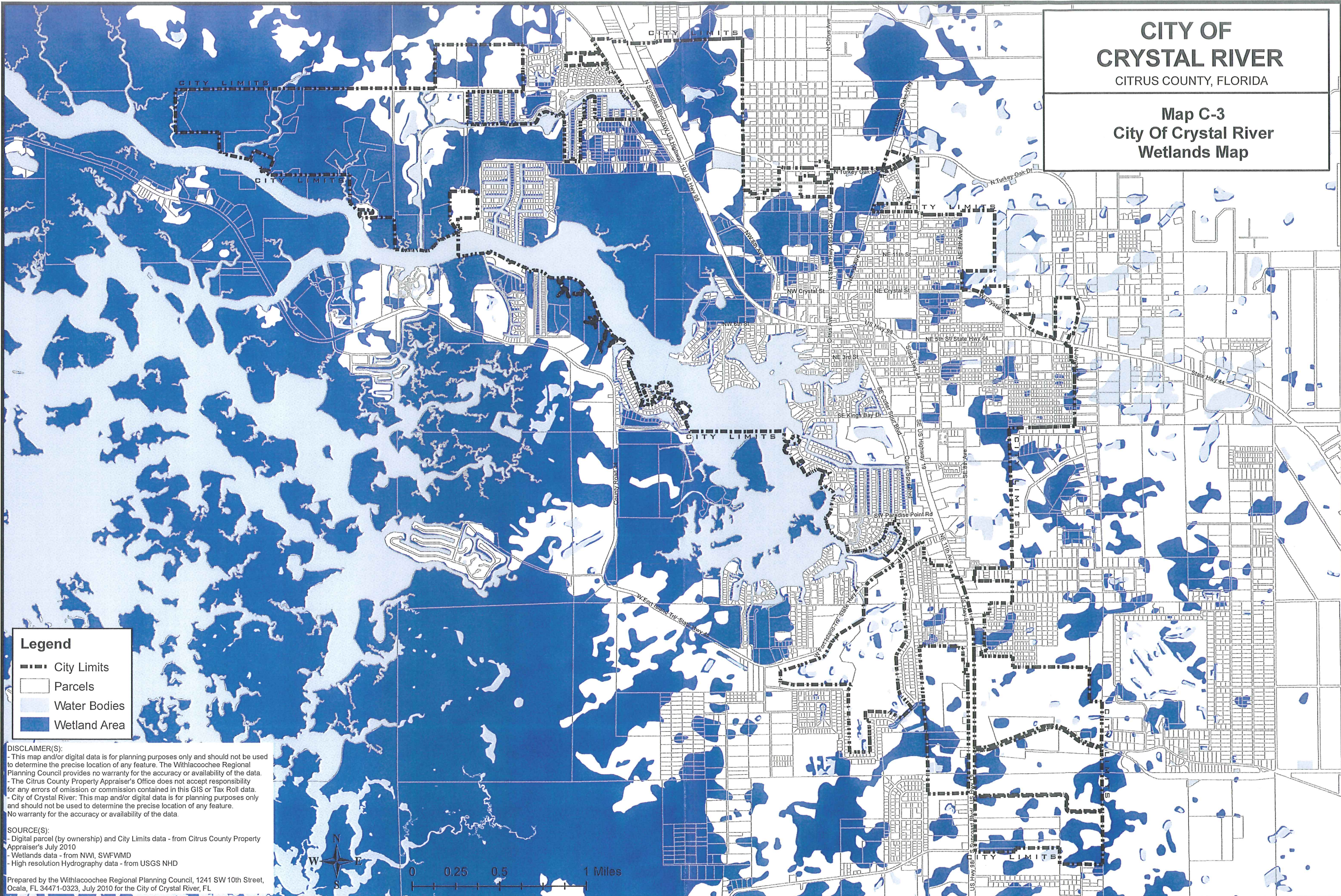
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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-3 City Of Crystal River Wetlands Map



Legend

- City Limits
- Parcels
- Water Bodies
- Wetland Area

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SOURCE(S):
- Digital parcel (by ownership) and City Limits data - from Citrus County Property Appraiser's July 2010
- Wetlands data - from NWI, SWFWMD
- High resolution Hydrography data - from USGS NHD

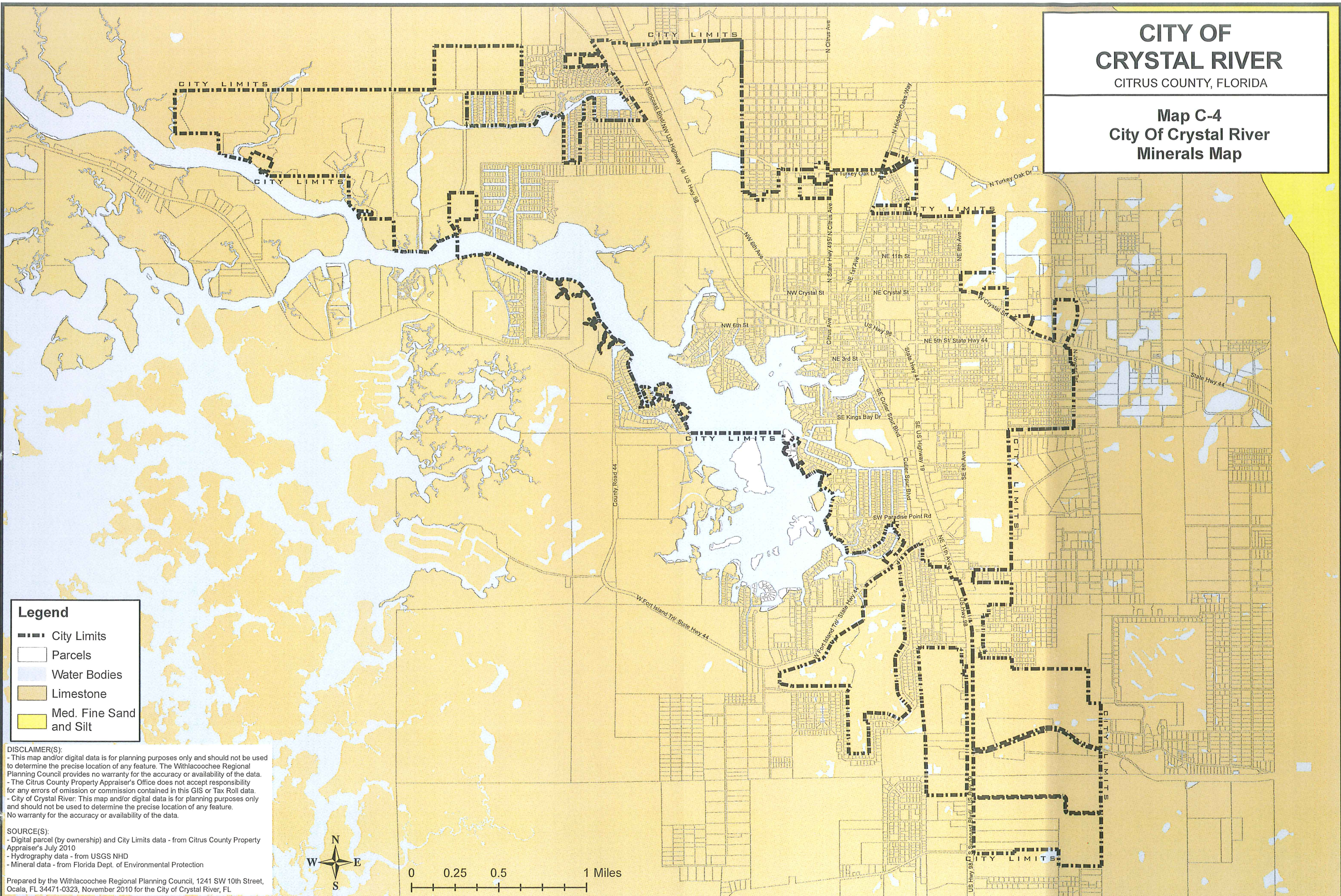
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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-4 City Of Crystal River Minerals Map



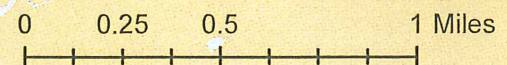
Legend

- City Limits
- Parcels
- Water Bodies
- Limestone
- Med. Fine Sand and Silt

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SOURCE(S):
 - Digital parcel (by ownership) and City Limits data - from Citrus County Property Appraiser's July 2010
 - Hydrography data - from USGS NHD
 - Mineral data - from Florida Dept. of Environmental Protection

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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-5 City Of Crystal River Soils Map

Legend

- City Limits
- Parcels
- Water Bodies

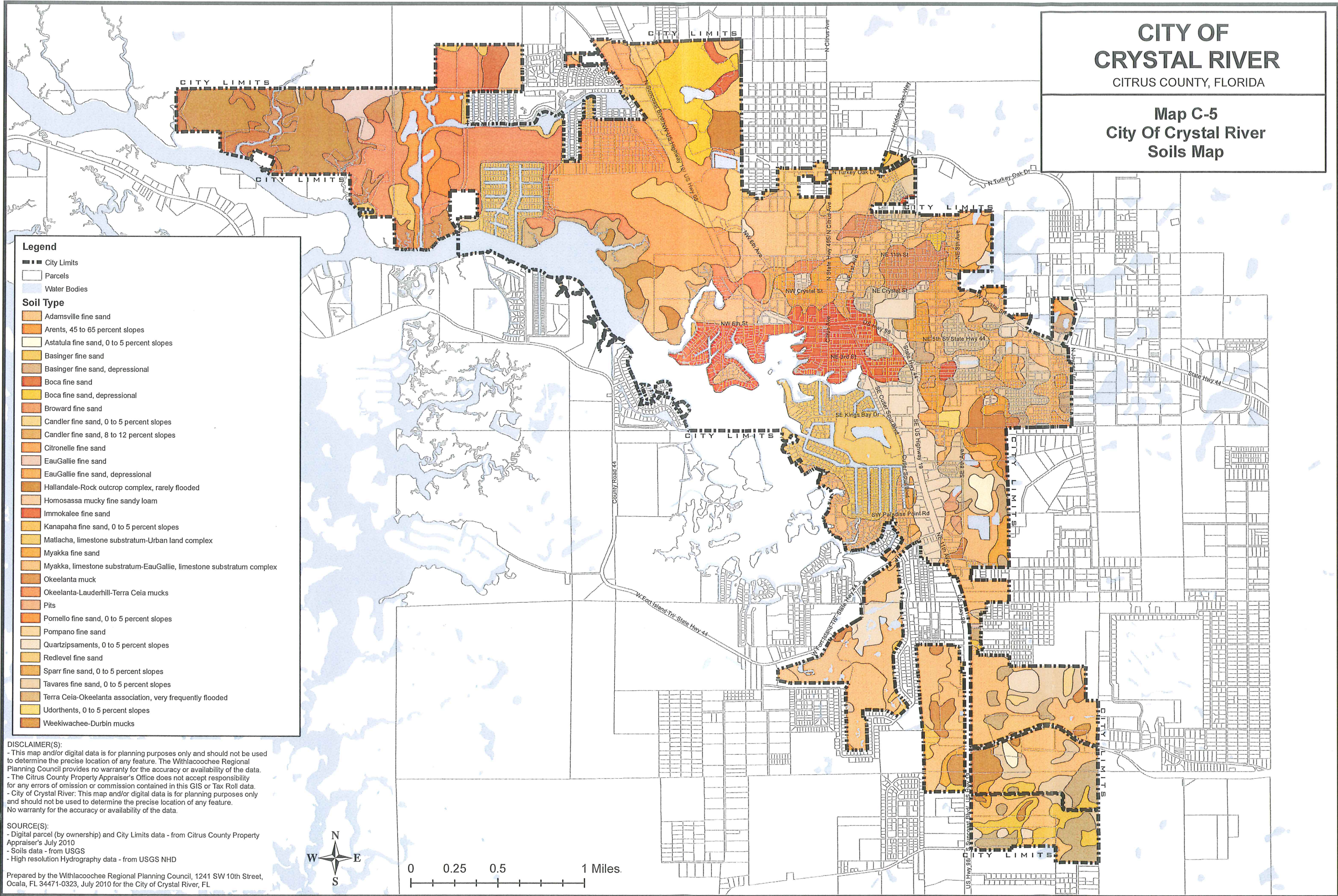
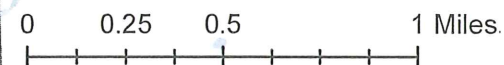
Soil Type

- Adamsville fine sand
- Arents, 45 to 65 percent slopes
- Astatula fine sand, 0 to 5 percent slopes
- Basinger fine sand
- Basinger fine sand, depressional
- Boca fine sand
- Boca fine sand, depressional
- Broward fine sand
- Candler fine sand, 0 to 5 percent slopes
- Candler fine sand, 8 to 12 percent slopes
- Citronelle fine sand
- EauGallie fine sand
- EauGallie fine sand, depressional
- Hallandale-Rock outcrop complex, rarely flooded
- Homosassa mucky fine sandy loam
- Immokalee fine sand
- Kanapaha fine sand, 0 to 5 percent slopes
- Matlacha, limestone substratum-Urban land complex
- Myakka fine sand
- Myakka, limestone substratum-EauGallie, limestone substratum complex
- Okeelanta muck
- Okeelanta-Lauderhill-Terra Ceia mucks
- Pits
- Pomello fine sand, 0 to 5 percent slopes
- Pompano fine sand
- Quartzipsaments, 0 to 5 percent slopes
- Redlevel fine sand
- Sparr fine sand, 0 to 5 percent slopes
- Tavares fine sand, 0 to 5 percent slopes
- Terra Ceia-Okeelanta association, very frequently flooded
- Udorthents, 0 to 5 percent slopes
- Weekiwachee-Durbin mucks

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SOURCE(S):
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 - Soils data - from USGS
 - High resolution Hydrography data - from USGS NHD

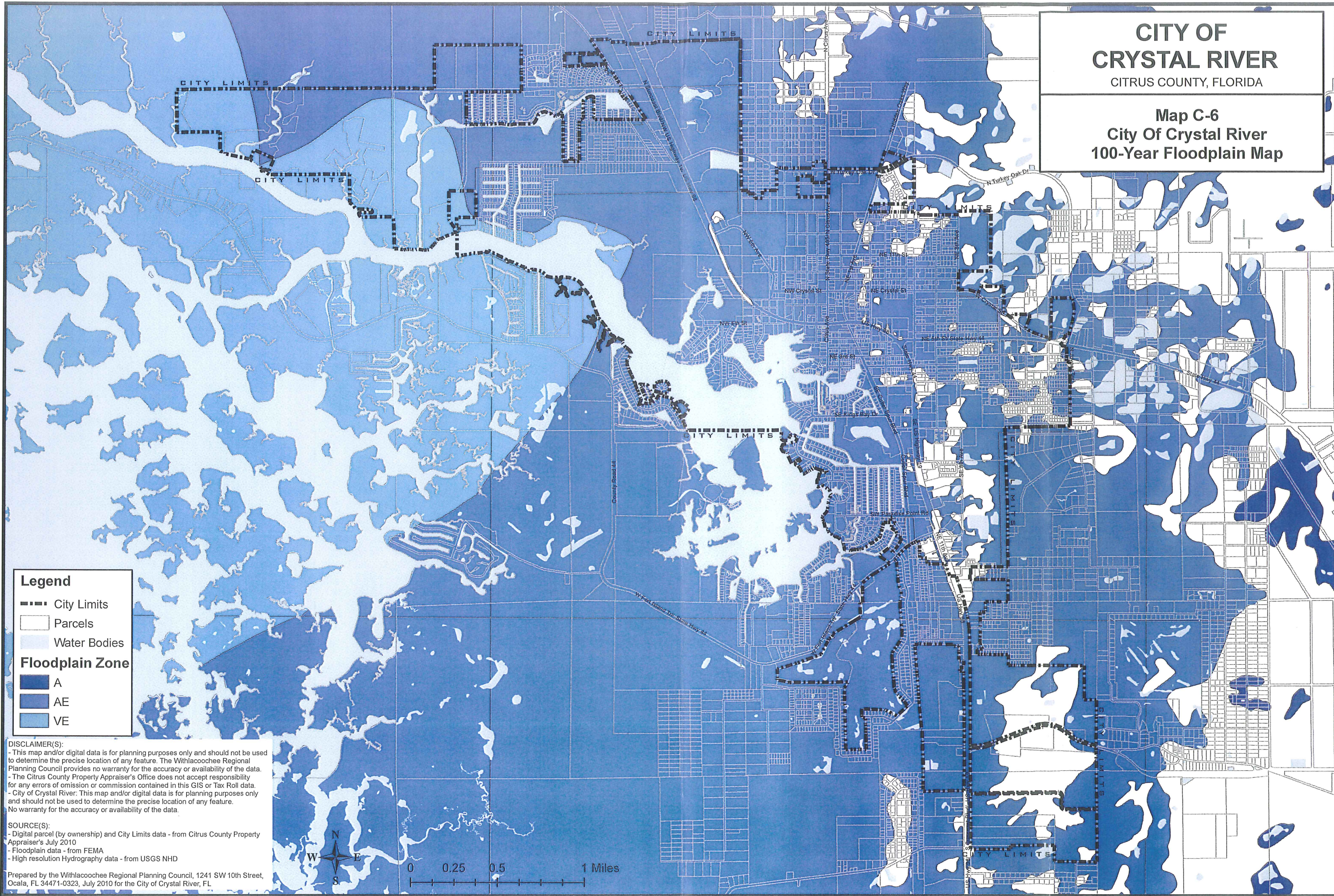
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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-6 City Of Crystal River 100-Year Floodplain Map



Legend

- City Limits
- Parcels
- Water Bodies

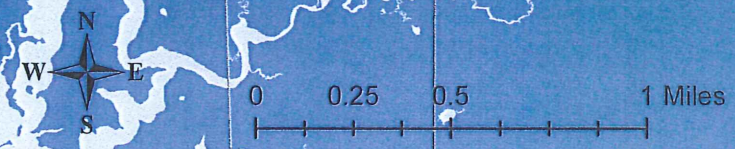
Floodplain Zone

- A
- AE
- VE

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SOURCE(S):
 - Digital parcel (by ownership) and City Limits data - from Citrus County Property Appraiser's July 2010
 - Floodplain data - from FEMA
 - High resolution Hydrography data - from USGS NHD

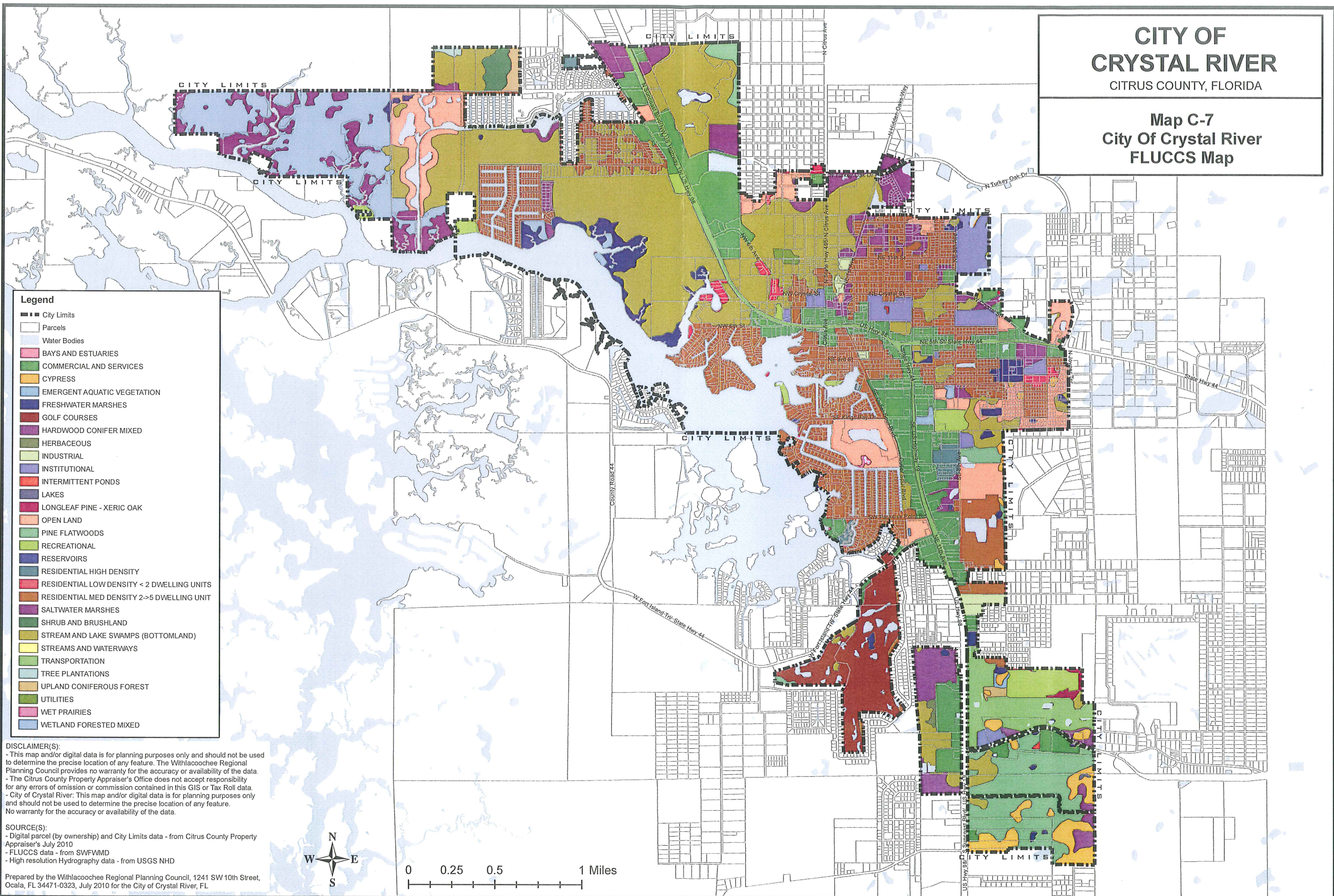
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CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

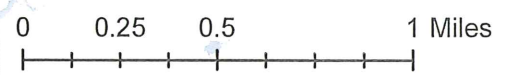
Map C-7 City Of Crystal River FLUCCS Map



- Legend**
- City Limits
 - ▭ Parcels
 - ▭ Water Bodies
 - ▭ BAYS AND ESTUARIES
 - ▭ COMMERCIAL AND SERVICES
 - ▭ CYPRESS
 - ▭ EMERGENT AQUATIC VEGETATION
 - ▭ FRESHWATER MARSHES
 - ▭ GOLF COURSES
 - ▭ HARDWOOD CONIFER MIXED
 - ▭ HERBACEOUS
 - ▭ INDUSTRIAL
 - ▭ INSTITUTIONAL
 - ▭ INTERMITTENT PONDS
 - ▭ LAKES
 - ▭ LONGLEAF PINE - XERIC OAK
 - ▭ OPEN LAND
 - ▭ PINE FLATWOODS
 - ▭ RECREATIONAL
 - ▭ RESERVOIRS
 - ▭ RESIDENTIAL HIGH DENSITY
 - ▭ RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS
 - ▭ RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT
 - ▭ SALTWATER MARSHES
 - ▭ SHRUB AND BRUSHLAND
 - ▭ STREAM AND LAKE SWAMPS (BOTTOMLAND)
 - ▭ STREAMS AND WATERWAYS
 - ▭ TRANSPORTATION
 - ▭ TREE PLANTATIONS
 - ▭ UPLAND CONIFEROUS FOREST
 - ▭ UTILITIES
 - ▭ WET PRAIRIES
 - ▭ WETLAND FORESTED MIXED

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 - FLUCCS data - from SWFWMD
 - High resolution Hydrography data - from USGS NHD



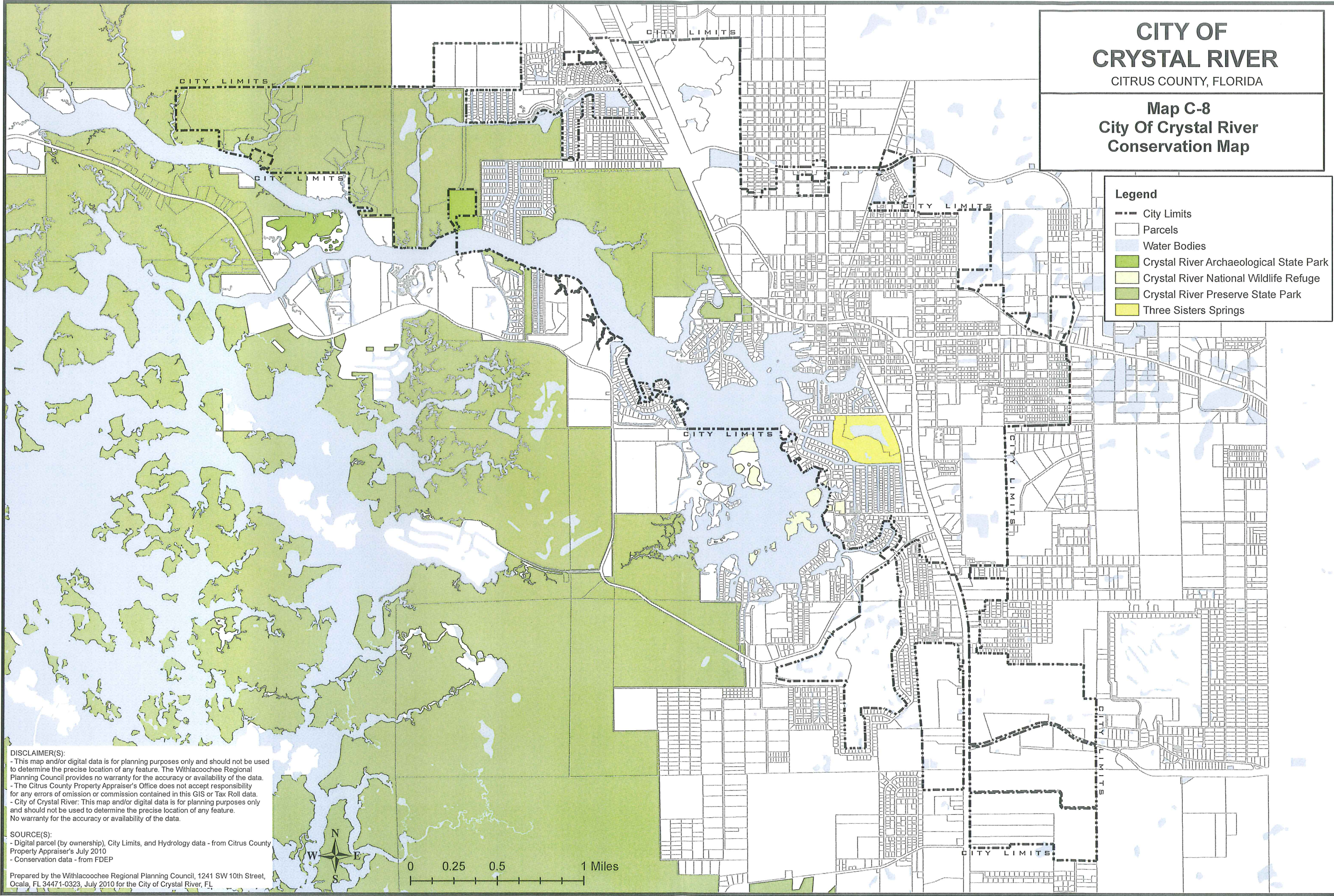
CITY OF CRYSTAL RIVER

CITRUS COUNTY, FLORIDA

Map C-8 City Of Crystal River Conservation Map

Legend

-  City Limits
-  Parcels
-  Water Bodies
-  Crystal River Archaeological State Park
-  Crystal River National Wildlife Refuge
-  Crystal River Preserve State Park
-  Three Sisters Springs



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SOURCE(S):
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 - Conservation data - from FDEP

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