Developing Scientifically-Based Ecological Buffers to Protect the Watersheds in Hillsborough County, Florida

Prepared by the Environmental Protection of Hillsborough County

January 2006

Abstract and Acknowledgments

In response to an Administrative Referral from Hillsborough County on a Comprehensive Plan requirement for the Environmental Protection Commission of Hillsborough County to evaluate existing scientific studies on setbacks and buffers, staff has carried out a literature search, and produced a Technical Memorandum (please see attached), on the use of ecological buffers for watershed protection around the United States. The focus was primarily on the eastern seaboard, which included parts of the state of Florida.

Within the state of Florida, some outstanding work in the area of establishing setbacks and ecological buffers in central Florida, particularly in the Wekiva River Basin and surrounding areas, was drawn on considerably. The St. Johns River Water Management District is to be commended for their prominent role in that effort, as is the University of Florida Center for Wetlands.

Outside of Florida, along with Georgia, New Jersey, and Wisconsin, some outstanding work done in Maryland and the Chesapeake Bay area was especially valuable in producing some of the recommendations in this report.

Our findings indicate considerable support in the literature for a minimum buffer width of 50 feet. Based on this, we would recommend that as a more immediate or near-term measure, Hillsborough County considers increasing its minimum buffer width in the Land Development Code from 30 feet to 50 feet. Buffers may be wider than 50 feet, depending on the results of project-specific and waterbody/watershed specific evaluations.

As a longer term action for Hillsborough County, we would recommend that the County develop a process for writing a Technical Manual for use in documenting the procedures and scientific methodologies to be used for establishing ecological buffers on a project-by-project basis.

Staff recognizes that this is essentially the beginning of a public process on setting buffers for Hillsborough County watersheds that will likely transpire over the next couple of years. Through the forthcoming round of amendments to the County Comprehensive Plan, we look forward to a good deal of discussion on this topic, both from within the County, and from interested parties outside of County government, prior to the implementation of any of the recommendations coming from this effort.

Staff of the Environmental Protection Commission of Hillsborough County would like to acknowledge the valuable input provided by several staff members with the Southwest Florida Water Management District, and Dr. Scott Emery of Environmental Health Integrated, Inc., in helping with the final editing of this document.

TECHNICAL MEMORANDUM

Date: **January 25, 2006**

To: **Hillsborough County Planning and Growth Management Department**

From: **Staff of the Environmental Protection Commission of Hillsborough County**

Subject: **Developing Scientifically-Based Ecological Buffers to Protect the Watersheds in Hillsborough County, Florida**

Introduction

The Conservation and Aquifer Recharge Element (CARE) Policy 19.1 of the Hillsborough County Comprehensive Plan includes the following language pertaining to the establishment of construction setback distances and buffers for wetlands and water bodies in Hillsborough County:

> "The County shall request the Environmental Protection Commission (EPC) to evaluate existing scientific studies regarding construction setback distances and buffers needed to maintain the hydrological and biological integrity of wetlands and water bodies (e.g. SJRWMD Wekiva River study) and shall request EPC to recommend appropriate scientifically defensible setback distances and buffers from wetlands and water bodies. Within one year of such recommendations, the County shall amend its land development regulations to the extent that such setback distances and buffers are determined to be warranted. Until amended per this policy, all current setbacks shall remain in effect."

On June 24, 2005, the EPC received a request from the Hillsborough County Planning and Growth Management Department (Administrative Referral attached as Appendix A) to perform this evaluation.

The present report provides recommendations developed by EPC staff in response to that request. The report is organized into three sections. The first section describes the setbacks and buffers that are currently implemented within the county. The second summarizes existing scientific studies regarding setbacks and buffers needed to maintain hydrological and biological integrity of wetlands and water bodies. The third section provides recommendations regarding the development of scientifically defensible setback and buffers.

This report outlines the scientific criteria used for establishing protective buffers, including buffers for water quality protection and riparian habitat protection. It is to be emphasized that the buffer widths cited in this report are based on work done by others

outside of Hillsborough County. These scientific methodologies have not yet been verified for use in Hillsborough County's watersheds.

This report is informational. Further discussion among the public, and the County departments with responsibility for land use planning and development review, including the EPC, the Planning and Growth Management Department, and the Planning Commission, will be vital to the success of this process. At this early stage, none of the recommendations in this report are meant to supplant or undermine the policies or procedures currently applied by the County in evaluating water quality and/or riparian buffers for present-day land developments. The EPC evaluated buffer widths are based on general principles of natural resource management and conservation, but would not imply establishing standards for Hillsborough County outside of the delegated authority of the agency or the expertise of the technical staff. In particular, suggested buffer widths related to Wildlife Habitat should be evaluated by appropriate staff within the departments primarily responsible for wildlife management in Hillsborough County.

Section 1. Existing Setbacks and Buffers

Hillsborough County, in Section 4.01.07 of its Land Development Code (LDC), includes the following language pertaining to land alterations and setbacks from environmentally sensitive areas:

> "Sec. 4.01.07. Environmentally Sensitive Areas - Wetlands and Natural Water Bodies"
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> A. Activities Prohibited, Allowed
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> 1. Land alteration activity which destroys, reduces, impairs or otherwise adversely impacts a wetland or natural body of water shall be prohibited unless specifically approved by the EPC, in accordance with EPC Rule Chapter 1-11, or, in the case of seawalls, such other regulatory agencies as are empowered by law to authorize such activities.
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> 2. Land alteration activity which destroys, reduces, impairs or otherwise adversely impacts a wetland within 500 feet of the Hillsborough River, Alafia River, or Little Manatee River shall be prohibited, regardless of any other regulatory agency authorization. The 500 feet shall be measured from the jurisdictional line established by the EPC for wetlands and natural waterbodies.
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> 3. Wetlands and natural water bodies to be protected from development shall be designated Conservation Area or Preservation Area, as appropriate, on all development plans and plats. (See definition of environmentally sensitive areas.)

B. Setbacks

1. Setbacks shall be required from those Conservation and Preservation Areas listed as wetlands or natural water bodies in the definition of environmentally sensitive areas. Setbacks shall be a minimum of 30 feet for Conservation Areas and a minimum of 50 feet for Preservation Areas. Wider setbacks may be required by the EPC depending on the environmental sensitivity of the area and the intensity of the development proposed adjacent to the area. For example, a wider setback may be required for a large excavation proposed adjacent to a wetland in order to prevent dewatering of the wetland. Narrower setbacks may be allowed to preserve trees within the portion of the parcel to be developed, if specifically approved by the Administrator and the EPC."

Conservation Areas and Preservation Areas are defined in the Hillsborough County Comprehensive Plan as follows:

- Conservation Areas include the following types of wetlands, natural water bodies, and uplands: freshwater marshes, wet prairies, hardwood swamps, cypress swamps, natural shorelines other than natural beaches and dunes, Class III Waters, and significant wildlife habitat.

- Preservation Areas include the following types of wetlands, natural water bodies and uplands: coastal marshes, mangrove swamps, marine grass beds, natural beaches and dunes, Class I and II Waters, aquatic preserves, essential wildlife habitat, and natural preserves.

Section 2. Existing Technical Information Regarding Setbacks and Buffers

2.1. Types of Ecological Buffers

2.1.1. Buffers for Water Quality Protection

Water quality protection is one important consideration when establishing buffer widths around waterbodies. The general idea is to make sure that a land development is far enough away from a given waterbody so that the development, during construction and over the long term, does not cause adverse water quality impacts.

In its Model Ordinance Issue Paper entitled *Vegetative Buffer Zones*, the Surface Water Improvement and Management (SWIM) section of the Southwest Florida Water Management District reported that "establishing ecological setbacks, or buffers for water quality protection, is related to the ability of the buffer to abate destructive water velocities, and the quantities of pollutants carried by surface runoff from uplands that may have a negative impact on downstream water quality, flora and fauna (Southwest Florida Water Management District, 1991)." In essence, this means that inadequate setback distances between a land development and a wetland, especially if the topography is relatively steeply sloped toward the wetland, can result in excessive

sediment accumulation in the wetland. It follows that excessive sediment accumulation can be detrimental to water quality, particularly when the sediments are transporting a pollutant load to a receiving water body.

Also with respect to sedimentation and water quality protection, the United States Environmental Protection Agency (EPA) reports that "sediment decreases water quality for fish and other stream animals and plants. Even if the water appears clear, some sediment remains. Oxygen-depleting substances and excess nutrients can be harmful to aquatic life and plants, sometimes causing algal blooms or fish kills. Pathogens and metals can also be harmful to aquatic life and human health, causing health problems and sometimes death." (http://epa.gov/owow/nps/wetmeasures/ U.S. EPA, 2005).

In terms of buffer widths for water quality protection, the Center for Watershed Protection (CWP) reported that "buffers can provide effective pollutant removal for development located within 150 feet of the buffer boundary, when designed properly." From a national perspective, based on a national survey of 36 local buffer programs, the CWP reported that buffers ranged from 20 to 200 feet in width on each side of the stream, with a median buffer width of 100 feet. The CWP also reported that, in general, a minimum base width of at least 100 feet is recommended to provide adequate stream protection (Schueler, T.R., and Holland, H.K. (editors), 2002). This would tend to support a minimum buffer width of 100 feet.

The University of Florida Center for Wetlands, in its Wekiva River Basin buffer study completed for the St. Johns River Water Management District, stated that "a buffer zone for maintenance of water quality is related to filtering capacity and roughness of natural undisturbed vegetation to minimize inputs of sediments and destructive velocity of water." "The potential for erosion and subsequent sedimentation is a function of erodibility of soil and slope (University of Florida, 1987)." This reference clearly promotes water quality-related buffers as a means for protecting water bodies from excessive sedimentation, and associated water quality degradation.

Lowrance, et.al (1997), in their work in the Chesapeake Bay region, reported on the significance of properly designed buffer systems on water quality, and specifically, on controlling nitrate in shallow ground water systems flowing into streams (Lowrance and Altier, et. al. 1997). This underscores the important role that buffers also have in protecting ground water quality, which because of the hydrologic connection between ground water and surface water that is common throughout Florida can likewise protect surface water quality.

From the technical references cited above, and as a general theme from other supporting references cited in the area of using buffers for water quality protection, EPC staff believes that the benefits of using buffers for water quality protection have been well documented. Properly established buffers can reduce the pollutant loads from land development, and preserve water quality in waterbodies that could potentially receive runoff from development.

Establishing adequate buffer widths between land development projects and wetlands, for water quality protection purposes, should be an important consideration in the Hillsborough County land development review process.

2.1.2. Buffers for Water Quantity Protection

Water quantity protection, in terms of setting buffers for water bodies, pertains most closely to ensuring that land developments in a watershed are constructed so as not to reduce the ground water flow (i.e. baseflow) contribution to a waterbody.

In Florida, river systems, lakes, and wetlands typically rely on some quantity of ground water flow to sustain healthy ecosystems within them. Ground water flow is especially critical to these ecosystems during Florida's annual climactic dry season, usually a period lasting from November through the end of June. Over that period of time, ground water baseflow can be a significant source of water for the health and well being of wetland systems, as well as rivers and lakes.

The Southwest Florida Water Management District noted that "lowering of water tables to accommodate development is probably the single most important factor affecting adjacent wetlands, and that a properly sized buffer will go a long way toward minimizing such impacts (1991)." This underscores the link between setting water quantity-based buffers for developments, and maintaining adequate ground water flows to wetlands in the watersheds where these developments are taking place.

The University of Florida Center for Wetlands (1987) reported that "lowering of water tables to accommodate construction-related activities and as a permanent consequence of development can reduce ground water elevations and intercept ground water flows to adjacent wetlands." EPC staff views this as an acknowledgement by the scientific community that ground water flow has an important role in wetland hydrology, including its role to supply baseflow to rivers, lakes, and wetlands during Florida's annual dry season. A riverine wetland system might be partly sustained by a ground water flow system extending hundreds of feet up slope from the stream or river that it fringes. Land development, particularly if it has a high proportion of impervious surface, can reduce recharge to the ground water flow system and possibly to the detriment of the riverine wetland system, and to the river itself. It could not be ascertained whether the existing development setbacks being enforced by the County (30 feet for a Conservation Area and 50 feet for a Preservation Area) had taken this important water quantity protection issue into consideration.

Another example of water quantity protection is in cases where development is taking place in a "springshed," or ground water basin that supplies water to a naturally flowing spring. Without proper buffers and other environmental considerations in place, land development in a springshed could reduce the flow of ground water to the spring, and to the stream or river that receives water from the spring. Development near isolated lakes might also require a water quantity buffer because lakes in Florida often receive water from small ground water basins surrounding the lake.

Establishing adequate buffers between land developments and wetlands, for water quantity protection, should be an important aspect of the County's land development review process.

2.1.3. Buffers for Riparian Habitat Protection

Another factor that will have influence on the width of an ecological buffer is the need to sustain wildlife and healthy plant communities adjacent to a waterbody. In this case of flowing water bodies, such as rivers and streams, this has become commonly known as establishing a wildlife and habitat corridor.

The Wekiva River Basin buffer study (1987) proposes a scientifically-based methodology for calculating the width for a habitat protection buffer, and as a general observation, it is dependent of the particular type of plant or wildlife species that is being targeted for protection.

The methodology for setting a habitat protection buffer involves surveying the plants and wildlife living near a given water body, and then evaluating their individual buffer requirements. Buffer requirements for individual species are taken from available scientific literature, and the buffer width is established to protect the most sensitive of the species identified.

Establishing an adequate buffer for habitat protection should also be an important part of the County's land development review process.

2.1.4. Buffers for Lakes

Lakes are valuable ecological water resources in Hillsborough County. Throughout the County there are cases where lakes have experienced water quality degradation, and/or lowered water levels, primarily because of human activities. Water quality degradation is most commonly connected to a lake receiving polluted runoff from stormwater. Lowered water levels in lakes, on a regional scale, have been attributed to historically high rates of ground water pumping, particularly in the Northwest part of the county.

The Hillsborough County City-County Planning Commission (Planning Commission), in its report entitled *Hillsborough County Lakes - Analysis of Local Planning and Regulation*, presents sound reasoning and documents scientifically-based literature for establishing ecological buffers, particularly for lakes (Hillsborough County City-County Planning Commission, 2001). EPC staff concurs with the need to set scientifically defensible buffers for lakes, and it was noted that the three key buffer parameters (water quality protection, water quantity protection, and habitat protection) would apply when establishing a lake buffer. A publication cited in the Planning Commission report (Bernthal, T.W., and Barrett, J.R., 1997) states that "the determination of an appropriate buffer width is somewhat problematic and subject to site specific conditions." It was further cited that "such an approach is impractical in the context of planning and zoning, which must be done comprehensively on a broad scale (1997)." Bernthal and Barrett

(1997) also state that "the most scientifically justifiable approach in determining the appropriate buffer for a certain level of protection around a given water body would be to send out a team of biologists to mark out the buffer in the field."

EPC staff can appreciate that setting buffer widths on a site specific basis may not be practical for broad-based planning. However, we believe that if taken in the narrower context of permitting under the LDC and Chapter 1-11, Rules of the EPC, setting a buffer in the field, on a project specific basis, is worthy of further consideration. In practice, a project-specific buffer width would be set in the field by the developer. Review and verification of the buffer would then be carried out as part of the County's normal land development review process. From the standpoint of acquiring the most scientific data on buffers for lake protection, EPC staff concurs that using a field team to collect data project specifically would be the preferred approach.

The 2001 Planning Commission report also includes some significant discussion on other buffer programs around the United States, citing examples of buffers applied to protect water bodies in the states of Virginia, Maryland, and Washington. Based on these examples, it appears that a minimum buffer width of 50 feet has gained some support in the Chesapeake Bay area, and the Pacific Northwest. To further support 50 feet as a minimum buffer width needed to provide some level of protection for a water body, in a report prepared for the Wisconsin Department of Natural Resources, Bernthal and Barrett (1997) stated that "based on the literature a 50-foot absolute minimum setback would be justifiable." EPC staff feels that these references form a valid basis for a recommendation that over the short term, Hillsborough County consider increasing the buffer width for a Conservation Area from 30 feet to a minimum of 50 feet.

For water quality protection, and primarily in parts of the County that are not supplied with municipal water and sewer services, septic tanks can potentially be a significant threat to water quality in a lake. The Pinelands Commission in south-central New Jersey has established a buffer of 300 feet between development and wetlands, mostly to allow for the dilution of septic tank leachate in groundwater (New Jersey Pinelands Commission, 2005). With ground water also being important to the ecology of lakes throughout Florida, it follows that a similar buffer for septic tanks is worth considering in the County. The actual buffer width for a septic system from a lake in the County could be based on an estimate of travel time, using a contaminant transport model for example, for septic tank leachate in ground water for a given lake basin. Predominant soil types may also be a factor in determining the appropriate buffer for a septic system.

As a general observation, based our experience in working with lakes that have been impacted by wellfield pumping, EPC staff believes that protecting water quantity in a lake is likely to be more of a function of maintaining ground water levels in the lake basin (in the case of isolated lakes), or in the case of flow through lakes, maintaining adequate flows in the creek system feeding the lakes.

To establish an ecological buffer for a lake, the scientific methodologies developed by the Southwest Florida Water Management District for setting Minimum Flows and Levels on lakes could offer a reasonable starting point. These have been promulgated in Chapter

40D-8, F.A.C., under the rules of the Southwest Florida Water Management District. As with the other types of buffers described above, appropriate ecological buffers for lakes are best determined on a lake-by-lake basis using site specific data and information.

2.2. Ecological Buffers Established and Proposed in Other Areas

2.2.1. West-Central Florida

2.2.1.1 Manatee County

- Under its Land Development Code (LDC), Manatee County generally requires a wetland buffer of at least 50 feet from the most landward extent of a jurisdictional wetland contiguous with certain sensitive water bodies such as the Terra Ceia Aquatic Preserve, the Sarasota Bay Outstanding Florida Water, or the Little Manatee River Outstanding Florida Water.

- A wetland buffer of at least 30 feet is observed for lands developments adjacent to other water bodies in Manatee County. The Manatee County LDC includes an administrative procedure where senior staff may recommend increased buffer widths adjacent to Outstanding Florida Waters, riverine systems, or larger isolated wetlands, for a variety of reasons including enhancing watershed protection.

- Also under its LDC, Manatee County establishes what are termed "Watershed Protection Overlay Districts" for the Braden River and Manatee River watersheds. These rivers are used for potable water supply. The Overlay Districts provide added levels of protection, special setback distances for septic tank systems, for example, within those watersheds. Areas where the average depth to the water table is less than 3 feet in September are also given added protections from septic systems.

2.2.1.2. Hernando County

- Under its Riverine Protection Ordinance, Hernando County affirms that uplands that fringe wetlands play a vital role in buffering the potentially degrading impacts of development.

- Among other provisions, the Ordinance establishes that a buffer width of 75 feet shall be added to the upland side of a wetland delineation.

- The Ordinance cites the "Wekiva River Basin Study," and makes reference to using the methodologies from the Study, if applicable, to establishing buffer zones in Hernando County.

2.2.1.3. SWFWMD

The Southwest Florida Water Management District (SWFWMD), in its *Environmental Resource Permitting Information Manual, Part B: Basis of Review for 40-D Rules* (SWFWMD, 2002) includes the following language pertaining to buffer widths.

- "Secondary impacts to habitat functions of wetlands associated with adjacent upland activities will not be considered adverse if buffers, with a minimum width of 15 feet and an average width of 25 feet are provided abutting those wetlands that will remain under the permitted design, unless additional measures are needed for protection of wetlands used by listed species for nesting, denning, or critically important feeding habitat."

- "For projects located wholly or partially within 100 feet of an Outstanding Florida Water (OFW), or within 100 feet of any wetland abutting an OFW. Applicants must provide reasonable assurance that the proposed construction or alteration of a system will not cause sedimentation in the OFW or adjacent wetlands and that filtration of all runoff will occur prior to discharge into the OFW or adjacent wetlands. Reasonable assurance is presumed if in addition to implementation of the requirements in section 2.8.2, any one or more of the following measures are implemented:

  a. Maintenance of a vegetative buffer, consisting of an area of undisturbed vegetation that is a minimum of 100 feet in width, landward of the OFW or adjacent wetlands. During construction or alteration of the system, all runoff, including turbid discharges from dewatering activities, must be allowed to sheet flow across the buffer area. Concentrated or channelized runoff from upstream areas must be dispersed before flowing across the vegetative buffer. Construction activities of limited scope that are necessary for the placement of outfall structures may occur within the buffer area.

  b. The installation or construction of the structures described below at all outfalls to the OFW or adjacent wetlands must be completed prior to beginning any construction or alteration of the remainder of the system. These structures must be operated and maintained throughout construction or alteration of the permanent system. Although these structures may be located within the 100 foot buffer described in subparagraph (a) above, a buffer area of undisturbed vegetation that is a minimum of 25 feet in width must be maintained between the OFW or adjacent wetlands and any structure."

Through the Surface Water Improvement and Management (SWIM) program Model Ordinance project (SWFWMD, 1991); SWFWMD put forth the following recommendations with respect to suggested buffer widths.

- For maintenance of water quality in "municipal conditions", a minimum buffer width of 15 to 20 meters (49 to 66 feet) for low (0 to 3%) land slope conditions, with buffers as high as 80 meters (263 feet) for higher land slopes in the 60% range.

- For water quantity maintenance, a buffer width that ranged from 30 feet to 550 feet was recommended. The actual buffer within that range would depend on site specific hydrologic conditions.

- For water quality maintenance, buffer widths ranging from 75 feet to perhaps as wide as 450 feet, depending on site specific measurements of particle size for sediments that could be carried to a water body through runoff. Average conditions in East-Central Florida were taken to generally represent conditions within the SWFWMD.

- For protection of wildlife habitat, buffer widths ranging from 322 feet to 732 feet, depending on the type of water body being targeted for protection, and the predominant types of indicator species that utilize the water body for sustenance. Lower buffer widths may be possible for water bodies of lesser quality. Site specific evaluation would be necessary to set an appropriate buffer width for wildlife habitat protection.

2.2.2. Other Regions of Florida

2.2.2.1. Wekiva River

The Center for Wetlands (1987) suggests buffer widths for the Wekiva River basin as follows:

- For water quality maintenance, depending on site specific land slope and soil erodibility, a buffer width in the range of 49 to 316 feet was calculated using a formula derived in the report.

- For water quantity maintenance, under certain assumptions for an acceptable water table drawdown at the edge of a wetland, a buffer width ranging from 19 to 280 feet was calculated using a formula derived in the report.

- For maintaining habitat suitability, depending on site specific habitat factors in the Wekiva River Basin, a minimum width of 536 feet of suitable habitat from the landward edge of the forest along both sides of the river is suggested.

2.2.2.2. Orange County, Florida

In its Wekiva River Protection Ordinance, and under the Wekiva River Protection Act approved by the Florida Legislature as Chapter 369, part III of the Florida Statutes, Orange County incorporated the following buffer zone language into the Ordinance.

- "A buffer zone is hereby established 550 feet from the landward limit of waters of the state (F.A.C. 17-4.022) or edge of the Wekiva River, or from the landward edge of the wetlands associated with the Wekiva River."

- "In no case shall development activities be permitted closer than 550 feet from the river's edge except for created forested or herbaceous wetlands, and passive recreation when it is clearly demonstrated by the applicant that the areas shall not adversely affect aquatic and wetland-dependent wildlife, water quality, ground water table or surface water levels."

2.2.2.3 St. Johns River Water Management District

Under Chapter 40C-41, Florida Administrative Code, *Environmental Resource Permits: Surface Water Management Basin Criteria*, the St. Johns River Water Management District establishes specific rule language for surface water management in the Upper St. Johns River Hydrologic Basin, the Oklawaha River Hydrologic Basin, the Wekiva River Hydrologic Basin, the Econlockhatchee River Hydrologic Basin, the Tomoka River Hydrologic Basin, the Spruce Creek Hydrologic Basin, the Sensitive Karst Areas Basin, and the Lake Apopka Hydrologic Basin. The standards are intended to incorporate the appropriate water quantity and water quality control and other environmental measures to, among other things, minimize adverse impacts to the water resources of the District. In the Wekiva River Basin, for example, the Code incorporates buffer widths and protection zones that are summarized as follows:

- A minimum 100 foot width of undisturbed vegetation must be retained landward of the Outstanding Florida Water Body or the abutting wetland, whichever is more landward.

- A Water Quality Protection Zone of ½ mile from the Wekiva River, and ¼ mile from a wetland abutting an Outstanding Florida Waterbody.

- A Water Quantity Protection Zone shall extend 300 feet landward of the landward extent of the Wekiva River, and several other water bodies within the Wekiva River Hydrologic Basin.

- A riparian wildlife habitat protection zone that includes the wetlands abutting the Wekiva River and several other water bodies in the basin, and the uplands within 50 feet of the landward extent of those wetlands.

- Uplands that are within 550 feet landward of the stream's edge in the Wekiva River Basin, and as further defined in the Code.

With respect to a Water Quality Protection Zone, the St. Johns River Water Management District, under chapter 40C-41, F.A.C., and the "Applicant's Handbook: Management and Storage of Surface Waters"(www.sjrwmd.com/programs/regulation/handbooks/pdfs/msswhdbk.pdf) (St. Johns River Water Management District, 2005), includes the following language (please note: the Handbook applies to Environmental Resource Permitting as administered by the St. Johns River Water Management District). The Applicant's Handbook is available to the development community when applying for Environmental Resource Permits within the St. Johns River Water Management District.

> "Construction and alteration of systems can result in erosion and downstream turbidity and sedimentation of waters. Erosion is the process by which the land surface is worn away by action of wind, water, and gravity. During construction and alteration, the potential for erosion increases dramatically. The result of erosion is discharges of turbid water and subsequent sedimentation (settling out) of soil particles in downstream receiving waters. Turbidity, suspended solids, and sedimentation result in adverse biological effects in aquatic and wetland environments, water quality degradation, and loss of flood storage and conveyance. The potential for erosion can be severe in the Wekiva Basin as a result of steep slopes and erosive soils."
>
> "Although erosion and sediment control measures are required throughout the St. Johns River Water Management District, the District has determined that the problems associated with erosion in the Wekiva Basin are sufficiently serious to warrant requiring those applicants proposing certain systems to provide detailed plans when permit applications are submitted."
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> "A Water Quality Protection Zone shall extend one half mile from the Wekiva River, Little Wekiva River north of State Road 436, Black Water Creek, Rock Springs Run, Seminole Creek, and Sulphur Run, and shall also extend one quarter mile from any wetland abutting an Outstanding Florida Water."
>
> "For a project which will be located wholly or partially within 100 feet of an Outstanding Florida Water or within 100 feet of any wetland abutting such a water, an applicant must provide reasonable assurance that the construction or alteration of the system will not cause sedimentation within these wetlands or waters and that filtration of runoff will occur prior to discharge."
>
> "A minimum 100 foot width of undisturbed vegetation must be retained landward of the Outstanding Florida Water or the abutting wetland, whichever is more landward. During construction or alteration, runoff (including turbid discharges from dewatering activities) must be allowed to sheet flow across

this undisturbed vegetation as the natural topography allows. Concentrated or channelized runoff from construction or alteration areas must be dispersed before flowing across this undisturbed vegetation. Construction or alteration f limited scope necessary for outfall structures may occur within this area of undisturbed vegetation."

The SJRWMD Handbook separates water quality issues into short term and long term considerations. Some of the short term water quality considerations are summarized as follows:

- Providing turbidity barriers for land development activities that are near wetlands.

- Stabilizing slopes adjacent to wetlands and other surface waters to prevent erosion and turbidity.

- Maintaining construction equipment to ensure that pollutants are not released into wetlands or other surface water bodies.

- Preventing any other release of pollutants that would cause a violation of water quality standards.

Some of long term water quality considerations that must be addressed, per the SJRWMD Handbook, are summarized as follows:

- The potential of a constructed or altered water body to violate water quality standards due to its depth of configuration.

- Long term siltation, erosion, or dredging that will cause turbidity violations.

- Prevention of any release of pollutants that will cause water quality standards to be violated.

The SJRWMD Handbook includes specific language to protect water quality specifically at docking facilities. The language deals with new dock construction, and also with the expansion or alteration of existing docks, where there is the potential to adversely affect water quality. As examples of methods to protect water quality at docking facilities, per the Handbook, the following requirements must be satisfied:

- A hydrographic study must be conducted to document the flushing time for water at the docking facility.

- The disposal of waste material from boats must be addressed to prevent disposal into wetlands or other surface waters.

- Pollutant leaching characteristics for materials such as pilings and paints used on boat hulls must be addressed. This is to insure that pollutants will not leach and cause water quality standards to be violated.

The above mentioned water quality protection strategies, as derived from the SJRWMD Handbook, do not represent all of what has been written into the Handbook. The Handbook is more exhaustive. The intent here is to provide some examples of the water quality protection strategies that are currently in place for land developments taking place within the SJRWMD's jurisdiction. EPC staff believes these can form the basis for similar water quality protection strategies in Hillsborough County.

For a Water Quantity Protection Zone, site specific evaluations are undertaken for land developments located within this zone. With respect to the ecological significance of a Water Quantity Protection Zone, the following language is excerpted from the "*Applicant's Handbook: Management and Storage of Surface Waters* (St. Johns River Water Management District 2005)."

> "Lowering the ground water table adjacent to wetlands can change the wetland hydroperiod such that the functions provided by the wetland are adversely affected."
>
> "As part of providing reasonable assurance that the standard set forth in paragraph 40C- 4.301(1) (d) is met, where any part of a system located within this (Water Quantity Protection) zone will cause a drawdown, the applicant must provide reasonable assurance that construction, alteration, operation, or maintenance of the system will not cause ground water table drawdowns which would adversely affect the functions provided by the referenced wetlands. The applicant shall provide an analysis which includes a determination of the magnitude and areal extent of any drawdowns, based on site specific hydrogeologic data collected by the applicant, as well as a description of the referenced wetlands, the functions provided by these wetlands, and the predicted impacts to these functions. It is presumed that the part of this standard regarding drawdown effects will be met if the following criteria are met: A ground water table drawdown must not occur within the Water Quantity Protection Zone."

For water quantity protection, EPC staff would support Hillsborough County considering the SJRWMD's approach. This essentially calls for site specific hydrogeologic data by the applicant to determine the appropriate water quantity-based buffer for a given land development. This would include an evaluation of wetland functions, and any predicted impacts to these functions (St. Johns River Water Management District, 2005).

2.2.3. Eastern U.S.

2.2.3.1. Georgia

The University of Georgia Institute of Ecology, through its Office of Public Service & Outreach, has published "A Review of the Scientific Literature on Riparian Buffer Width, Extent, and Vegetation" (http://outreach.ecology.uga.edu/tools/buffers/lit_review.pdf) (University of Georgia, 1999). The stated purpose of the publication was to provide a scientific basis for riparian buffer ordinances established by local governments in Georgia (University of Georgia, 1999). Among other recommendations, the publication offers three options for buffer width guidelines as follow:

Option 1:

- Establish a base (buffer) width of 100 feet plus 2 feet per 1% of slope.
- Extend the buffer to the edge of the floodplain; include adjacent wetlands (the buffer width is extended by the width of the wetlands, which guarantees that the entire wetland and an additional buffer are protected).
- Existing impervious surfaces in the riparian zone do not count toward the buffer width (i.e., the width is extended by the width of the impervious surface, just as for wetland.
- Slopes over 25% do not count toward the width; and the buffer applies to all perennial and intermittent streams.

Option 2:

- The same as Option 1, except: base (buffer) width is 50 feet plus 2 feet per 1% of slope.
- Entire floodplain is not necessarily included in buffer, although potential sources of severe contamination should be excluded from the floodplain.
- Ephemeral streams are not included; affected streams are those that appear on US Geological Survey 1:24,000 topographic quadrangles.
- Alternatively, buffer can be applied to all perennial streams plus all intermittent streams of second order or larger

Option 3:

- Fixed buffer width of 100 feet. The buffer applies to all streams that appear on US Geological Survey 1:24,000 topographic quadrangles or,

alternatively, all perennial streams plus all intermittent streams of second order or larger (as for Option Two).

All Options:

- Buffer vegetation should consist of native forest. Restoration should be conducted when necessary and possible.

- All major sources of contamination should be excluded from the buffer. These include construction resulting in major land disturbance, impervious surfaces, logging roads, mining activities, septic tank drain fields, agricultural fields, waste disposal sites, livestock, and clear cutting of forests.

- Application of pesticides and fertilizer should also be prohibited, except as may be needed for buffer restoration.

All of the buffer options described above will provide some habitat for many terrestrial wildlife species. To provide habitat for forest interior species, at least some riparian tracts of at least 300 ft width should also be preserved. Identification of these areas should be part of an overall, county-wide wildlife protection plan. For riparian buffers to be most effective, some related issues must also be addressed. These include reducing impervious surfaces, managing pollutants on-site, and minimizing buffer gaps.

2.2.3.2. Chesapeake Bay

The Chesapeake Bay Program, in its publication entitled *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers,* (www.chesapeakebay.net/pubs/subcommittee/nsc/forest/handbook.htm) (United States Department of Agriculture, 1998) offers a range of minimum buffer widths for several different buffer objectives. The publication states that "there is substantial agreement in the scientific community about the value of using vegetation to buffer valuable aquatic resources from the potential impacts of adjacent human use of the land."

The approximate ranges cited for buffer widths, per objective, are as follows:

- Wildlife Habitat: from 50 to 275 feet

- Flood Mitigation: from 50 to 225 feet

- Sediment Removal: from 50 to 175 feet

- Nitrogen Removal: from 25 to 125 feet

- Water Temperature Moderation: from 25 to 50 feet

- Bank Stabilization and Aquatic Food Web: from 15 to 40 feet

2.2.4. National Overview

The Center for Watershed Protection (2002) provided the following summary:

- According to a national survey of 36 local buffer programs, urban stream buffers range from 20 to 200 feet in width on each side of the stream, with a median width of 100 feet.

- An average buffer width of 100 feet protects up to 5% of watershed area from future development.

- Buffers can provide effective pollutant removal for development located within 150 feet of the buffer boundary, if designed properly.

- One mile of stream buffer can provide 25 to 40 acres of habitat area.

- Other, expensive flood controls are not necessary if the buffer includes the 100-year floodplain.

Section 3. Recommendations

3.1. Background Discussion and Summary of Findings

3.1.1. Outstanding Florida Waters (OFW)

For consistency with the Wekiva River protections (St. Johns River Water Management District, 2005), which appear to be among the most scientifically defensible buffers for Outstanding Florida Waters (OFWs) that are currently being implemented in Florida, EPC staff recommends the following buffers for OFWs be evaluated for potential adoption in Hillsborough County.

- Establish a minimum 100 foot width of undisturbed vegetation landward of an Outstanding Florida Water Body or the abutting wetland, whichever is more landward.

- Establish a water quality protection zone of ½ mile from an Outstanding Florida Waterbody, and ¼ mile from a wetland abutting an Outstanding Florida Waterbody. Work to adopt specific land development criteria, for inclusion in the Comprehensive Plan and the Land Development Code, to identify development restrictions within these zones.

- Establish a water quantity protection zone that shall extend 300 feet landward of the landward extent of an Outstanding Florida Water Body. Work to adopt specific land development criteria, for inclusion in the Comprehensive Plan and the Land Development Code, to identify development restrictions within these zones.

- Establish a riparian wildlife habitat protection zone that includes the wetlands abutting an Outstanding Florida Waterbody, and the uplands within 50 feet of the landward extent of those wetlands. Work to adopt specific land development criteria, for inclusion in the Comprehensive Plan and the Land Development Code, for development restrictions within this zone.

3.1.2. Non-OFW Sites

For non-OFW waters, the following buffers have received extensive technical review and are currently being recommended by several states and local governments within the Chesapeake Bay watershed:

- Wildlife Habitat: from 50 to 275 feet

- Flood Mitigation: from 50 to 225 feet

- Sediment Removal: from 50 to 175 feet

- Nitrogen Removal: from 25 to 125 feet

- Water Temperature Moderation: from 25 to 50 feet

- Bank Stabilization and Aquatic Food Web: from 15 to 40 feet

3.2. Recommendations for Immediate Implementation in Hillsborough County

• Consider expanding the existing setback of 30 feet for a Conservation Area to a minimum of 50 feet.

• Consider adopting a minimum buffer width of 50 feet in the Hillsborough County Land Development Code.

3.3. Recommendations for Long-Term Implementation Hillsborough County

- Develop a Technical Guidance Manual for setting buffers, on a project specific basis, for waterbodies in Hillsborough County. Use a minimum buffer width of 50 feet as a starting point for the project specific evaluation. The Manual would provide technical direction on the collection of site-specific data for setting scientifically defensible buffers throughout the County.

- Develop a process for integrating buffers for land development with TMDLs water quality requirements throughout the County.

- Develop and adopt watershed protection ordinances for priority watersheds for incorporation into the Land Development Code.

References Cited

Bernthal, T.W., and Barrett, J.R. 1997. Effectiveness of shoreline zoning standards to meet statutory objectives: a literature review with policy implications. Wisconsin Department of Natural Resources.

Hillsborough County City-County Planning Commission. 2001. Hillsborough County lakes, analysis of local planning and regulation

Hillsborough County, Florida. 2005. Hillsborough County comprehensive plan. Conservation and aquifer recharge element.

Hillsborough County, Florida. 2005. Hillsborough County land development code.

Lowrance, R., Altier, L.S., Newbold, J.D., Schnabel, R.R., Groffman, P.M., Denver, J.M., Carrell, D.Z., Gilliam, J.W., Robinson, J.L., Brinsfield, R.B., Staver, K.W., Lucas, W., and Todd, A.H., 1997. Water quality functions of riparian forest buffers in Chesapeake Bay watersheds, Environmental Management Vol. 21, No. 5, pp. 687-712.

New Jersey Pinelands Commission. 2005. Comprehensive Management Plan

Orange County, Florida. 1991. Wekiva river protection ordinance: Article XIII of the Orange County, Florida land development code

Palone, R.S., and Todd, A.H. (editors). 1998. Chesapeake Bay riparian handbook: a guide for establishing and maintaining riparian forest buffers. USDA Forest Service, Radnor, PA.

Schueler, T.R., and Holland, H.K. (editors). 2002. The Practice of watershed protection. Article 39 - The Architecture of urban stream buffers. Center for Watershed Protection, Ellicott, MD

Southwest Florida Water Management District. 1991. Surface Water Improvement and Management (SWIM) Department ordinance model project. Issue III: Vegetative buffer zones. Contract to Henigar & Ray Engineering Assoc., Inc.: 59 pp.

Southwest Florida Water Management District. 2002. Environmental resource permitting manual - part b - basis of review for 40D rules. 162 pp.

Southwest Florida Water Management District. 2005 Chapter 40D-8, Florida Administrative Code, water levels and rates of flow. 63 pp.

St. Johns River Water Management District. 2005. Chapter 40C-41, Florida Administrative Code: environmental resource permits: surface water management basin criteria.

St. Johns River Water Management District. 2005. Applicant's handbook: management and storage of surface waters.

United States Environmental Protection Agency. 2005. Polluted runoff (non point source pollution): National management measures to protect and restore wetlands and riparian areas for the abatement of non point source pollution: EPA 841-B-05-003.

University of Florida Center for Wetlands. 1987. Buffer zones for water, wetlands, and wildlife, a final report on the evaluation of the applicability of upland buffers for the wetlands of the wekiva basin. Prepared for the St. Johns River Water Management District.

University of Georgia, Office of Public Service & Outreach: Institute of Ecology. 1999 (revised). A review of the scientific literature on riparian buffer width, extent, and vegetation.

Appendix A - Letter to EPC from Planning and Growth Management Department

June 24, 2005

Richard D. Garrity, Ph.D., Executive Director
Hillsborough County Environmental Protection Commission
Roger P. Stewart Center
3629 Queen Palm Drive
Tampa, Florida 33619

Dear Dr. Garrity,

SUBJECT: IMPLEMENTATION OF COMPREHENSIVE PLAN POLICY 19.1 IN THE CONSERVATION AND AQUIFER RECHAREGE ELEMENT

The Planning and Growth Management Department is in the process of reviewing the implementation of Comprehensive Plan policies dealing with river protection. We are asking for help and input from the Environmental Protection Commission (EPC) staff in this process.

Policy 19.1 of the Conservation and Aquifer Recharge Element states: "The county shall request the Environmental Protection Commission (EPC) to evaluate existing scientific studies regarding construction setback distances and buffers needed to maintain the hydrological and biological integrity of wetlands and water bodies (eg. SJRWMD Wekiva River study) and shall request EPC to recommend appropriate scientifically defensible setback distances and buffers from wetlands and water bodies. Within one year of such recommendations, the County shall amend its land development regulations to the extent that such setback distances and buffers are determined to be warranted. Until amended per this policy, all current setbacks shall remain in effect."

We are writing to officially request the Environmental Protection Commission, in conjunction with County staff, make recommendations concerning scientifically defensible setback distances and buffers from wetlands and water bodies to the Planning Commission and the Board of County Commissioners. We would expect that this study and its recommendations to be available for use in the upcoming round of plan amendments in early 2006 as a part of the Comprehensive Plan update. The PGM staff contact for this work is Daniel Blood, who can be reached at 276-8465. Please call me if I can be of further help in facilitating this process.

Sincerely,

Bruce McClendon, Director
Planning and Growth Management Department
Hillsborough County

CC: Robert Hunter, Executive Director, The Planning Commission