Basin Management Action Plan

For the Implementation of Fecal Coliform and Dissolved Oxygen Total Maximum Daily Loads in

Long Branch

(WBID 3030)

Developed by Orange County, Florida, and the Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management with significant support from Camp, Dresser, and McKee, Inc.

May 2008

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The Long Branch Basin Management Action Plan was prepared as part of a five-year cycle to implement Total Maximum Daily Loads adopted by the Florida Department of Environmental Protection for Long Branch (WBID 3030). It was developed by staff from Orange County, CDM, Inc. (under contract with Orange County), the Florida Department of Environmental Protection, and others, identified below.

The majority of information included in this Basin Management Action Plan was initially drafted by Danielle Honour of CDM, Inc. Ms. Honour deserves special recognition for the high quality of work applied to this document.

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List of Acronyms

BMAP	Basin Management Action Plan
BMP	Best management practice
BOD	Biological oxygen demand
DACS	Florida Department of Agriculture and Consumer Services
DEP	Florida Department of Environmental Protection
DO	Dissolved oxygen
DOT	Florida Department of Transportation
ERP	Environmental Resource Permit
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FWRA	Florida Watershed Restoration Act
LA	Load allocation
MS4	Municipal separate storm sewer system
OCEPD	Orange County Environmental Protection Department
OCHD	Orange County Health Department
QA	Quality assurance
QC	Quality control
SJRWMD	St. Johns River Water Management District
TMDL	Total maximum daily load
TN	Total nitrogen
TP	Total phosphorus – inorganic and organic phosphorus compounds analyzed as total phosphorus
WBID	Waterbody identification (number)
WLA	Wasteload allocation

Basin Management Action Plan for Implementation of Fecal Coliform and Dissolved Oxygen Total Maximum Daily Loads in Long Branch (WBID 3030), Orange County, Florida

The Long Branch Basin Management Action Plan (BMAP) addresses fecal coliform and dissolved oxygen (DO) impairments in Long Branch, a stream in northeastern Orange County, Florida (WBID 3030). Long Branch was verified as impaired for elevated fecal coliform counts and low dissolved oxygen. Total Maximum Daily Loads (TMDLs) were adopted for these parameters in 2006. The BMAP focuses on a common-sense approach to identify pollutant sources and reduce their impacts. The BMAP documents the management actions that have been or will be undertaken by Orange County, as the entire Long Branch watershed is located within the unincorporated County.

Fecal coliforms are variable in the environment, and sources are frequently difficult to identify. For Long Branch, BMAP development involved fecal coliform source identification efforts. However, the coliform sources remain primarily unknown. Despite this uncertainty, management actions are proceeding to address potential pollutant contributions from septic tanks and domestic animals and to identify the relative magnitude of natural pollutant sources (e.g. wildlife contributions of coliforms and wetland.

This BMAP provides for phased implementation of the TMDLs pursuant to 403.067(7)(a)1. F.S. This first phase of the BMAP is designed to address the TMDLs for achievement of water quality standards in the mainstem portion of Long Branch. The first phase also includes additional information gathering and studies that can be used in the development of subsequent phases that would support further TMDL implementation. This adaptive management process will continue until the TMDL pollutant load reduction requirements are met.

Orange County has committed to further activities to help identify and isolate the pollutant sources contributing to current water impairments. Despite the lack of direct evidence that human sources are a major contributor of bacteria to Long Branch, the County has implemented and committed to future management actions that address existing and future development. These actions will protect water quality from pollutants, including fecal coliform bacteria, in stormwater runoff from new and existing development in the Long Branch basin.

Looking toward the future, the County will monitor any changes in land use within the basin and will take water samples annually to monitor fecal coliform levels in Long Branch over the next five years. The Florida Department of Environmental Protection (DEP) will reassess the basin as part of the Watershed Management Basin Rotation Cycle to determine the status of TMDL implementation. As part of the 2009 reassessment, the Basin Working Group will determine the appropriate actions based on the findings from ongoing or planned source identification studies and any changes in land use or water quality.

A.1 Background

The Long Branch BMAP has been developed as part of DEP's TMDL Program (authorized by the Florida Watershed Restoration Act [FWRA], Section 403.067, Florida Statutes [F.S.]). DEP implements the act using a watershed management approach that includes a five-year rotating basin cycle. Each year of the cycle represents a different activity for the waters within a given basin group, as follows: Initial Basin Assessment, Strategic

Monitoring, Data Analysis and TMDL Development, ***Basin Management Action Plan Development***, and Basin Management Action Plan Implementation. At the end of each five-year, five-phase cycle, a new cycle begins for each group of basins in which additional waters may be identified for TMDL establishment and implementation.

The Long Branch watershed is located within the Middle St. Johns Basin. Long Branch is a tributary to the Big Econlockhatchee River and is located in east central Orange County as shown on **Figure A-1**. The watershed is generally bounded on the west by the Big Econlockhatchee River, to the south by the Wedgefield Subdivision, and to the east and north by State Road 50. The area of the WBID is entirely within unincorporated Orange County and comprises approximately 4,511 acres, including a small portion of the unincorporated Town of Bithlo. Long Branch is located within the jurisdiction of the St. Johns River Water Management District (SJRWMD), DEP Central District, and Department of Transportation (DOT) District 5.

Land use in the study area is dominated by agriculture, forest, open land, and wetlands. Combined, these account for more than 78 percent of the watershed. There are a number of publicly owned lands within the study area. Both the County and the SJRWMD own a number of parcels within the study area that are part of Long Branch Park, Hal Scott Preserve, regulatory easements and conservation easements. With a total area of approximately 1,520 acres, 34 percent of the watershed is in public ownership or management. Beyond the dominance of conservation land, the other significant feature in the watershed is the Orlando Speedworld facility.

Long Branch consists of a northern tributary that drains the southeastern portion of Bithlo, a southern tributary that drains conservation area, and the mainstem, flanked primarily by wetlands. Streamflow in this system is intermittent, and there is typically only flow immediately after a storm event. Times of no flow or stagnant water in Long Branch are common. A summary of fecal coliform conditions can be found in **Figure A-2**. Water quality samples taken near the Speedworld facility have shown highly variable results, but conditions in this portion of the watershed appear to correlate with rainfall.

A.2 Total Maximum Daily Loads

TMDLs are water quality targets for waterbodies that DEP has identified as impaired for specific pollutants (such as total phosphorus [TP], total nitrogen [TN], and others). TMDLs, which DEP adopts by rule, establish the maximum amount of specific pollutants that a waterbody can assimilate while maintaining water quality standards. Long Branch is designated as a Class III water in accordance with Rule 62-302, Florida Administrative Code (F.A.C.), meaning that it must have suitable water quality for recreational use and for the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

To establish the TMDLs, DEP assessed Long Branch, the pollutant(s) contributing to the impairment, and the amount of the pollutant(s) entering the waterbody during a specified period. DEP then determined the level of pollutant(s) that Long Branch could receive while maintaining its designated use (the TMDL), and calculated the corresponding pollutant reduction needed to achieve the TMDL.

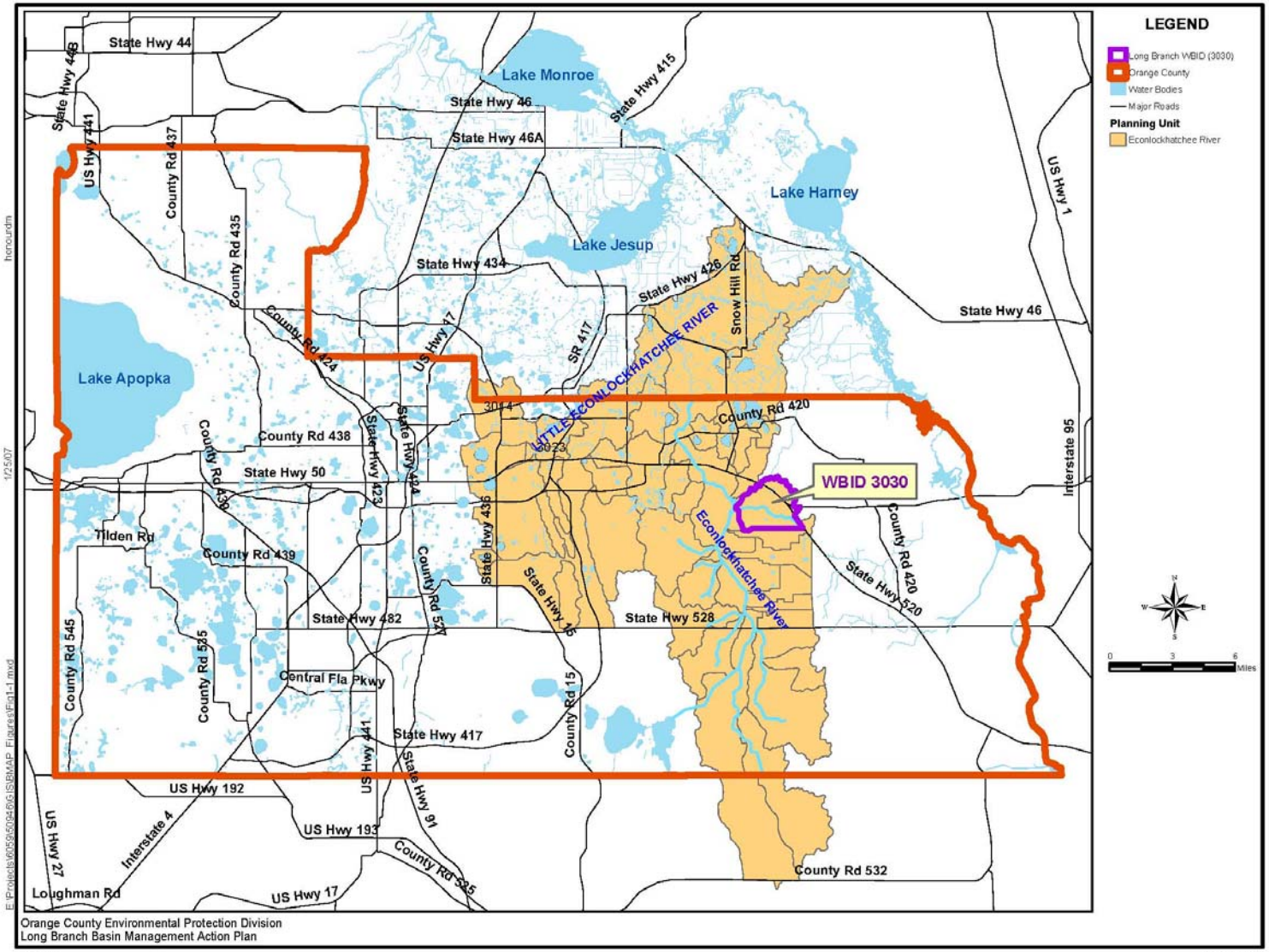

FIGURE A-1: LOCATION OF THE LONG BRANCH WATERSHED

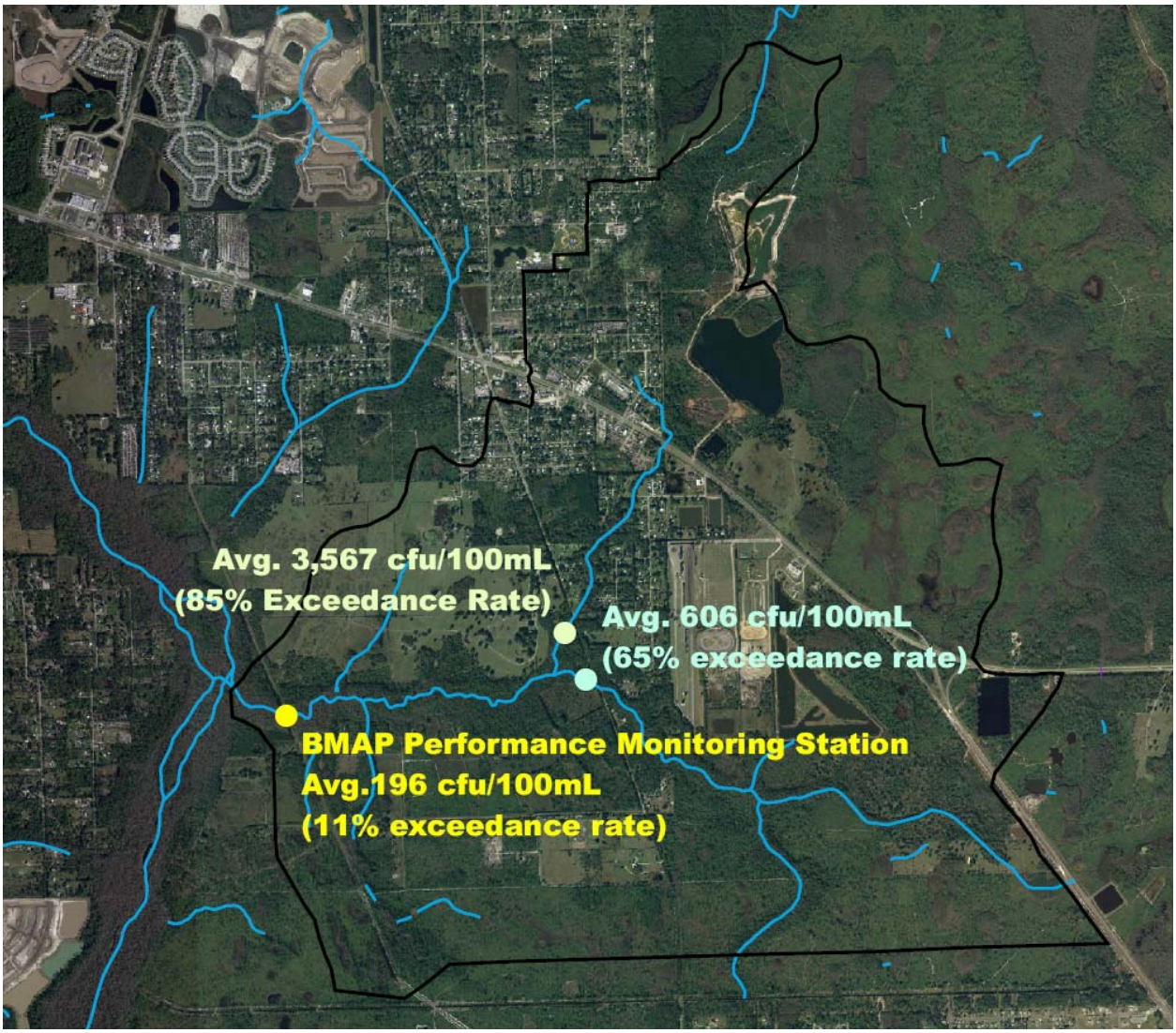

FIGURE A-2: SUMMARY OF FECAL COLIFORM DATA FOR LONG BRANCH

In 2006, DEP adopted TMDLs to address elevated fecal coliforms and low dissolved oxygen in Long Branch. **Table A-1** lists the TMDLs for these waterbodies. Long Branch was also verified as impaired for total coliforms and iron. However, between TMDL adoption and BMAP development, total coliforms were removed from the Florida water quality standards and an iron evaluation indicated that this impairment was naturally caused. Thus, this BMAP addresses only the fecal coliform and dissolved oxygen impairments.

In the Long Branch dissolved oxygen TMDL, three different causative pollutants were found: biochemical oxygen demand (BOD) in the tributaries, TP in the tributaries, and TN in the mainstem. Thus, the dissolved oxygen TMDL is expressed in terms of these three parameters.

TABLE A-1: LONG BRANCH TMDLS AND REDUCTION REQUIREMENTS

Parameter	TMDL	Allocation	
		Orange County Permitted Municipal Stormwater (percent reduction)	Other Nonpoint (percent reduction)
Fecal Coliform	4.64 x 10^{10} counts/day	32%	32%
BOD (tributaries)	14.96 tons/year	10%	10%
TP (tributaries)	0.74 tons/year	30%	30%
TN (mainstem)	5.20 tons/year	17%	17%

A.3 BMAP Process

Stakeholder involvement is essential to develop, gain support for, and secure commitments to implement the BMAP. Because of the location of the Long Branch watershed, the vast majority of this BMAP was developed by Orange County, CDM, Inc. (under contract with Orange County), and DEP. The County's participation included staff from the Environmental Protection Division, Stormwater Management Division, and the Health Department. Staff from the Florida Department of Agriculture and Consumer Services (DACS) were also involved.

The Orange County Commission was briefed on March 18, 2008. During that meeting the County approved a resolution in support of Long Branch BMAP implementation. A noticed public meeting to review, discuss, and comment on the BMAP was held at the Bithlo Community Center on April 23, 2008. Six local residents and several staff members from Orange County government attended the meeting at which the BMAP was presented and discussed by DEP and Orange County Environmental Protection Department (OCEPD) staff. Attendees expressed significant interest in the plan and in water quality conditions in Long Branch. Informal public comments included strong support for continued water quality monitoring. No formal public comments were received during or after the public meeting. The SJRWMD and DACS Office of Agricultural Water Policy also signed statements of commitment. Commitment documents are shown in **Figure A-3**.

FIGURE A-3: COMMITMENT DOCUMENTS IN SUPPORT OF THE LONG BRANCH BMAP

APPROVED
BY ORANGE COUNTY BOARD
OF COUNTY COMMISSIONERS
MAR 18 2008 JNLBS

RESOLUTION

of the

ORANGE COUNTY BOARD OF COUNTY COMMISSIONERS

Regarding

THE LONG BRANCH BASIN MANAGEMENT ACTION PLAN

Resolution No. 2008-M-06

WHEREAS, in an effort to improve water quality, Section 303(d) of the federal Clean Water Act requires the adoption of total maximum daily loads ("TMDLs") of pollutants that may be discharged into impaired surface water bodies in the United States; and

WHEREAS, to implement TMDLs for Florida's impaired water bodies, the Florida Department of Environmental Protection ("FDEP"), along with stakeholders within the watersheds of impaired waters, develops Basin Management Action Plans ("BMAPs"), which are to specify the activities, schedule, and funding sources that pollutant dischargers will undertake to achieve the TMDLs adopted by FDEP for each water body and thereby restore the water body; and

WHEREAS, FDEP has been working closely with Orange County and other stakeholders within the Long Branch watershed to develop the Long Branch BMAP; and

WHEREAS, on March 4, 2008, the Board of County Commissioner of Orange County (the "Board") was briefed by Orange County staff on the current draft of the Long Branch BMAP and recognizes that, although there will be some revisions to the BMAP before it is adopted by order of the FDEP Secretary, the revisions are not expected to significantly change any fiscal or policy impacts to Orange County.

NOW, THEREFORE, be it resolved by the Board of County Commissioners of Orange County as follows:

Section 1. The Board supports the continued development and finalization of the Long Branch Basin Management Action Plan with the participation of representatives of Orange County.

Section 2. The Board supports the implementation of the Long Branch BMAP and intends to seek the necessary approvals and funding to carry out the management actions for Orange County identified in the Long Branch BMAP.

Section 3. The Board intends to give careful consideration to any recommendations for further action contained in the final BMAP.

Section 4. The Board supports Orange County's participation in the coordinated tracking of BMAP implementation, continued coordination with FDEP and other stakeholders, and revising the BMAP as necessary ensure the management actions are effective in meeting the TMDLs.

Section 5. The Board endorses a coordinated and comprehensive watershed management approach to address and achieve FDEP-adopted TMDLs for the Long Branch River Basin.

Section 6. The Board authorizes the Mayor or his designee to represent the Board in reviewing and approving the BMAP preliminary to its adoption by FDEP, provided that such approval will not significantly change any fiscal or policy impacts to Orange County beyond those presented in the March 4, 2008 BMAP briefing of the Board by Orange County staff. In the event the Mayor, his designee, or Orange County staff determine that revisions to the Long Branch BMAP, preliminary to its adoption by FDEP, significantly change any fiscal or policy impacts to Orange County, they shall bring the matter to the Board and request further direction before approving the plan.

Section 7. This Resolution shall take effect immediately upon its adoption.

ADOPTED this 18th day of March, 2008.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners

By: _____
Richard T. Crotty
Orange County Mayor

ATTEST: Martha O. Haynie, County Comptroller
As Clerk of the Board of County Commissioners

By: _____
Deputy Clerk

BOARD OF COUNTY COMMISSIONERS • ORANGE COUNTY FLORIDA •

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2008
LONG BRANCH BASIN MANAGEMENT ACTION PLAN

STATEMENT OF COMMITMENT TO PLAN IMPLEMENTATION

The Long Branch Basin Management Action Plan (BMAP), developed by Orange County, Florida, the Florida Department of Environmental Protection, and the Florida Department of Agriculture and Consumer Services, was finalized as a consensus document in April, 2008.

As a signatory to this BMAP, the St. Johns River Water Management District, agrees to:

- Seek the necessary approvals and funding to implement the applicable management actions identified in the BMAP, and implement those actions as required approvals and funding are secured.
- Pursuant to the process identified in the BMAP, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Inform DEP and the BWG of any permanent obstacles to carrying out management actions for which they are responsible, including technical, funding, and legal obstacles.
- Continue to use a coordinated and comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements.
- Continue to communicate and coordinate actions and funding across agencies and programs with regard to BMAP implementation.

St. Johns River Water Management District

Kirby B. Green III

Kirby B. Green III, Executive Director

21 April 2008

Date

<INSERT DACS SIGNED STATEMENT>

A.3.1Allocations

The TMDL provides a basis for allocating acceptable loads among all of the known pollutant sources in a watershed, so that appropriate control measures can be implemented and water quality standards achieved. An adopted TMDL is expressed as the sum of all point source load allocations, nonpoint source load allocations, and an implicit or explicit margin of safety, which takes into account any uncertainty concerning the relationship between effluent limitations and water quality.

Under the FWRA (Subsection 403.067[7], F.S.), the TMDL allocation may be an "initial" pollutant allocation of allowable pollutant loads among point and nonpoint sources. In such cases, the "detailed" allocation to specific point sources and specific categories of nonpoint sources must be established in the BMAP. Under the FWRA, the "detailed" allocation to specific point sources and specific categories of nonpoint sources may be established in the BMAP. Both initial and detailed allocations must be determined based on a number of factors listed in the FWRA, including cost-benefit, technical and environmental feasibility, implementation timeframes, and others. Detailed allocations are most appropriate in basins with multiple point sources, detailed source identification, and sufficient data to support division of the initial TMDL allocations.

With only one permitted source is present in the watershed (Orange County MS4), there was no need to divide the initial TMDL allocation beyond "permitted nonpoint" [wasteload allocation (WLA)] and "non-permitted nonpoint" [load allocation (LA)]. Thus, detailed allocations were not developed for this BMAP. The following factors also contributed to this decision:

- Source identification efforts resulted in qualitative information. Thus, no information was available to calculate detailed allocations for the nutrient parameters related to the DO impairment.
- Coliform counts in the natural environment are notoriously variable. Given the unknowns about coliform behavior in Long Branch specifically (e.g. potential for regrowth in the sediment, frequency of extremely low flow, effect of sampling day selection relative to flow), division of the coliform allocation was illogical.

A.3.2 Management Actions

This section provides information on the type of management actions being implemented to address Long Branch impairments. The majority of management actions in this BMAP are being implemented by Orange County. Long Branch management actions can be split into two groups: broad-based and basin-specific. Broad-based actions are those programs and activities that are implemented in a wider geographic area beyond the Long Branch watershed, such as the MS4 program and Environmental Resource Permitting (ERP). Basin-specific management actions are primarily focused on source identification. **Table A-2** lists the Long Branch BMAP management actions.

The Orange County Health Department (OCHD), OCEPD, and DEP worked closely together to evaluate coliform sources. Despite additional water testing and follow-up investigations it is not entirely clear what the sources of fecal coliform loadings are and what percentage are anthropogenic versus naturally occurring.

As shown in **Table A-2**, Orange County has committed to further activities to help identify and isolate the pollutant sources contributing to current water impairments. Management actions in the BMAP will limit the discharge of pollutants, including fecal coliform bacteria, in stormwater runoff from new and existing development in the Long Branch basin.

TABLE A-2: MANAGEMENT ACTION SUMMARY

Management Action	Description	Timeline	Responsible Party	Related to County MS4 Permit (FLS000011)
Broad-Based Management Actions				
MS4 Permit Implementation	Orange County is a Phase I MS4 (Permit No. FLS000011) responsible for developing and implementing a stormwater management program that reduces pollutants in stormwater to the maximum extent practicable. This involves a broad range of activities from public education through erosion control, stormwater system and facility inspections, and system inventories.	Ongoing	Orange County EPD	*Yes*
Public Education and Outreach	To help citizens develop a commitment to the environment's health and well being, the County conducts two types of public outreach efforts: those intended to change behavior and those intended to inform the public about water resources. These efforts include implementation of the Florida Yards and Neighborhoods Program, the Orange County Water Atlas www.orange.wateratlas.org , CLIP program, brochures, public presentations, school programs, Earth Day activities, and other outreach efforts.	Ongoing	Orange County (multiple departments)	*Yes*
Econlockhatchee River Protection Program	Orange County has established special criteria for development within the Big Econlockhatchee River Basin, which are defined in Chapter 15 of the County's Code of Ordinances. Within this basin, Orange County regulations require pollution abatement, recharge where possible, and flood protection.	Ongoing	Orange County EPD	*Not Applicable*
Parks Total Phosphorus Removal	Implementation of a program for Parks Department landscape contractors to utilize fertilizer labeled with 0% phosphorus for all turf fertilizer applications. In addition, no fertilizers are applied within 10 feet of waterbodies or wetlands.	Ongoing	Orange County EPD and Parks and Recreation Division	*Not Applicable*

Management Action	Description	Timeline	Responsible Party	Related to County MS4 Permit (FLS000011)
Pollution Abatement Swale Design Criteria	The County is currently researching the possibility of developing more specific criteria for the design, construction and maintenance of environmental berms and swales on properties abutting lakes and streams. The County has identified specific deficiencies in the current code that require modification. These modifications would apply to new development and redevelopment.	Program under development	Orange County (multiple departments)	*Not Applicable*
Environmental Control Regulations (Ch. 15, Article X, Orange County Code)	Orange County has established environmental regulations for development within Orange County. These regulations require pollution abatement, flood protection, and wetland habitat preservation.	Ongoing	Orange County	*Not Applicable*
Stormwater Regulations (Ch. 38, Zoning, Orange County Code)	In the zoning code, Orange County established stormwater regulations for development within Orange County. These regulations require pollution abatement, recharge criteria, and flood protection.	Ongoing	Orange County	*Not Applicable*
Environmental Resource Permitting	Activities that exceed SJRWMD permitting thresholds must be authorized by an Environmental Resource Permit from the District, which incorporates both stormwater treatment and mitigation of any wetland impacts.	Ongoing	SJRWMD	*Not Applicable*
Agricultural Best Management Practices	DACS develops, adopts, and implements agricultural Best Management Practices (BMPs) to reduce water quality impacts from agricultural discharges and enhance water conservation. A statewide BMP manual for cow/calf operations is under development. Upon adoption, DACS will work with private landowners to implement the provisions of this BMP manual on their properties.	Program ongoing; Adoption of cow/calf BMP manual expected Fall 2008	DACS and Private Landowners	*Not Applicable*

Management Action	Description	Timeline	Responsible Party	Related to County MS4 Permit (FLS000011)
Basin-Specific Management Actions				
Hydrologic Measurements	Flow meters will be installed at locations on both the north and south tributaries. The County will also install a rainfall gage in the basin. Data measured using these tools will provide a better understanding of the flow regimes in the Long Branch system. Water quality data collected during future events can then also be correlated to flow and rainfall amounts.	Begin in 2008	Orange County EPD	*Not Applicable*
Sanitary Survey	A detailed sanitary survey will be performed to determine what role septic systems play in the fecal coliform loading. To help with prioritization, the County will first survey those properties constructed prior to 1984 which may not meet the current setback requirements and/or have the highest probability of failure.	Begin in 2008	Orange County Health Department and EPD	*Not Applicable*
Optical Brightener Testing	Fluorometric detection of optical brighteners is a methodology used for detecting anthropogenic pollution in aquatic environments. Pending equipment availability, the County will use this device to determine the presence of optical brightener dyes in the Long Branch system.	2008 (pending equipment availability)	Orange County EPD	*Not Applicable*
Speedworld Wastewater Field Visits and Follow-up	Contact management of Orlando Speedworld to identify procedures in place to ensure proper management of wastewater during events. Follow-up activities will be implemented, depending on the results of the initial contact.	TBD	Orange County EPD, Health Dept., and DEP	*Not Applicable*

A.3.3 Future Population Growth and Land Use Change

Given the rural nature of the Long Branch watershed, its distance from urbanized areas, and the large proportion of the watershed (34%) that is in public ownership, this low population estimate based on conditions observed in the watershed is considered more accurate than the high estimate based on conditions in the rest of the County. This low projection demonstrates that population growth in the Long Branch watershed is essentially flat (addition of 52 people between now and 2030). Land use is also expected to be consistent over time. Based on a comparison of current land use with the Orange County Future Land Use Map, no significant land use changes are planned for the Long Branch watershed. The only significant difference in these two figures is around the pond, just east of Bithlo. This area is currently a gravel mine. Although identified as rural on the Orange County future land use map, this area is not expected to change operations in the future. Regarding coliform impairments, the addition of 50 people (approximately 20 new septic tanks) is not expected to increase coliform concentrations. or contribute to fecal coliform loading. Regarding the DO impairment, septic tank effluent from the addition of 20 new tanks could contribute BOD and TN loading to the northern tributary. However, as shown in Chapter 2, nutrient loading in the northern tributary does not appear to affect DO levels in the mainstem. Thus, the addition of a small number of septic tanks over the next 25 years is not expected to affect DO levels in Long Branch.

BMAP management actions, such as Environmental Resource Permitting and the Econlockhatchee River Protection Program, will minimize the potential impacts of the limited population growth expected in the Long Branch watershed.

A.3.4 Cost of BMAP Implementation

The cost of BMAP implementation is summarized in **Table A-3**. BMAP management actions that were developed specifically to address this TMDL cost approximately $50,000. This includes hydrologic measurements, a sanitary survey, and an optical brightener study, with funding to be provided by Orange County. A suite of additional ongoing management actions are also included in the BMAP, such as the County municipal stormwater permit program, public education, agricultural best management practices, environmental resource permitting, etc. These programs are implemented at a scale broader than the Long Branch watershed. Thus, costs associated with their implementation were not estimated.

TABLE A-3: BMAP IMPLEMENTATION COST SUMMARY

Management Action	Responsible Party	Estimated Implementation Cost
Broad-Based Management Actions		
MS4 Permit Implementation	OCEPD	Countywide
Public Education and Outreach	Orange County (multiple depts.)	Countywide
Econlockhatchee River Protection Program	OCEPD	Countywide
Parks Phosphorus Removal	OCEPD and Parks	Countywide
Swale Design Criteria	Orange County (multiple depts.)	Countywide ($40,000 for study)
Environmental Control Regulations (Ch. 15, Article X, Orange County Code)	Orange County	Countywide
Stormwater Regulations (Ch. 38, Zoning, Orange County Code)	Orange County	Countywide
Environmental Resource Permitting	SJRWMD	District-wide
Agricultural Best Management Practices	DACS and Private Landowners	Statewide
Basin-Specific Management Actions		
Hydrologic Measurements	OCEPD	$45,000 (2008)
Sanitary Survey	OCEPD and Health Dept.	$1500 (EPD) TBD (Health Dept.)
Optical Brightener Testing	OCEPD	$1500
Speedworld Wastewater Field Visits and Follow-up	Orange County EPD, Health Dept., and DEP	TBD

A.4 Monitoring Program

As part of the BMAP, stakeholders designed a strategy for monitoring water quality and measuring pollutant loads. This strategy builds on the County's existing water quality monitoring resources. The strategy addresses monitoring parameters, quality assurance/ quality control (QA/QC), data management, and data evaluation to measure progress in

achieving the TMDLs, while allowing for evaluation and feedback that better refine the monitoring strategy and provide information to better define how to achieve the TMDLs. The specific objectives of this monitoring strategy are as follows:

- Determine if positive trends in water quality conditions are being observed;
- Improve our ability to evaluate water quality conditions by enhancing flow measurements;
- Continue to improve source identification efforts; and
- Provide sufficient data to support the development of future management actions.

Information provided by the monitoring network will be useful in evaluating the cost-effectiveness of load reduction strategies, modifying existing and selecting future load reduction strategies, coordinating agency/group monitoring efforts to reduce duplication and conserve resources, and increasing the understanding of the relationship between pollutant loads and waterbody response.

The County intends to monitor basic water quality parameters and flow at critical points in the watershed. These points were selected to facilitate ongoing source identification efforts. Data collected by the network are maintained by DEP in a central database available to the public, and must meet QA requirements set by DEP. Additional interagency data comparisons and QA checks will be conducted as practical.

Observations of water quality conditions and trends will be discussed between the County, DEP, and other interested parties on a regular basis. A more complete analysis of trends in the progress made toward achieving designated use will be made on a five-year basis, corresponding with DEP's watershed management cycle.

A.5 Anticipated Outcomes

Since the adoption of the TMDL for Long Branch, Orange County has put forth significant effort to identify and isolate the source(s) contributing to both the DO and fecal coliform impairment. To date, the County has been unsuccessful in identifying exact sources due to lack of flow in the Long Branch system as well as inconclusive sampling results. Therefore, the BMAP will address further investigation of the sources of pollution and it is anticipated that BMAP implementation will:

- Identify and isolate sources of anthropogenic pollutants, if any, and develop management strategies to curb or eliminate these loads;
- Decrease average coliform counts and/or frequency of exceedances at the mainstem performance monitoring station, if anthropogenic sources are found;
- Identify those areas where the impairment may be attributed to natural background conditions (i.e., blackwater system, wildlife, etc.);
- Enhance understanding of Long Branch hydrology, water quality, and pollutant sources; and
- Enhance public awareness of pollutant sources, impacts, and management actions.

At this point, the activities outlined above are all qualitative. As exact pollutant sources have not yet been identified, there are no data available to quantify anticipated nutrient loading reductions associated with BMAP activities as is typically done for other

watersheds. The following benefits are expected to result from the monitoring strategy proposed herein:

- Establish a long enough period of record for water quality data such that trends can be analyzed.
- Determine the relationship, if any, between water quality and the hydrologic data to be collected.
- Gain a better understanding of the relationships between the affect that nutrients have on DO, if any, in the Long Branch system.

BMAP implementation in the Long Branch watershed will be an ongoing process, building upon current commitments defined above. The intent of these management actions is to help the County and FDEP gain a better understanding of the behavior of the Long Branch system. The completion of these management activities will occur during the first two years after the BMAP is adopted. Subbasin specific management actions to identify pollutants are needed for this basin. Similar work that has been completed to date has been either inconclusive or has not identified pollutant sources that contribute to the impaired status of this waterbody. These outstanding unknowns regarding bacteria and nutrient sources mean that TMDLs established for the basin will not be achieved in the near term. However, common sense management activities such as hydrologic measurements, sanitary survey, optical brightener testing, monitoring of Speedworld and continued water quality monitoring at strategic locations throughout the Long Branch Subbasin will be implemented to address impairments in the Long Branch watershed.