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1.0 EXECUTIVE SUMMARY

1.1 Mission

Clermont County is recognized as one of the faster growing counties in Ohio based on population data released by the Ohio Department of Development with 18.5 percent population growth from 1990 to 2000 and more recently 10.9 percent growth from year 2000 to 2010. The County owns and operates wastewater collection and treatment systems that serve approximately two-thirds of its current population, an estimated 197,363 people (2010 U.S. Census Bureau). While serving this estimated population, centralized conveyance and treatment systems accommodate approximately 25 percent of the land area of the County.

Like many other public utilities, Clermont County is faced with financial restraint amid increasingly stringent regulatory requirements and the recurring need for resources to replace and maintain existing wastewater assets that are aging or undersized. These drivers, along with increased stakeholder interest and the County's desire that financial resources be applied to projects that contribute the most value, support the mission of this updated plan:

- To provide for protection of public health (an estimated 34 percent of the County is served by 21,000+ existing home sewage treatment systems);
- To provide and sustain area growth and development;
- To address current and future conveyance/treatment capacity limitations caused by excessive infiltration and inflow;
- To provide detailed planning for addressing needs in unsewered areas such that wastewater utilities associated with new development can evolve consistent with integrated and comprehensive planning;

- To provide townships, municipalities and other stakeholders with a forum in which the County can educate and solicit input on the social, environmental and economic implications of a centralized sewer system.

1.2 Project Goals

Previous master planning efforts placed emphasis on the achievement of water quality goals and objectives. While these objectives are an inherent part of wastewater master planning, the Master Plan Update focuses on effective planning and implementation to maintain and improve existing service levels. In addition to meeting these needs, the future demands on the collection, conveyance, and treatment facilities are also addressed. The primary goals of the Wastewater Master Plan Update are:

- Identification of wastewater peak flows throughout the system, including interpretation of existing records and documentation, compilation of future growth projections, and updated modeling of the collection system;
- Development and evaluation of cost-effective solutions to system limitations, including infiltration/inflow control, use of regional excess flow holding basins, sub-regional wastewater treatment facilities, and recommended improvements to Clermont County's conveyance system;
- Prioritization of recommended improvements to produce the greatest benefit based on environmental, social and economic criteria that reflect Clermont County Water Resources Department's goals and objectives, thus enabling Clermont County to maintain the desired service level to its rate payers;
- Identification and scheduling of proposed capital improvement projects consistent with affordability, regulatory compliance and sustainable growth in the best interest of the ratepayers of Clermont County;
- Identification of new regulatory requirements and their associated impacts on the County's existing treatment systems;

- Development of a strategy for sustainable infrastructure through effective, predictive, preventative and routine maintenance.

The Wastewater Master Plan Update provides Clermont County with a comprehensive plan for the development of its wastewater infrastructure to meet both the short-term and long-term growth of the County through the 2030 time horizon.

A major objective of this updated wastewater master plan is to establish a plan for conveyance of wastewater to the County's wastewater treatment facilities. Of the eight existing wastewater treatment facilities managed by the Clermont County Water Resources Department: Lower East Fork Regional, Middle East Fork Regional, O'Bannon Creek Regional, Ward's Corner Regional, Nine Mile, Felicity, Miami Trails and Arrowhead, the latter two facilities are proposed for elimination to consolidate resources.

A second objective of this Wastewater Master Plan Update is the identification of peak wastewater flows associated with the County's design storm and the evaluation of the capacity of the existing collection and conveyance system to convey these peak flows without excessive surcharging and without sanitary sewer overflows. Modeling of five key planning areas, including the Lower East Fork, Middle East Fork, O'Bannon Creek, Nine Mile and Loveland/Horner's Run/Branch Hill planning areas provides the required information to identify capacity limitations within each planning area. The models used in this analysis, except for the new Loveland/Horner's Run/Branch Hill model, were built using the County's existing calibrated models and projecting the base flows, groundwater infiltration and inflow/infiltration responses. Field measured flow data representative of the existing collection system were not available and thus not used for this analysis.

Different versions of the updated existing models and the new Loveland/Horner's Run model were developed to represent flows for the years 2010, 2020, and 2030. The 2010 flows are based on additional populations resulting from growth within the County between the time when the original models were built and calibrated (in 2000) to the time of the most recent GIS data provided by the County. From the modeling outcome, improvements to the

wastewater collection and treatment system infrastructure are recommended. Planning, for both infrastructure replacement and system maintenance, is critical to the long-term sustainability of the County's system.

Finally, this updated wastewater master plan provides the County with recommendations for capital improvements that are necessary to achieve the goals identified above. The capital improvement recommendations are categorized into three priority levels: near-term 2010 needs, intermediate-term, or 2020 needs and long-term 2030 needs which are intended to serve and guide development of the County's five-year revolving capital improvement plan.

1.3 Key Findings and Recommendations

The Wastewater Master Plan Update prescribes capital improvements and measures to improve wastewater management in sewerred and unsewerred areas through the year 2030. Key areas of the updated wastewater master plan include proposed improvements to address:

- Existing problems in the County's sanitary service areas; including inadequate collection and pumping facilities that address excessive surcharging, water-in-basements, sanitary sewer overflows and modifications to existing wastewater treatment facilities to increase peak wet weather flow treatment;
- Existing problems in unsewerred areas; including new wastewater management facilities and sewer extensions to unsewerred problem areas;
- Growth and economic development; including upgrading of existing collection, conveyance and treatment infrastructure;
- Consolidation of infrastructure to promote regionalization of wastewater management

The 20-year Wastewater Master Plan Update includes a total of \$291.2 million in capital improvements covering 85 proposed projects located throughout the County's service area. The recommended projects have been divided into three project priority levels, reflecting near-term, intermediate and long-term areas of need, described as follows:

- ***Priority 1(P1) Level*** – presence of excessive sewer surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from existing (2010) modeled areas;
- ***Priority 2(P2) Level*** – presence of excessive sewer surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from future (2020) modeled areas;
- ***Priority 3(P3) Level*** – presence of excessive sewer surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from future (2030) modeled areas;

An objective decision analysis approach was employed to prioritize the projects for each priority level, utilizing weighted decision criteria developed by the Clermont County Water Resources Department to measure benefit for its rate payers. The prioritized listing of the recommended projects and their estimated (May 2010) costs is included in Exhibits 1.1 through 1.3. The costs presented include major trunk sewer improvements, pumping improvements and treatment modifications. Costs for local sewers and community treatment systems have not been included. The recommended projects are assigned an alpha-numeric code which identifies the facility planning area, priority level and project number. Each project is located on a facility planning map for reference.

The total cost of recommended improvements for each of these areas is as follows:

- Priority 1: \$128.5 million (33 near-term areas of need projects);
- Priority 2: \$124.1 million (42 intermediate-term areas of need projects);

- Priority 3: \$38.6 million (10 long-term areas of need projects).

The project compilation is intended to provide a basis for project consideration and timing of capital investment. Prior to proceeding with the design of the proposed capital improvement projects as outlined herein, the County should undertake a detailed, project-level flow monitoring campaign for each project to refine and update model output and thereby confirm project magnitude and concept.

In closing, with the current economic climate characterized by financial restraint, increasingly stringent regulatory requirements and the recurring need for resources to replace and maintain existing wastewater infrastructure assets, the County must focus on capital improvements that contribute the most value to its rate payers while supporting its mission for growth, economic development and quality of life. The Wastewater Master Plan Update, as presented herein, seeks to achieve that goal, reflecting the concerns of its rate payers while addressing wastewater management challenges over the next 20 years.

EXHIBIT 1.1
Summary of Proposed Near Term Capital Improvements

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P1-06	Obannon Creek Sewer Upgrade (MH 5351 - OBNWW)	4,800 LF			Involves laying 4,837' of open cut sewers ranging from 27"-54".	63.7	\$2,501,000
MEF-P1-01	Bethel Collection Improvements I (MH 100493 - MH 2552)	4,900 LF			Involves laying 4,931' of open cut sewers ranging from 10"-15".	60.1	\$2,440,000
MEF-P1-02	Bethel Collection Improvements II (MH 2689 - MH BETHELPS)	11,000 LF			Involves laying 10,997' of open cut sewers ranging from 21"-30".	60.1	\$5,211,000
OBN-P1-02	Creek Sewer Upgrade (MH 5935 - MH 5783)	15,600 LF			Involves laying 15,997' of open cut sewers ranging from 12"-21".	60.1	\$6,181,000
OBN-P1-04	Paxtonwoods Sewer Upgrade (MH 5133 - MH 5208)	3,000 LF			Involves laying 555' of 10" open cut sewers and 2,421' of 12" open cut sewers.	60.1	\$1,155,000
OBN-P1-05	Redbird Road Sewer Upgrade I (MH 5350 - MH 5351)	1,800 LF			Involves laying 1,760' of 27" open cut sewers.	60.1	\$888,000
LEF-P1-01	Shayler Run Upstream Sewer Upgrade (MH 9840 - MH 9159_branches to MH 777/MH 419)	4,900 LF	3 MG		Involves laying 4,826' of open cut sewers ranging from 10"-24" and providing 3 MG of storage.	55.3	\$10,295,000
LEF-P1-03	Hall Run Sewer Replacment and EQ Expansion	14,500 LF	2 MG		Involves laying 14,460' of open cut sewers ranging from 8"-21" and providing 2 MG of storage.	55.3	\$15,672,000
LEF-P1-04	Wolf Pen-Pleasant Hill Road Sewer Upgrades (MH 8235-MH8144)	4,500 LF	3.6 MG	7 MGD	Involves laying 4,402' of open cut sewers ranging from 10"-30", providing 3.6 MG of storage and upgrading list staion to 7 MGD.	55.3	\$13,724,000
LEF-P1-05	Cook Road Sewer Upgrade (MH 5033 - MH 10050)	3,500 LF		6.5 MGD	Involves laying 3,159' of 12" open cut sewers and 266' of 18" open cut sewers and upgrading lift stations to 6.5 MGD.	55.3	\$3,416,000
LEF-P1-07	Mt. Caramel-Tobasco Sewer Upgrade (MH 8491-MH 9659)	3,200 LF			Involves laying 3,184' of open cut sewers ranging from 10"-18".	55.3	\$1,803,000
LEF-P1-08	Clough Pike Sewer Upgrade (MH 226- MH 9646)	2,800 LF			Involves laying 453' of 10" open cut sewers and 2,297' of 12" open cut sewers.	55.3	\$1,051,000
OBN-P1-T1	OBN Regional WWTP Modifications Phase 1 (augment wet weather flow treatment capacity to 11 mgd)				OBN Regional WWTP Modifications Phase 1 (augment wet weather flow treat	53.8	\$8,340,000
MEF-P1-T1	MEF Regional WWTP Modifications Phase 1 (augment wet weather flow treatment capacity to 18 mgd)				MEF Regional WWTP Modifications Phase 1 (augment wet weather flow treat	53.8	\$4,183,000
LEF-P1-06	Elick Lane Sewer Upgrade (MH1843-MH 2002)	1,300 LF			Involves laying 1,244' of 10" open cut sewers.	50.5	\$584,000
SLC-P1-T1	Village of Newtonsville WWTP (will address to address existing on-site issues)				Village of Newtonsville WWTP (will address to address existing on-site issues	44.7	\$2,800,000
NML-P1-T1	NML WWTP Modifications Phase 1 (provide 0.75MG EQ capacity)				NML WWTP Modifications Phase 1 (provide 0.75MG EQ capacity)	42.6	\$8,423,000
LEF-P1-09	Arcadia Lane Sewer Upgrade (MH 1546-1653)	700 LF			Involves laying 640' of 10" open cut sewers.	41.4	\$281,000
NML-P1-01	Nine Mile-Tabasco Road Sewer Upgrade I (MH 6544 - WWTP)	6,000 LF			Involves laying 5,650' of 24" open cut sewers and 299' of 21" open cut sewers.	38.5	\$2,734,000
LEF-P1-15	Orchard Lift Station Upgrade			2.2 MGD	Involves upgrading lift station to 2.2 MGD.	38.5	\$1,282,000
LEF-P1-16	Shepherd Lift Station Upgrade			2.5 MGD	Involves upgrading lift station to 2.5 MGD.	38.5	\$1,305,000
MEF-P1-03	Locust Lake LS/FM Upgrade	2,600 LF (F.M.)		1 MGD	Involves laying 2,628' of 8" force main and upgrading lift station to 1 MGD.	35.8	\$2,189,000

EXHIBIT 1.1
Summary of Proposed Near Term Capital Improvements (continued)

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P1-03	O'Bannon Trunk Sewer Improvements (MH 5787 - MH 5439)	15,000 LF			Involves laying 14,994' of open cut sewers ranging from 12"-54".	28.2	\$9,667,000
LEF-P1-10	SR 28 Sewer Upgrade (MH 8139- MH 4207)	3,300 LF			Involves laying 3,291' of 15" open cut sewers.	27.3	\$1,917,000
LHR-P1-01	Miami Trails Sewer Upgrade (MH 7503 - Miami Trails WWTP)	4,500 LF			Involves laying 4,485' of open cut sewers ranging from 10"-15".	24.7	\$2,925,000
NML-P1-02	Nine Mile-Tabasco Road Sewer Upgrade II (MH 6625-6615)	1,800 LF			Involves laying 1,161' of 21" open cut sewers and 610' of 24" open cut sewers.	24.6	\$1,051,000
LEF-P1-11	SR 131 Lift Station Upgrade	1,400 LF		3 MGD	Involves laying 1,381' of 15" open cut sewers and 19' of 35" open cut sewers and upgrading lift station to 3 MGD.	24.6	\$1,938,000
LEF-P1-12	Happy Hollow Lift Station Upgrade	140 LF		4 MGD	Involves laying 131' of 18" open cut sewers and upgrading lift station to 4	24.6	\$1,516,000
LEF-P1-13	Viking Village Lift Station Upgrade			1.1 MGD	Involves upgrading lift station to 1.1 MGD.	24.6	\$1,198,000
LEF-P1-14	State Route 28 Lift Station Upgrade			3 MGD	Involves upgrading lift station to 3 MGD.	24.6	\$1,347,000
MEF-P1-04	Lucy Run Sewer Upgrade (Phase I) (MH 3264 - MH 3239)	7,100 LF			Involves laying 7,146' of 42" open cut sewers.	24.6	\$4,862,000
OBN-P1-01	Deerfield Road Collection Improvements (MH 4757 - MH 5567)	8,800 LF			Involves laying 8,761' of 12" open cut sewers.	24.6	\$4,977,000
LEF-P1-02	Eastgate North Drive Sewer Upgrade (MH 7547-9968)	1,500 LF			Involves laying 397' of 12" open cut sewers and 1,102' of 15" open cut sewers.	18.3	\$631,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

EXHIBIT 1.2
Summary of Proposed Intermediate Term Capital Improvements

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P2-08	SR 132 Sewer upgrade (MH 6097 - MH 6076)	18,700 LF			Involves laying 18,654' of open cut sewers ranging from 18"-30".	63.7	\$9,909,000
OBN-P2-09	Goshen Sewer Upgrade (MH 6227 - MH 5755)	18,100 LF			Involves laying 18,148' of open cut sewers ranging from 15"-42".	60.1	\$9,991,000
OBN-P2-12	Deerfield Road Storage		2 MG		Involves providing 2 MG of storage.	60.1	\$6,443,000
OBN-P2-13	Fay Road Sewer Upgrade (MH 5765 - MH 5787)	5,000 LF			Involves laying 4,981' of 12" open cut sewers.	60.1	\$1,857,000
OBN-P2-10	SR 48 Sewer Upgrade (MH 5410 - MH 5351)	2,000 LF			Involves laying 1,414' of 10" open cut sewers and 627' of 12" open cut sewers.	57.4	\$866,000
MEF-P2-08	Bethel Lift Station Storage		1.5 MG		Involves providing 1.5 MG of storage.	46.9	\$4,685,000
LEF-P2-T1	LEF Regional WWTP Modifications (nutrient removal facilities)				LEF Regional WWTP Modifications (nutrient removal facilities)	45.6	\$3,950,000
OBN-P2-T2	OBN Regional WWTP Modifications Phase 2 (nutrient control facilities)				OBN Regional WWTP Modifications Phase 2 (nutrient control facilities)	45.6	\$1,850,000
MEF-P2-T2	MEF Regional WWTP Modifications Phase 2 (nutrient removal facilities)				MEF Regional WWTP Modifications Phase 2 (nutrient removal facilities)	45.6	\$3,150,000
LHR-P2-T2	Miami Trails WWTP Elimination	19,000 LF, 5,000 LF (F.M)		2 MG	Miami Trails WWTP Elimination. Involves laying 19,000' of open cut sewers ranging 8"-15", 5,000' of 4" force mains and upgrading lift stations to 2 MG.	35.7	\$13,757,000
OBN-P2-T3	OBN Regional WWTP Modifications Phase 2 (augment EQ capacity)				OBN Regional WWTP Modifications Phase 2 (augment EQ capacity)	42.6	\$9,000,000
MEF-P2-13	Owensville P.S. and F.M. Upgrade (STLOUSFM - MH 3220)	6,100 LF (F.M.)		4 MGD	Involves laying 6,142' of 15" force mains and upgrading lift station to 4 MGD.	42.1	\$3,954,000
LEF-P2-21	Meadow Drive Sewer Upgrade (MH 4648- MH 10070/Longfield PS)	1,890LF		3 MGD	Involves laying 1,890' of 12" open cut sewers and upgrading lift station to 3	38.5	\$2,066,000
LHR-P2-T4	Arrowhead Park WWTP Elimination (flow to be directed to Wards Corner Regional WWTP)	2,500 LF			Arrowhead Park WWTP Elimination (flow to be directed to Wards Corner Regional WWTP). Involves new lift station and laying 5,000' of force main.	35.7	\$1,906,000
NML-P2-04	Legendary Run Sewer Upgrade (MH 9563 MH 9488)	1,500 LF			Involves laying 1,483' of 12" open cut sewers.	33.7	\$662,000
NML-P2-06	Oakland Farm Drive Sewer I (MH 9480 MH 455)	1,200 LF			Involves laying 1,116' of 10" open cut sewers.	33.7	\$442,000
NML-P2-05	Pierce Lift Station Upgrade			1.5 MGD	Involves upgrading lift station to 1.5 MGD.	33.7	\$1,225,000
MEF-P2-05	Bethel Collection Improvements III (MH 9465 - MH 9468)	1,800 LF			Involves laying 1,821' of open cut sewers ranging from 12"-15".	33.7	\$1,001,000
MEF-P2-06	Bethel Collection Improvements IV (MH 9437 - MH 2689)	6,300 LF			Involves laying 2,188' of 15" open cut sewers and 4091' of 18" open cut sewers.	33.7	\$3,025,000
MEF-P2-07	Bethel Collection Improvements V (MH 2606 - MH 2689)	1,300 LF			Involves laying 1,305' of 10" open cut sewers.	33.7	\$648,000
MEF-P2-11	Owensville Collection Improvements I (MH 3148 - MH 3119)	3,100 LF			Involves laying 1,037' of 12" open cut sewers and 2,054' of 15" open cut sewers.	33.7	\$1,694,000
MEF-P2-12	Owensville Collection Improvements II (MH 3116 - MH 3100)	300 LF			Involves laying 318' of 12" open cut sewers.	33.7	\$192,000
MEF-P2-19	Huntsman Trace Sewer Upgrade (MH 2952 - MH 3490)	8,300 LF			Involves laying 7,146' of 12" open cut sewers and 1,198' of 15" open cut sewers.	33.7	\$3,452,000
MEF-P2-20	Chapel Sewer Upgrade (MH 2895 - MH 2364)	3,500 LF			Involves laying 2,362' of 12" open cut sewers and 1,138' of 15" open cut sewers.	33.7	\$1,570,000

EXHIBIT 1.2
Summary of Proposed Intermediate Term Capital Improvements (continued)

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P2-11	Redbird Road Sewer Upgrade II (MH 7756 - MH 5350)	5,000 LF			Involves laying 4,981' of 18" open cut sewers.	33.7	\$2,092,000
MEF-P2-18	Rose Lane Sewer Upgrade (MH 3016 - MH 3018)	800 LF			Involves laying 830' of 10" open cut sewers.	31	\$324,000
MEF-P2-23	Locust Lake Sewer Upgrade (MH 2869 - LOCUSTPS)	200 LF			Involves laying 171' of 12" open cut sewers.	31	\$94,000
OBN-P2-07	Twin Oak Sewer Upgrade (MH 7741 - MH 7753)	1,900 LF			Involves laying 1,919' of 10" open cut sewers.	31	\$1,004,000
MEF-P2-16	Haskell Sewer Upgrade (MH 3427 - MEFWW)	4,600 LF			Involves laying 794' of 24" open cut sewers and 3,796' of 42" open cut sewers.	30.9	\$2,834,000
NML-P2-03	Nine Mile-Tabasco Road Sewer Upgrade III (MH 6714 - MH6721)	3,700 LF			Involves laying 3,625' of 21" open cut sewers.	27.3	\$1,523,000
LEF-P2-17	Founders Boulevard Sewer Upgrade (MH 2101- MH 2130)	1,200 LF			Involves laying 1,168' of 21" open cut sewers.	27.3	\$518,000
LEF-P2-18	Old SR 74 Sewer Upgrade (MH 2214- MH 2251)	800 LF			Involves laying 742' of 12" open cut sewers.	27.3	\$401,000
LEF-P2-19	Olive Branch-Stonelick Road Sewer Upgrade (MH 9850- MH 9843)	2,500 LF			Involves laying 2,438' of 21" open cut sewers.	27.3	\$1,029,000
MEF-P2-09	Lucy Run Sewer Upgrade (Phase II) (MH 8133 - MH 3264)	8,400 LF			Involves laying 6,030' of 27" open cut sewers and 2,323' of 36" open cut	27.3	\$4,131,000
MEF-P2-10	Lucy Run Sewer Upgrade (Phase III) (MH 3239 - MEFWW)	6,000 LF			Involves laying 5,981' of 42" open cut sewers.	27.3	\$4,105,000
MEF-P2-14	Hartman Lane Sewer Upgrade (MH 9395 - MH 3427)	7,700 LF			Involves laying 7,652' of 24" open cut sewers.	27.3	\$3,360,000
MEF-P2-15	Winemiller Sewer Upgrade (MH 3317 - MH 9393)	3,900 LF			Involves laying 3,934' of 21" open cut sewers.	27.3	\$1,802,000
MEF-P2-17	SR 132 @ Elmwood Road Sewer Upgrade (MH 3214 - MH 3205)	3,600 LF			Involves laying 3,645' of 21" open cut sewers.	27.3	\$1,591,000
MEF-P2-21	Foozer FM/Sewer Upgrade (MH 9354 - FOOZERPS; FOOZERFM - MH 12901)	700 LF/8,000 LF (F.M.)			Involves laying 656' of 15" open cut sewers, 20' of 12" open cut sewers and 8,005' of 15" force mains.	27.3	\$5,450,000
MEF-P2-22	Upper Lucy Run Sewer Upgrade (MH 3488 - MH 8133)	6,000 LF			Involves laying 3,389' of 21" open cut sewers and 2,618' of 24" open cut sewers.	27.3	\$2,716,000
MEF-P2-24	SR 132 @ SR 125 Sewer Upgrade (MH 12901 - MH 3490)	7,100 LF			Involves laying 7,080' of 24" open cut sewers.	24.6	\$3,838,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

EXHIBIT 1.3
Summary of Proposed Long Term Capital Improvements

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
NML-P3-T2	NML WWTP Modifications Phase 2 (augment EQ capacity)				NML WWTP Modifications Phase 2 (augment EQ capacity)	42.6	\$2,300,000
MEF-P3-T3	MEF Regional WWTP Modifications Phase 3 (augment EQ capacity)				MEF Regional WWTP Modifications Phase 3 (augment EQ capacity)	42.6	\$10,175,000
LEF-P3-20	Ferguson Drive and Aicholtz Road Sewer Upgrade (MH 356- MH 11962)	4,200 LF			Involves laying 226' of 10" open cut sewers and 3,885' of 12" open cut sewers.	41.2	\$2,029,000
LEF-P3-22	Nature Run Upgrade			0.6 MGD	Involves upgrading lift station to 0.6 MGD.	38.5	\$1,119,000
LEF-P3-T2	LEF Regional WWTP Design Flow Expansion (ADF = 14 mgd)				LEF Regional WWTP Design Flow Expansion (ADF = 14 mgd)	35.7	\$15,000,000
NML-P3-07	Oakland Farm Drive Sewer II (MH 6875 - MH 6721)	2,100 LF			Involves laying 2,047' of 15" open cut sewers.	33.7	\$826,000
NML-P3-08	Pierce F.M Upgrade (MH Pierce Pump Station-MH 9484)	1,200 LF			Involves laying 1,129' of 12" open cut sewers and 56' of 10" force mains.	33.7	\$522,000
NRH-P3-01	Sewer Extensions immediately adjacent to the New Richmond sewer area to serve homes currently served by on-site systems.	3,000 LF			Involves laying 3,000' of 8" open cut sewers.	21	\$1,642,000
NML-P3-09	Sewer Extensions along Fulton Grove Road to serve homes currently served by on-site systems	3,000 LF			Involves laying 3,000' of 8" open cut sewers.	21	\$1,622,000
SLC-P3-01	Sewer Extensions in the Owensville area to serve homes currently served by on-site systems. Owensville-Belfast Road north of Owensville.	7,000 LF			Involves laying 7,000' of 8" open cut sewers.	16.2	\$1,830,000
SLC-P3-02	Sewer Extensions in the Owensville area to serve homes currently served by on-site systems. SR 50 east to the Clermont Northeastern Local School treatment facility.	6,000 LF			Involves laying 6,000' of 8" open cut sewers.	16.2	\$1,571,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

2.0 INTRODUCTION

2.1 Objectives of the Wastewater Master Plan Update

Clermont County owns and operates wastewater collection and treatment systems that serve an estimated two-thirds of its current population of 197,363 (2010 U.S. Census Bureau). Since Clermont County is recognized as one of the ten fastest growing counties in Ohio and the second fastest growing county in southwestern Ohio, this Wastewater Master Plan Update effort is necessary to:

- Protect public health. This includes plans to address the estimated 34 percent of the County served by 21,000+ existing home sewage treatment systems as well as numerous semi-public systems (i.e. any facility not owned and operated by County, State or Federal government, such as mobile home parks and schools).
- Sustain area growth and development.
- Identify current and future conveyance/treatment capacity limitations caused by excessive infiltration and inflow.
- Provide detailed planning for servicing currently unsewered areas such that wastewater utilities associated with new development can evolve consistent with integrated and comprehensive planning.
- Provide a forum for townships, municipalities and other stakeholders in which the County can educate and solicit input on the social, environmental and economic implications of a centralized sewer system

2.2 Previous Reports and Planning Documents

Preparation of this document is based on available data and published resources from various departments within Clermont County, local townships, villages and other governmental agencies whose function is relevant to the preparation of this Wastewater

Master Plan Update. The main sources and methodologies for compiling information used in the document are as follows:

Facility Planning Areas – The facility planning areas used in this report are derived from the *Regional Water Quality Management Plan* (OKI, 1977), the *Status of Wastewater Treatment Facilities and Facility Planning Areas* (OKI, 1998; revised 1999) except as recently amended to include updated FPA boundaries within Clermont County (City of Milford, Amendment 29, 2004) and a new FPA (Village of Williamsburg, Amendment 32, 2009).

Population Trends – The facility planning areas’ population estimates and projections were derived from the traffic analysis zone (TAZ) database maintained by OKI. This database includes population figures, both current and projected. A total of 128 traffic zones span the facility planning areas analyzed in this report, making the traffic zones useful building blocks for projecting populations in the facility planning areas which often encompass segments of multiple political jurisdictions.

Development Trends – Development trends within each FPA were inferred from a host of comprehensive land use, growth management and zoning plans prepared at the township level, regional economic development, industry, transportation and corridor studies.

Sewer Service Areas – Sewered areas within the planning area boundaries were obtained from the jurisdictions providing the service, including Clermont County, Village of New Richmond, Village of Williamsburg, Village of Moscow, City of Milford, Village of Batavia and the City of Loveland (Metropolitan Sewer District of Greater Cincinnati).

Wastewater Treatment – Data pertaining to the permitted discharge of treated wastewater from publicly and privately owned and operated facilities were obtained from the Ohio EPA, Division of Surface Water, Southwest District office files and additional data furnished by the Clermont County Water Resources Department (CCWRD).

Home (On-site) Sewage Treatment Systems – On-site wastewater treatment system locations in each FPA were identified using a Geographical Information System (GIS) data layer provided by the Clermont County General Health District which maintains this database for the entire County and regularly conducts inspections of these facilities.

Notable key documents relevant to this study are summarized below.

2.2.1 1995 Wastewater Master Plan (Harza)

Harza Environmental Services developed a Wastewater Master Plan, in concert with the Clermont County Sewer District (forerunner of the Clermont County Water Resources Department) and the Technical Advisory Committee appointed by the Board of County Commissioners. The plan developed planning methods and introduced concepts and guidance to solutions dealing with water quality management issues. The objective of the master plan was to provide the County with the direction and resources needed to:

- Address existing wastewater management and related water quality problems
- Begin taking a coordinated, pro-active approach to planning, implementation, operation and maintenance, and monitoring of wastewater management activities
- Establish sound, technically-based policies to complement a long-term plan for wastewater service that supports continued economic growth and development while protecting the natural environment of the County; and
- Define a management strategy that is well-suited to supporting the effective implementation and administration of the wastewater master plan

The report identified wastewater management issues in Clermont County, wastewater management needs and solutions for each facility planning area, evaluation of sludge management options, and a recommended wastewater management master plan. The major elements of the recommended wastewater master plan included:

- 
- Basic policies related to environmental preservation and wastewater management
 - Recommendations for implementation of specific physical facility improvements
 - Proposed operation and maintenance improvements
 - Recommendations for adoption of specific policies related to wastewater management, and
 - Suggestions for structuring of the management units required to implement and maintain the master plan

The plan also included estimated costs, financing options, and plan for implementation of recommendations.

2.2.2 2003 Revised Executive Summary Update (Quest)

Since the development of the Wastewater Master Plan by Harza in 1995, Clermont County refocused its priorities, necessitating an update to the Wastewater Master Plan in 2003 that revisited the philosophy and principals of the plan and provided updates as necessary. A new executive summary was developed by Quest to include all relevant information verbatim from the existing Executive Summary that remained accurate and supplemented with updated data, tables and attachments where applicable. The executive summary provided recommendations for the following:

1. Approach to Wastewater Management:
 - Response to Critical Existing Problems
 - Development of Countywide Wastewater Policies and Management Structure
 - Improvement Plan to Support Future Growth

2. Wastewater Management Improvements:

- Corrective Action: Centralized and non-Centralized Problem Areas
- Capital Improvements: Non-Centralized Areas and Growth Related

3. Policy/Management Structure Improvements:

- Creation of a central entity responsible for countywide management of water quality issues
- Improved inventory and management of data related to location and performance of semi-public and on-site systems
- Improved inventory and management of water quality data
- Regional planning of sewer extension projects to maximize benefits and minimize costs per connection
- Detailed, coordinated, technical review of development and wastewater management plans for unsewered areas
- Regional consideration of non-wastewater related impacts on water quality and the natural environment

4. Stormwater Initiatives:

- Establish an Interim Dedicated Account for Stormwater Management
- Program Development Strategy
- Form a Citizens Advisory Task Force
- Begin Preparations for NPDES Phase II Permitting
- Develop a Stormwater Management GIS Needs Assessment
- Develop a Watershed Capital Improvement Planning Strategy

- Preparation and Assessment of Cooperative Opportunities
5. Master Plan Policy and Management Structure:
- Adoption of the Environmental Protection Policy
 - Improved Policies for Management of On-Site Systems
 - Formation of a Countywide Office of Environmental Quality (OEQ)
 - Master Plan Financing Options
6. Plan for Implementation:
- Establishing a County commitment to plan implementation
 - Promotion of public awareness of wastewater management issues and consensus building
 - Development of technically sound, implementable policies related to wastewater planning, permitting and management of semi-public and on-site systems, improved management of point and nonpoint threats to water quality, and project financing.
 - Development of the organizational and procedural elements needed to support collaborative planning, design, and implementation of projects by entities in the County.
 - Initiation of focused efforts aimed at addressing critical on-going problems and defining in greater detail the manner in which recommended improvements are successfully implemented.

The report recommended that Clermont County continue its policy of continually revising the prioritizations of the 5-year capital improvement plan, as a means of proceeding with final planning and design of recommended master plan capital improvements. It provided



a general basis for considerations of projects and estimating the timing of expenditures that have been significantly altered over the planning years that have passed since the original implementation of the master plan. The report recommended that the revised plan must be implemented in the form of new policies, management structures, and facility improvements as summarized above.

2.2.3 Economic Development Strategic Plan 2010-2013

One of the key initiatives emphasized in the *Economic Development Strategic Plan (June 2010)* is to improve the coordination of various local governments responsible for land use, utilities, zoning and transportation. This will be accomplished through a master plan of development prepared by the County that is intended to provide a common basis of understanding and useful guidance for townships, villages and cities as development strategies are formulated and implemented. The vision and desire is to obtain a high degree of collaboration between governmental entities so that coordinated capital improvement planning can be accomplished that transcends jurisdictional boundaries.

With over \$19 million budgeted by the County in 2010 for wastewater projects, these capital improvements influence the location and type of development and re-development that will occur throughout the County. Accordingly, the *Economic Development Strategic Plan (June 2010)* recommends the following for these projects:

- Timing the funding of infrastructure projects to coincide with state and federal funding opportunities so that maximum financial leverage can be obtained;
- Aligning planned capital improvement with the priorities of local communities to the extent possible;
- Engaging public sector partners in a collaborative effort with planning for infrastructure improvements which often include acquisition of real estate for new sewers, easements and rights-of-way.

2.2.4 Clermont County Industry Report 2010

Recent industry data compiled and evaluated for the third quarter 2010 and forecasted to 2015 in Clermont County indicates the following:

- The job outlook for various selected industries suggests a 13.1 percent increase over the five year period. Among those industries examined include construction, manufacturing, retail and wholesale trade, real estate, utilities, finance and insurance, transportation and warehousing;
- The projected change in job growth over the 2010 to 2015 period is higher than the projected state growth rate (5%) and national growth rate (8%);
- The largest job gains are in the areas of retail trade, construction and finance and insurance;
- The location quotient is a way of quantifying how concentrated an occupation or industry is in a region compared to the nation (i.e. an LQ=1.0 indicates an average share of jobs compared to the nation as a whole). The location quotient (LQ) computed for each selected industry suggests that retail trade (LQ=1.42), construction (LQ=1.45) and finance and insurance (LQ=1.31) are expected to remain as pillars of the local economy with a larger than average share of total jobs.

The five-year forecast from economic indicators suggests an upward trend in the local economy lies ahead. This upward trend will lead to development and re-development in established commercial and industrial corridors and new development in adjoining areas.

2.2.5 Eastern Corridor Project

The initial tier of the “Eastern Corridor Project” in Hamilton and Clermont Counties developed a feasible multi-modal plan for an area extending from downtown Cincinnati to the Eastgate Mall area located in Union Township. SR 32 in western Clermont County is a developed, predominantly commercial/retail corridor that experiences a high volume of



commuter, business/freight and local residential traffic. During the initial studies, a number of alternatives were considered in the Eastgate area including various I 275/SR 32 interchange options to improve capacity and safety. The main improvements considered include the following:

- Modification of the existing I 275/SR 32 and Eastgate Boulevard interchanges;
- Removal of existing Old SR 74/SR 32 intersection west of I 275 and extending Old SR 74 west to intersect with Mt. Carmel-Tobasco Road;
- Widening SR 32 to Gleneste-Withamsville Road and creating a new intersection at relocated Old SR 74/SR 32;
- Coordination with locally planned roadways.

The multi-modal plan is planned for construction in three phases and is being coordinated with other local projects in the area programmed by Clermont County. Clermont County Transportation Improvement District (CCTID), in cooperation with the Clermont County Engineers Office, Ohio Department of Transportation (ODOT) and Union Township, is beginning planning for a local roadway network improvement between Mount Carmel-Tobasco Road and Eastgate Boulevard, referred to as the Aicholtz Road Connector.

The improvement corridor follows Old SR 74 and Aicholtz Road, with a new connection under I-275. Total length is about 1.3 miles. The Aicholtz Connector is being coordinated with ODOT's planned improvement of the I-275 / SR 32 interchange and planned multi-modal improvements associated with the Eastern Corridor project and will offer residential and commercial growth opportunities in addition to improving travel efficiency, safety and access to the Eastgate area.

Additionally, CCTID currently has more than thirty projects, mainly in Miami and Union Township that are in the planning and design stage. Two roadway projects began construction in southern Miami Township in 2010.

2.2.6 Union Township Comprehensive Land Use Plan 20/20

The *Union Township Comprehensive Land Use Plan 20/20* plans to promote sustainable development in nine focus areas that were identified within the township. According to the Plan, there is a disproportionate level of apartments, townhouses, and condominiums located throughout the township as compared to other areas. Accordingly, to obtain more balance and to retain a diversity of land uses, the Plan recommended future residential development should consist of large lot single-family homes since ample small lot single-family structures and sufficient areas currently zoned for small lot residential development are available. Sanitary service is in place for the majority of the township.

The Ivy Pointe Commerce Park, a 100-acre Class A office park at the southeast corner of the intersection of SR 32 and I 275, was completed in 2009. In addition to interstate frontage and convenient access to I-275, Ivy Pointe will be enhanced by significant road improvements to Ferguson Drive between Aicholtz Road and Clough Pike.

2.2.7 Miami Township Comprehensive Plan – 2005

The *Miami Township Comprehensive Plan – 2005* contains a capacity analysis which concluded that future development pressure is likely to continue due to the projected increase in population. Future pressure was predicted by comparing the projected population to the amount of developable land available.

Ten key concept areas were identified and analyzed as to their potential for growth and development. The capacity analysis concluded that the estimated 2,200 acres of developable land for residential units under existing zoning regulations will likely be built out by 2025 in Miami Township. This, in turn, will challenge CCWRD to continue to maintain adequate sanitary service to the township as this growth is realized.

2.2.8 Batavia Township Growth Management Plan Update 2004

The *Batavia Growth Management Plan* was prepared in 1997 and updated in 2004. The Plan stresses the importance of encouraging development to occur that is generally contiguous to existing developed areas and that can be served with public utilities and services. CCWRD provides sanitary service to Batavia Township but not the Village of Batavia. The Village of Batavia has recently agreed to a proposal from the County that would enable the County to operate and maintain the Village's collection and treatment systems for a limited time period of three years, after which time a decision would be considered to merge the Village's water and wastewater service with the County's systems.

The 1997 Growth Management Plan recommended that Batavia Township assume a 2.5% annual growth rate, resulting in a 2020 population of approximately 26,000 residents. The Plan Update 2004 projections indicate that Batavia Township's population by 2020 will be between 26,350 and 28,375 residents. This means that the Township can anticipate approximately 9,550 new residents by 2020.

Accordingly, residential development will be controlled consistent with the densities of existing neighborhoods in the planning area; generally 2 to 3 dwelling units per acre for single family detached development and 5 to 7 dwelling units per acre for multiple family or attached single family development.

Future residential development will be encouraged at densities between 1 and 2 dwellings per acre; however, in rural areas, residential development will be encouraged in 3 acre minimum lot sizes.

The "UC East" project has been a boon to the township, the local economy and to the educational aspirations of Clermont County residents. The 230 acre Ford plant in eastern Batavia Township has been vacant since 2008, and was recently acquired by Industrial Realty Group LLC in 2010.



The Batavia Township trustees approved zoning plans for the University of Cincinnati to use an 18-acre portion of the 230-acre Ford site for educational purposes. The University of Cincinnati signed a lease for approximately 81,000 square feet of space which was renovated in time for classes to open in the fall of 2010.

2.2.9 Goshen Township Growth Management Plan – 2000

Approximately half of Goshen Township is served by sanitary sewers under the jurisdiction of CCWRD. This service extends and covers most of the western portion of the township where the majority of high density development exists. As part of the Plan, a capacity analysis of residentially and agriculturally zoned land was evaluated at its full potential, that is, the number of units that could be developed regardless of the existence of sewer and water or the presence of development constraints.

There are approximately 14,000 acres of land that have a potential for subdivision and development. Of this total, approximately 10,700 acres are zoned for agricultural uses while another 3,330 acres are zoned for residential or planned development districts. Based on permitted densities within each of these agricultural and residential districts, there is enough undeveloped land to accommodate another 14,393 housing units. This number of housing units is far in excess of the anticipated demand. If the Township is fully built out according to existing zoning, the total population of Goshen Township could exceed 58,000 people. Projections for the year 2020 indicate a demand for 2,300 new housing units in the township.

The majority of new residential development has located in areas around SR 48 due to amenities and features not available in other parts of the township. This area, designated for moderate density suburban residential, will continue to be developed for single-family uses with a maximum density of 2 units per acre.



Commercial development will likely continue along SR 28 in conjunction with pending SR 28 corridor improvements planned for construction in 2011 along this primary thoroughfare.

2.2.10 Stonelick Township Growth Management Plan – 2002

The current land use distribution indicates approximately 87 percent (approximately 17,800 acres) of the Township's total land area serves agricultural or woodland use. The remainder of the land is primarily residential, totaling about 11 percent (2,340 acres) of the Township. This development is scattered throughout the township, with some concentration along SR 131 in the north and US 50 in the south. Nearly all of the local commercial and office development has occurred within or near the Village of Owensville.

Sanitary sewer service provided by Clermont County is confined to the Village of Owensville and along State Route 132 in the immediate vicinity of Owensville. As a practical matter, development with substantial density cannot occur without sanitary sewer service. For this reason, residential development does occur in rural areas using on-site systems for wastewater treatment.

The available land in Stonelick Township can easily accommodate the range of growth that may occur over the next twenty years, if the current zoning regulations remain unchanged. The range of future population as determined in the Plan and the projected demand for new homes would only consume about 12 percent of the land capacity in Stonelick Township.

The extent of sanitary service suggests that most of the township will maintain a semi-rural level of development within the next ten to twenty years. Growth pressure will likely come from the south through the SR 32 corridor and the growth that has been confined to Union and Batavia Townships will begin to move north into the southern portion of Stonelick Township.

2.2.11 Pierce Township Land Use Plan

According to the Plan, township growth is somewhat constrained by the lack of sanitary sewer service and steep slopes. However, there is a significant amount of land that has potential for new growth with 41 percent of this land area classified as either undeveloped or in agriculture. If the township continues to experience an average annual growth rate of 2.15 percent or more, a population of over 20,000 residents by 2025 could result. With the recent provision for higher density housing around Amelia, this rate may increase if the proposed density attracts a significant number of new developments.

Low density residential areas (where sanitary service is unavailable) is recommended to be 1 dwelling per 2 acres; in areas where sanitary service is available, these areas can continue to develop at a density of 1 dwelling per 0.5 acre.

2.2.12 Jackson Township Land Use Plan, 2008

The type of development that will take place in Jackson Township in the future will be determined by the availability of sanitary sewers. Currently sewer service is not provided within Jackson Township. Growth pressure will likely come from the south and migrate north from SR 32 although population growth has and will continue to be slow in this area.

Jackson Township has the largest area of contiguous undeveloped land in Clermont County. The future development of the 1,000 acre “White Farm” tract located in the southern part of the township bordering SR 276 and Jackson Pike will introduce development potential to Jackson Township although no timetable has been set for this project and sewer service to this area.

2.2.13 Washington Township/Moscow Village Wastewater Study, 2002

The purpose of this study was to develop a plan to provide treatment and collection alternatives to serve the future needs of unsewered areas within Washington Township.

The study investigated the possibility of directing some of the township wastewater production to the treatment facility owned and operated by the Village of Moscow. At the time the study was undertaken, the Clermont County Health District reported that 25 percent of the existing on-site treatment systems in the study area were failing.

The study advocated the continued use of on-site systems for the near term if slow population growth is forecast for Washington Township. The report also concluded that conveyance of wastewater flow to the Village of Moscow's facultative pond treatment system is not desirable for several reasons: 1) limited capacity exists to accept additional flow, 2) the treatment system is located in the Ohio River floodplain and 3) two of the three facultative ponds have water surface elevations that are below the 25-year flood elevation which does not comply with "Ten States Standards" which requires treatment systems to be fully operational and accessible during a 25-year flood.

2.3 Current Legislation, Planning and Regulatory Matters

Current legislation, planning and regulatory matters have been identified that impact wastewater planning in Clermont County. These include work presently being undertaken by the *Ohio-Kentucky-Indiana Regional Council of Governments* to update area-wide 208 Plans, legislation relating to household sewage treatment systems, nutrient discharge control and the total maximum daily load program.

2.3.1 Area-Wide 208 Planning

The *Ohio-Kentucky-Indiana Regional Council of Governments* (OKI) serves as the lead planning agency for the development of a regional water quality management plan (208 plan) for the 43 facility planning areas (FPAs) located in Butler, Clermont, Hamilton and Warren Counties. OKI recently received three grants for work related to the 208 Plan for southwest Ohio. Some of this grant-funded work relates to on-going consistency reviews, dataset analysis and compilation, amendments adopted by OKI and incorporation of OEPA's 2010 *Integrated Water Quality Monitoring and Assessment Report* into the planning process. A key

task slated for completion by the end of June 2011 is the development of an updated, electronically-accessible 208 Plan that will include current profiles, trends and data analyses for 20 of the 43 FPAs.

2.3.2 Recent Legislation

2.3.2.1 Household Sewage Treatment Systems

There are thousands of household sewage treatment systems scattered throughout Clermont County. In fact, the Clermont County Health District maintains an electronic filing system of approximately 21,400 on-site systems. Of this total, approximately 18,500 of these systems have undergone inspection by County staff. The aggregate wastewater production from these systems is significant, accounting for the total production in some planning areas.

A household sewage treatment system (HSTS) is a system, or a part of such a system, that receives sewage from a single-family, two-family, or three-family dwelling. The Ohio Department of Health (ODH) regulates sewage treatment systems across the state through statutory authority established under Ohio Revised Code (ORC) Chapter 3718 and Ohio Administrative Code Chapter 3701-29. The Public Health Council within the ODH is empowered to adopt, amend and rescind rules pertaining to public health and establishes state minimum rules for siting, permitting, installing, altering, operating, and abandoning sewage treatment and disposal systems. Local boards of health are tasked with the associated permitting, inspecting, and enforcing the rules.

It is important to note that the current version of the Ohio Administrative Code (OAC) Chapter 3701-29 has not changed and will remain in effect until new rules are adopted sometime after January 1, 2012. In addition, more stringent local health district rules that have been adopted since the state rule change in July 2007 also

remain in effect until new state rules are adopted after January 1, 2012. All existing sewage treatment system approvals and special device approvals authorized by the Director of Health remain approved until new rules are adopted.

Senate Bill (SB) 110 was passed and signed into law in June 2010. This bill became effective in mid-September 2010 and amended many of the Household and Small Flow On-Site Sewage Treatment System statutes that were suspended by prior legislation. Under SB 110, the Public Health Council has 18 months (but no sooner than January 1, 2012) working with local health districts, to create statewide standards for household sewage treatment systems (HSTSs), while allowing local boards of health some flexibility to set more stringent standards where necessitated by unique local conditions. Other provisions of this bill:

- Define “public health nuisance” to allow a determination based on evidence of observed mechanical failure or system malfunction evidenced by ponding, seepage, discharge of wastewater into surface water resulting in noncompliance with applicable water quality standards, etc;
- Require discharging systems to comply with terms of the National Pollutant Elimination System (NPDES);
- Require local boards of health to inspect an HSTS within 12 months (reduced from 18 months) of installation;
- Authorize standards for inspection of septage haulers;
- Require the Ohio Department of Health to develop educational programs to assist owners of HSTSs in the proper operation and management of their systems;

- Authorize the Public Health council to establish fees to support enforcement of Ohio law regulating HSTs and to fund the installation and evaluation of new HSTS technology pilot projects.

The net effect of SB 110 on the County will not be fully known until the Public Health Council releases draft rules sometime in 2012.

2.3.3 Regulatory Matters

2.3.3.1 Total Maximum Daily Load

The Clean Water Act requires watersheds that do not meet water quality goals to be “cleaned-up” in some approved manner. The “cleanup plan” is referred to as a total maximum daily load (TMDL) report which recommends specific actions and prescribes the pollutant loading reduction necessary from various sources to achieve water quality goals. The Ohio EPA measures the health of its streams by examining the number and types of fish and aquatic insects in the water. As well, the level of chemicals and bacteria are measured to determine the suitability of streams for use as a water supply and for recreation.

The Little Miami River which drains 1,756 square miles in southwestern Ohio and which drains a large portion of Clermont County is a state and national scenic river. In 2007, the Ohio EPA collected biological, chemical and physical data from the Lower Little Miami River Watershed and issued a TMDL Report that was approved by USEPA in March 2011. O’Bannon Creek located in Goshen Township was made part of the study and was included in the TMDL Report (Note: this was the only stream located in Clermont County that was included in the Lower Little Miami River TMDL Report that had monitoring sites). Based on the outcome of the study, O’Bannon Creek was judged as impaired but not needing a TMDL. Impairment was due to natural causes related to flow and habitat, mainly in headwater regions, upstream of the O’Bannon Creek Regional WWTP.

According to OEPA's 2010 *Integrated Water Quality Monitoring and Assessment Report*, Stonelick Creek and the East Fork of the Little Miami River are planned to be monitored in 2012 with a subsequent TMDL report prepared in 2015. Ohio River tributaries located in the southern portion of Clermont County (i.e. Nine Mile, Ten Mile, Twelve Mile Creek and others) are planned for monitoring in 2016 with TMDL work scheduled for completion in 2019.

2.3.3.2 Nutrient Control Initiatives

Much of the recently completed TMDL work has and will translate into more restrictive nutrient control initiatives for NPDES permit holders. Clermont County can expect issuance of nutrient control limitations for total phosphorus in the ensuing NPDES permit cycle for those WWTPs discharging to the Little Miami River Basin. The NPDES Permit in effect for the Wards Corner Regional WWTP presently requires compliance with a monthly average total phosphorus concentration of 1.0 milligram per liter. Total nitrogen control initiatives in the range of 3 to 10 milligrams per liter in plant discharges are anticipated in the future as 2020 is approached.

The establishment of in-stream numeric targets is a significant component of the TMDL process. The numeric targets serve as a measure of comparison between observed in-stream conditions and the conditions that are expected to restore the designated uses of a stream segment. The TMDL identifies the load reductions and other actions that are necessary to meet the target, with the intent of applicable water quality standards compliance and ultimately attainment of designated aquatic life uses.

Numeric targets are generally derived directly or indirectly from state narrative or numeric water quality standards; however, Ohio EPA does not have statewide numeric criteria for nutrients such as phosphorus and nitrogen. Targets are derived by analyzing the effects of nutrients on the aquatic life assemblages of Ohio streams

and rivers and inferences are drawn between the health of biologic communities and the concentrations of nutrients they are exposed to at reference sites (Ref. *Association Between Nutrients, Habitat and Aquatic Biota in Ohio rivers and Streams, OEPA, 1999*).

In effect, statistical association is used to link nutrient concentrations with biological index scores, thus providing threshold values (i.e. in-stream targets) for phosphorus and nitrogen that correspond to designated aquatic life uses. However, in this type of linkage analysis there can be a large variation between causal and response variables resulting in ill-defined relationships. Accordingly, in-stream nutrient targets derived in a TMDL analysis and upon which effluent limits are based, should be fully understood by the County before a compliance commitment is entered into. Nutrient targets are not codified in Ohio's water quality standards; therefore, some flexibility exists as to how they can be used in a TMDL study.

2.3.3.3 Water Quality Criteria for Bacteria

Ohio EPA adopted new rules in December 2009 which included new water quality criteria for bacteria. Criteria for the bacteria *E. coli* have replaced standards for *F. coli* (fecal coliform), as *E. coli* has been shown to be a better predictor of the potential for impacts to human health from exposure to wastewater effluent and surface waters which contain wastewater effluent. The standard recreation season when monitoring for bacteria is required has been changed to May 1st through October 31st. The new rules also grant authority to the Director of Ohio EPA to extend effluent disinfection requirements beyond the May 1st through October 31st recreation season if necessary. These new rules became effective on March 15, 2010.

Clermont County can expect *E. coli* discharge requirements to replace *F. coli* limits as each NPDES permit is renewed. Existing permits that are modified for reasons other than cyclic renewal will include the new *E. coli* limits. The numerical limits for *E. coli* are dependent on the use designation of the receiving stream. For a Class A (frequent recreational activity) stream, typical in Clermont County, the numerical

limits are 126 colony counts per 100 milliliters (30-day average) and 284 colony counts per 100 milliliters (7-day average). In general, wastewater treatment plant effluent disinfection facilities that have been designed for *F. coli* requirements of 1,000 colony counts per 100 milliliters (30-day average) will likely be adequate in *E. coli* limit compliance.

NPDES permits for WWTPs that discharge directly to the Ohio River will continue to include fecal coliform limits and monitoring requirements as pollution control standards for these streams are set by the Ohio River Sanitation Commission (ORSANCO).

2.4 Service Area Delineation

2.4.1 Facility Planning Areas

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) in their Status of Wastewater Treatment Facilities and Facility Planning Areas, 1999 has divided the Ohio portion of the OKI regions into 42 sub-regions. Of these 42 sub-regions (i.e. facility planning areas), 11 are located in Clermont County. The boundary of each facility planning area (FPA) generally follows watershed drainage areas but in most cases is modified to account for political boundaries. Some of the FPAs have become outdated and have been revised or newly created. For instance, the Village of Williamsburg has extended sanitary sewer service in several directions and expanded its wastewater treatment facility. A new (12th) FPA has been established for the Williamsburg area. Similarly, the Milford FPA boundary was revised recently to reflect current conditions within the City of Milford.

Conclusions drawn from OKI's most recent study indicate that of the eleven FPAs located in Clermont County, seven (Loveland, Horner's Run/Branch Hill, Middle East Fork, Nine-Ten Mile, Stonelick, Lower East Fork and O'Bannon Creek) are regarded as being in significant or in definite need of expanding or improving centralized wastewater treatment facilities.

2.4.2. Political Jurisdictions

Political jurisdictions that are provided wastewater collection and treatment service by Clermont County are summarized in Exhibit 2.1.

EXHIBIT 2.1

Clermont County Political Jurisdictions

Political Jurisdiction	Facility Planning Area	Served By Clermont County (Y/N)
Townships		
BATAVIA	Middle East Fork, Lower East Fork*	Y
FRANKLIN	Felicity	N
GOSHEN	O'Bannon, Stonelick*	Y
JACKSON	Upper East Fork, Stonelick, Middle East Fork	N
MIAMI	Horner Run Branch Hill, Loveland, Lower East Fork, O'Bannon	Y
MONROE	New Richmond, Felicity, Middle East Fork*	N
OHIO	New Richmond, Nine Ten Mile	N
PIERCE	Nine Ten Mile, New Richmond, Middle East Fork*	Y
STONELICK	Stonelick, Middle East Fork, O'Bannon*	N
TATE	Middle East Fork, Felicity, New Richmond*	N
UNION	Lower East Fork, Nine Ten Mile, Middle East Fork*	Y
WASHINGTON	Felicity	N
WAYNE	Stonelick, O'Bannon, Upper East Fork*	N
WILLIAMSBURG	Middle East Fork, Upper East Fork	Y
City and Village		
CITY OF MILFORD	Milford	N
CITY OF LOVELAND	Loveland	N
AMELIA	Nine Ten Mile, Middle East Fork	Y
BATAVIA	Middle East Fork, Lower East Fork*	N
BETHEL	Middle East Fork	Y
CHILO	Felicity	N
FELICITY	Felicity	Y
MOSCOW	Felicity	N
NEVILLE	Felicity	N
NEW RICHMOND	New Richmond	N
NEWTONSVILLE	Stonelick	N
OWENSVILLE	Stonelick	Y
WILLIAMSBURG	Williamsburg	N

* The village/city/township marginally lies within this FPA

There are a few sewers in the Franklin, Tate and Stonelick townships that drain to the villages of Felicity, Bethel and Owensville respectively.

2.4.3 Unsewered Priority Areas

A total of 12 public (8 owned and operated by Clermont County) and 23 semi-public wastewater management systems are estimated to serve less than a third of the area within Clermont County. Development in the remaining unsewered area of the County is served by home sewage treatment systems, commonly referred to as “on-site” systems. These on-site systems are not confined to any given planning area but are common in all planning areas, generally scattered, but concentrated in some areas.

The Clermont County Health District has electronic records of 21,394 on-site systems in the County. Of this total, approximately 80 percent have data from inspections conducted over the last ten years; however, no accurate records are kept to verify occupancy or vacancy because of the time interval between inspections. On-site system data is linked as a layer in the County’s GIS system and is used in this report. From this information, an estimated upper bound population of 57,800 is served by on-site systems.

Areas recommended by the Clermont County Health District to be in need of sewer service include those areas summarized in Exhibit 2.2. Some of these areas have small lot sizes and are not located adjacent to a sewer area, posing significant challenge to service. Areas that are shaded have a large number of older discharging systems and are considered priority areas.

The need to expand the wastewater management services into unsewered areas is driven by: 1) the County’s gradual transition from a predominantly rural region to a region that includes moderate to high density urban development, 2) public health nuisances and 3) impacts detrimental to water quality. The population distribution and corresponding wastewater production will continue to change as development patterns, reacting to economic conditions, gradually push eastward and southward.



In areas where there are problems associated with inadequate or failing on-site systems, corrective action is necessary where maximum benefit can be obtained for the capital investment. The approach taken should focus on:

- *Correction* (i.e. address existing problems in unsewered areas where health, safety and environmental protection is a concern and where stakeholder support is expressed – notably the Village of Newtonsville in the Stonelick Creek planning area);
- *Prevention* (i.e. prevent the return of existing problems through effective management and appropriate and beneficial capital investment);
- *Projection* (i.e. meet future needs to sustain growth and economic vitality consistent with county-wide objectives).

Identification of future needs is challenged by the economic downturn that began in 2008 and whose effects continue to impact the local economy, especially the housing market. Given this circumstance and the pace of recovery, the County should move forward with a reactive, yet integrated approach to wastewater management in unsewered areas. Reactive in the sense that need-based projects such as public health nuisances located adjacent to a nearby sewer, can be resolved cost effectively for maximum benefit. The second part of this approach would achieve sustainable growth through integrated consideration of land use, development and on-site issues wherein capital investment is planned and prioritized to align with development patterns and projected areas of wastewater infrastructure need.

EXHIBIT 2.2

Unsewered Areas Recommended for Sewer Extension

Clermont County Health District (November 2009)

Township	Road/Subdivision/Village
Miami	Arborcrest Lane
	Bonnie lane
	Bramblewood Drive
	Branch Hill-Miamiville Road
	Indianview Drive
	Apache Trail
	Tarkington Lane
	Cynthia Drive
	Wiltsee Avenue
	Timber Trail Subdivision
	Hickory Ridge Drive
	Pine Bluff Drive
	Thorn Tree Court
	Day Drive
	Eagle Ridge Subdivision
	Valley Forge Road
	Heritage Lane
	Brandywine Lane
	Bunker Hill Road
	Eagle Creek Trail
	Liberty Court
	Epworth Road (portion)
	Fox Run Road (portion)
	Indian Oaks Subdivision
	Blackhawk Trail
	Pheasant Run
	Pawnee Ridge
	Kickapoo Circle
	Jannie Lane
	Lewis Road (north end)
	Louanne Lane
	Oskamp Drive
	South Garrett Drive
	Valley View Drive
	Wardwood Subdivision
	Woodsway Drive
	Westward Drive
	Northward Drive
	Windfield Hills Subdivision

EXHIBIT 2.2

Unsewered Areas Recommended for Sewer Extension (continued)

Clermont County Health District (November 2009)

Township	Road/Subdivision/Village
Miami	East Knollwood Court
	West Knollwood Court
	Windfield Court
	Winding Woods Subdivision
	Covey Court
	Quail Run Court
Union	Fulton Grove Road
	Pepper Ridge Subdivision
	Caraway Drive
	Cinnamon Court
	Chicory Lane
	Sesame Street
	Oregano Drive
	Nutmeg Knoll Street
	Quail Run
	Sleepy Hollow Lane
	Woodland View Drive
Sanro Drive	
Pierce	West Concord Road
	East Concord Road
Monroe	Rolling Hills Drive
	Lindale-Mt Holly Road
	Fair Oak Road
	Christine Lane
	Norman Lane
	Village of Laurel (community system)
Goshen	Woodville Pike (Goshen and Miami segments)
Wayne	Village of Newtonsville (community system)
Stonelick	Sutton Lane
	Wilshire Circle
	Freda Lane
	Anna Court
	Goshen Road (southern end)
Ohio	Petri Lane
Notes: 1. Areas in bold have a large number of discharging systems and are considered priority areas. 2. Implementation of projects in these areas will be subject to affordability and regulatory initiatives pertaining to home sewage treatment systems.	

3.0 FACILITY PLANNING AREAS 2010 STATE OF THE SYSTEM

There are 12 facility planning areas designated by OKI that are located within Clermont County. These include: Felicity, Horner's Run/Branch Hill, Loveland, Lower East Fork, Middle East Fork, Milford, New Richmond, Nine-Ten Mile, O'Bannon Creek, Stonelick, Upper East Fork and Williamsburg. These planning areas are becoming outdated due to sewer extensions reaching beyond facility planning envelopes and boundaries that do not align with natural drainage boundaries. Yet, these planning area boundaries continue to be utilized by regulatory agencies for the organization of information and the discernment of wastewater management priorities.

This section describes the current (2010) state of each facility planning area in Clermont County and the wastewater challenges present in each. For purposes of this report, the Loveland and Horner's Run/Branch Hill facility planning areas have been combined into a single planning area.

3.1 Loveland/Horner's Run/Branch Hill

3.1.1 Existing Conditions

The drainage area of Loveland/Horner's Run/Branch Hill is approximately 15,500 acres, all of which lies in Miami Township. Of this area, approximately 1,180 acres is sewered and flow drains to the Miami Trails, Wards Corner Regional, Indian Lookout (being eliminated and therefore not considered) and Arrowhead Park WWTPs.

3.1.1.1 Land Use and Zoning Trends

The majority of Loveland/Horner's Run/Branch Hill is zoned residential with vacant land and agriculture accounting for an estimated 25 percent of the area. Concentrated areas of residential development exist in the southeastern sector of the City of Loveland, the Village of Miamiville and along local routes of transportation, including Branch Hill-Guinea Pike, Branch Hill-Miamiville Road, Ward's Corner

Road and Loveland-Miamiville Road. The highest densities are located in the Oasis/Miami Trails and the Wood Creek and Paxton developments. Commercial development exists mainly along Ward's Corner near the I-275 interchange and along SR-126 with other non-residential development scattered throughout the area.

Trends in zoning suggest that a pattern of moderate density residential development will continue to be the primary land use in the area, particularly in the Ward's Corner area, north and south of I-275.

3.1.1.2 Population

The current population within the Loveland/Horner's Run/Branch Hill area is estimated to be 20,900 (Refer to Section 4.0). The rapid growth that occurred during the last 20 years in this area, however, has moderated since the economic slowdown in 2008 that impacted the local housing market; yet, the population in Miami Township as a whole has increased 11.5 percent from year 2000-2010 (U.S. Census). The large quantity of developable land in the area, coupled with a forecast for sustained growth will stimulate single family home development at existing residential densities.

3.1.1.3 Current Wastewater Production

The total number of home sewage treatment systems (HSTSs) within the Loveland/Horner's Run/Branch Hill planning area is estimated to be 2,600, of which 660 are located in Loveland. Based on this information, the estimated sanitary wastewater production is 0.93 mgd which includes the estimated production of the HSTSs (basis: all active) and the current production of 0.4 mgd from the four permitted point sources described in Exhibit 3.1.

A dry weather flow model run was developed to estimate the average dry weather flow. The wet weather peak flow rate was determined by evaluating the modeled system using a 5 year 6 hour design storm.

3.1.1.4 Collection/Conveyance and Treatment Facilities

The collection system inventory and treatment facilities are listed in the Exhibit 3.1.

EXHIBIT 3.1

Loveland/Horner's Run/Branch Hill 2010 State of the System

Basin	Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
Loveland/Horner's Run/Branch Hill	1,179	15,457	22.0	4" to 12"	9	Miami Trails WWTP	0.4
						Arrowhead Park WWTP	0.14
						Wards Corner Regional WWTP	2
						Indian Lookout WWTP	0.045
						Total	2.585

3.1.1.5 Delineation of Unsewered Areas

The unsewered areas in this basin are served by on-site systems. Exhibit 3.2 shows the extent of sewerred and unsewered areas, treatment facilities, sewers, pump stations and the boundary for Loveland/Horner's Run/Branch Hill FPA

3.1.2 Wastewater Management Challenges

With the projection for continued area growth and quantity of land that is presently available for development, plans for wastewater management improvements must address the following challenges:

- Continued consolidation and regionalization of wastewater collection and treatment facilities, particularly in the northern portion of the planning area and specifically the smaller treatment facilities such as Arrowhead, Indian Lookout (planned for elimination) and Miami Trails;
- Provision for sustained residential growth and development in Miami Township, notably the areas north and south of the Ward's Corner/I-275 interchange;
- Addressing existing public health nuisances associated with HSTs, notably those cited in Exhibit 2.2.

3.2 O’Bannon Creek

3.2.1 Existing Conditions

The O’Bannon Creek planning area consists of approximately 27,000 acres located in north-central Clermont County. It includes most of Goshen Township and portions of Miami, Wayne and Stonelick Townships. Of this area, approximately 4,800 acres are sewered with flow draining to the O’Bannon Creek Regional Wastewater Treatment Plant. Although approximately 12 square miles located in Warren County drain southward into O’Bannon Creek, for purposes of this master plan update, the O’Bannon Creek planning area is assumed to include only those areas located in Clermont County

3.2.1.1 Land Use and Zoning Trends

Land use consists primarily of lower density residential development in the west and central portions of the planning area with several large mobile parks also present. Agriculture is the dominant land use in the east. Commercial development is mainly concentrated west of Goshen along SR-28. Planning projections suggest that moderate density suburban residential development will likely occur in the area between Smith Road and the Cincinnati Nature Preserve, north of SR-28, with continued commercial and industrial development along SR-28, both west and east of Goshen.

3.2.1.2 Population

The current (2010) population in the O’Bannon Creek planning area is estimated to be 23,100 (Refer to Section 4.0). As with other areas in the County that experienced moderate to significant growth during the last 20 years, this trend has moderated recently since the economic turndown that began in 2008; yet, the population of Goshen Township as a whole increased 13.5 percent from year 2000 to 2010

(U.S. Census). The availability of developable land will drive the forecast for continued commercial development and suburban residential growth in the area at moderate densities of two units per acre.

3.2.1.3 Current Wastewater Production

The total number of HSTSs in the O'Bannon Creek planning area is estimated to be 2,400 which are scattered throughout the area but primarily to the east and north. The estimated sanitary production is 2.25 mgd which includes the estimated HSTS production (basis: all active) and the O'Bannon Creek Regional WWTP which currently discharges an annual average flow of 1.67 mgd.

The updated hydraulic model was used to calculate the current wastewater production. A dry weather flow model run was developed to estimate the average dry weather flow. The wet weather peak flow rate was determined by evaluating the modeled system using a 5 year 6 hour design storm.

3.2.1.4 Collection/Conveyance and Treatment Facilities

The collection system inventory and treatment facilities are listed in the Exhibit 3.3.

EXHIBIT 3.3

O'Bannon 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
4,772	26,747	110.9	15" to 36"	5	O'Bannon Creek WWTP	4.4

3.2.1.5 Delineation of Unsewered Areas

The unsewered areas in this basin are served by on-site systems. This area has promising development potential in the existing agricultural areas as well as in areas that adjoin existing suburban development. Exhibit 3.4 shows the sewered and unsewered areas, treatment facilities, sewers, pump stations and the boundary for the O'Bannon Creek FPA.

3.2.2 Wastewater Management Challenges

The forecast for continued growth in the area suggests that wastewater management focus on the following challenges:

- Hydraulic improvements at the O’Bannon Creek Regional WWTP to enable increased treatment of peak wet weathers flows;
- Control of infiltration and inflow, particularly those portions of the trunk sewer that have been installed in, near or across creek beds where access is a challenge;
- Addressing public health nuisances associated with HSTSs, notably along Woodville Pike (CR-133);
- Plan for effective wastewater management in developing areas that lie outside the existing service area.

3.3 Stonelick Creek

The Stonelick Creek FPA includes approximately 43,700 acres, located in the northeast portion of Clermont County. This FPA includes most of Stonelick and Wayne Townships and portions of Union, Goshen and Jackson Townships. Incorporated municipalities in the planning area include the villages of Owensville and Newtonsville. There are various unincorporated towns and villages scattered through the area, notably Edenton and Belfast.

The entire planning area drains to Stonelick Creek, the area’s major water course, which flows in a southwesterly direction and is tributary to the East Fork of the Little Miami River. The 181 acre Stonelick Lake, a man-made reservoir which is surrounded by a state park, is located in the upper portion of the planning area.

3.3.1 Existing Conditions

3.3.1.1 Land Use and Zoning Trends

The current land use distribution suggests that approximately 87 percent of the FPA’s land area is devoted to agricultural or woodland use, both of which are

available for development under existing zoning regulations. Residential development is generally low-density and scattered around the planning area, with some concentration in the north along SR 131 and in the south along US 50. Most of the commercial development has occurred within or near the Village of Owensville and to a lesser degree in the Edenton and Belfast communities.

Physical limitations to the development of land in the area are steep slopes and floodplain areas. These two constraints are characteristic of the Stonelick Creek valley which is the most prominent physical feature of the area and its most valuable natural asset.

3.3.1.2 Population

The planning area's 2010 population is estimated at 13,700. Based on the 2010 U.S. Census figures, the combined populations of Stonelick and Wayne Townships, which make up the majority of land area in the FPA, declined slightly. The Village of Newtonsville which is currently unsewered grew from a population of 427 in 1990 to 492 in the year 2000 but lost an estimated 20 percent of its population from year 2000 to 2010. According to the 2010 U.S. Census, the current population of Newtonsville is 392. As well, the Village of Owensville declined in population during this same period from 1,019 in 1990 to 794 in 2010, resulting in a net population loss of 22.1 percent during the last 20 years.

3.3.1.3 Current Wastewater Production

The majority of wastewater generated within the planning area originates from individual on-site systems. The total number of on-site systems within the Stonelick Creek planning area is estimated to be 3,600 units which are scattered throughout the area. The Clermont County Health District has indicated that it does not know with certainty the number of these on-site systems that are active. Based on this information, it is estimated that the sanitary wastewater production within the

Stonelick Creek planning area is 0.78 mgd which includes the estimated production of the on-site systems (basis: all active) and the two localized point source discharges described below:

- Clermont Northeastern Local School, located in Stonelick Township near US 50 east of Owensville, which has a permitted flow of 40,000 gpd to Patterson Run (current flow of 21,000 gpd).
- Stonelick State Park Campgrounds, located in Wayne Township which has a permitted flow of 30,000 gpd to Stonelick Lake (estimated current flow of 12,000).

3.3.1.4 Collection, Conveyance and Treatment Facilities

Sanitary sewer service is provided to the Village of Owensville with service extending north and south along SR 132, and the Owensville North extension along Belfast-Owensville Road. Sanitary wastewater is conveyed southward to the Middle East Fork Basin and receives treatment at the Middle East Fork WWTP located in Batavia. The collection system inventory and treatment facilities are listed in the Exhibit 3.5.

EXHIBIT 3.5

Stonelick 2010 State of the System (Sewered and conveyed to Middle East Fork FPA)

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
340	43,698	5.5	8" to 18"	-	-	-

3.3.1.5 Delineation of Unsewered Areas

Exhibit 3.6 contains a map of the Stonelick Creek planning area showing the extent of sewered areas and unsewered areas presently served by on-site systems. The vast majority of the planning area is unsewered. Clermont County has extended sanitary service into the planning area's western and southern boundaries, as noted previously, increasing the potential of continued expansion of sanitary service into this area.

3.3.2 Wastewater Management Challenges

With the preponderance of on-site systems located within the Stonelick Creek planning area, the identified challenges to wastewater management include:

- Planning for the anticipated growth that is forecast to enter the planning area from the south, from the SR 32 corridor passing through Batavia Township and to a lesser extent from the east along SR 131.
- Addressing the concentration of small lot development located within established communities or along major roadways.
- Maintaining vigilance over the proper construction and adequate maintenance of on-site systems to prevent a public health nuisance.
- Supporting reasonable levels of growth and development through wastewater management improvement projects that are capable of providing maximum benefit to targeted areas.

One such target area is the Village of Newtonsville located in southern Wayne Township along SR 131. The residents of this community have indicated their desire for the elimination of on-site systems in favor of centralized collection and treatment to the Clermont County Water Resources Department (CCWRD).

In 1999, CCWRD responded to this local concern by commissioning a study to examine viable treatment alternatives to serve Newtonsville. For the general area bounded by Cedarville Road and Newtonsville Road, an area that includes approximately 200 housing units, a natural form of treatment system was recommended. In addition to eliminating the on-site systems, the natural treatment system would serve to augment the flow to Stonelick Creek. The estimated cost of the collection system and 0.2 mgd treatment system was

approximately \$4 million (1999 basis). Due to the excessive cost of construction, the unfamiliarity of operating a natural treatment system and the strict compliance criteria for discharge to Stonelick Creek, this alternative was not considered further.

Future planning by CCWRD to provide sanitary collection and wastewater treatment to the Village of Newtonsville is being considered in response to local support of these facilities.

3.4 Upper East Fork

The Upper East Fork FPA includes approximately 15,400 acres, located in eastern Clermont County, bordering Brown County. This FPA includes most of Jackson Township and portions of Wayne and Williamsburg Townships. Prior planning studies commissioned by the County have incorporated this area into the Middle East Fork FPA, although the current *Regional Water Quality Management Plan, Revised December 1999 (i.e. 208 Plan)* regards the Upper East Fork as a separate FPA.

The Upper East Fork area is bisected by SR 50 which runs east-west and by SR 133 running north-south. There are no incorporated municipalities in the planning area but sparsely populated, unincorporated communities are scattered through this area, including Marathon and Monterey. The planning area drains to the East Fork of the Little Miami River, the area's major water course, and its tributaries which flow in a southwesterly direction to East Fork Lake.

3.4.1 Existing Conditions

3.4.1.1 Land Use and Zoning Trends

The current land use distribution indicates that agriculture and woodlands dominate the area, both of which are available for development under existing zoning regulations. Steep slopes exist along the East Fork and its tributaries. The balance of the terrain has slopes generally less than 5 percent which are conducive to growth and development.

Residential development is generally low-density and scattered around the planning area, with the largest concentrations located in Marathon and Monterey. There is no major industry or employer in the area. Isolated commercial development exists along SR 50 and SR 133, primarily in the Marathon and Monterey communities.

A 207 acre hazardous waste landfill is centrally located in Jackson Township and is owned by CECOS, an international waste disposal company. This landfill ceased operation and eventually closed in the mid-1980s.

3.4.1.2 Population

The planning area's 2010 population is estimated at 2,270. The population has grown moderately in recent years (approximately 1% per year) and is anticipated to follow this same trend into the future, possibly leveling off due to the sparse development pattern and lack of transportation route expansion through the area.

3.4.1.3 Current Wastewater Production

The majority of wastewater generated within the planning area originates from individual on-site systems. The total number of on-site systems within the Upper East Fork planning area is estimated to be 990 units which are generally scattered throughout the area. The largest concentration of on-site systems is located within Marathon. Based on this information, it is estimated that the sanitary wastewater production within the Upper East Fork planning area is 0.2 mgd which includes only the estimated production of the on-site systems (basis: all active).

3.4.1.4 Collection, Conveyance and Treatment Facilities

The planning area is without centralized sanitary service. The nearest public sewer under the jurisdiction of Clermont County is located north of SR 32 and extends from Bauer Road to Half Acre Road. The Village of Williamsburg, located south of the planning area, has expanded its sewer service westward along Old SR 32.

The Village of Williamsburg was originally a part of the Middle East Fork and Upper East Fork FPAs. Recently, an amendment (*Amendment 32 to OKI's Regional Water Quality Management Plan*) to update the boundaries for facility planning areas in eastern Clermont County and to identify the boundaries of a new facility planning area for the Village of Williamsburg was granted by OKI in August 2009. This action designates responsibility to the Village of Williamsburg for the construction, maintenance and operation of wastewater collection and treatment facilities for the new Williamsburg FPA and re-designates CCWRD for the construction, maintenance and operation of wastewater collection and treatment facilities for the updated Middle East Fork and Upper East Fork FPAs. A small northern segment of the Williamsburg FPA extends into the Upper East Fork FPA, primarily between McKeever Road and SR 133. The collection system inventory and treatment facilities are listed in the Exhibit 3.7.

EXHIBIT 3.7

Upper East Fork 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
-	15,353	-	-	-	-	-

3.4.1.5 Delineation of Unsewered Areas

Exhibit 3.8 contains a map of the Upper East Fork planning area showing the extent of unsewered areas presently served by on-site systems. Clermont County has not extended sanitary sewer service into the planning area although public water service is provided in the southern portion of the FPA.

3.4.2 Wastewater Management Challenges

The area with the greatest potential to experience growth and conceivably be served with a public sewer system is the southwestern portion of the planning area, generally located south of Jackson Pike in Jackson Township. This part of the planning area is in close proximity to SR 32, one of the main transportation routes into and out of Clermont County.

As with other areas having a preponderance of on-site systems, the identified challenges to wastewater management in the Upper East Fork planning area include:

- Planning for the possible growth that is likely to enter the Upper East Fork area from the south, via the SR 32 corridor that passes through Batavia Township.
- Continuing vigilance over the proper construction and adequate maintenance of on-site systems whose operation best fits the current and future vision for growth within the planning area.

3.5 Lower East Fork

3.5.1 Existing Conditions

The Lower East Fork planning area includes 21,500 acres which are located in Union and portions of Miami and Batavia townships. Of this area, 16,500 acres are sewered with flow draining to the Lower East Fork Wastewater Treatment Plant. Wastewater is also pumped into the Lower East Fork drainage area through 49 pump stations.

3.5.1.1 Land Use and Zoning Trends

Single family residences constructed at suburban densities constitute the majority of existing development in the area, covering the most of the planning area. There are no incorporated communities in the planning area, yet significant commercial and industrial development exists, particularly in the Eastgate area located at the intersection of I-275 and SR-32. This area is a boon to the local economy which will continue into the future with planned transportation improvements such as the re-design of the I-275/SR-32 interchange and the 100 acre Class A office park complex located south of this intersection. Land use planning indicates that the availability of developable land will continue to drive moderate to low-density (2 houses per acre) single family home construction; however, the goal is to achieve an appropriate balance of residential, commercial and industrial development in the area.

3.5.1.2 Population

The existing population within the Lower East Fork planning area is estimated to be 51,900 (Refer to Section 4.0). This has resulted from sustained growth rates over the last 20 years which is forecast to continue into the foreseeable future. The townships of Batavia, Union and Miami all showed a pattern of strong growth from year 2000 to 2010 with Union Township registering an estimated 9.6 percent growth over this period.

3.5.1.3 Current Wastewater Production

There are approximately 560 HSTSs located in the Lower East Fork area. These are located primarily north and south of SR-50 east of I-275 and in a pocket area south of Milford. The sewered area produces an average of 6.9 mgd of sanitary flow. The existing on-site system production (basis: all active) adds another 0.12 mgd.

The updated hydraulic model was used to calculate the current wastewater production. A dry weather flow model run was developed to estimate the average dry weather flow. The wet weather peak flow rate was determined by evaluating the modeled system using a 5 year 6 hour design storm.

3.5.1.4 Collection/Conveyance and Treatment Facilities

The collection system inventory and treatment facilities are listed in the Exhibit 3.9.

EXHIBIT 3.9

Lower East Fork 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
16,485	21,500	286.2	2" to 42"	49	Lower East Fork WWTP	9

3.5.1.5 Delineation of Unsewered Areas

The unsewered areas in this basin are served by on-site systems. There are areas to the east in the Stonelick FPA that when developed could drain to the Lower East Fork drainage area. Exhibit 3.10 shows the extent of sewer and unsewered areas, treatment facilities, sewers, pump stations and the boundary for the Lower East Fork FPA.

3.5.2 Wastewater Management Challenges

The Lower East Fork planning area is the most populous and heavily developed area in the County. As such, wastewater management challenges relate to a greater extent to the maintenance and sustainability of existing service. Wastewater management challenges in this planning area include the following:

- Collection system improvements aimed at providing adequate capacity to collect, convey and treat existing and projected flows, including the elimination of surcharging and overflows;
- Expansion of the Lower East Fork WWTP to augment treatment capacity of excess wet weather flows and to provide for future growth in the area;
- Address the public health nuisances associated with on-site treatment systems, notably in the Pepper Ridge subdivision and Woodland View Drive areas.

3.6 Middle East Fork

3.6.1 Existing Conditions

The Middle East Fork planning area consisting of 71,446 acres is located in central Clermont County and includes nearly all of Batavia and Williamsburg townships and extends into Tate, Jackson, Pierce, Monroe, Stonelick and Union townships. Incorporated municipalities include Batavia, Bethel, Williamsburg and Amelia (Note: Areas tributary to the East Fork Little Miami River that lie outside Clermont County are not considered herein for planning

purposes). The planning area is bisected by the East Fork Little Miami River. Of the total Middle East Fork area, approximately 7,143 acres (10 percent) is currently sewered and drains to the Middle East Fork WWTP.

3.6.1.1 Land Use and Zoning Trends

The majority of existing development is located in the incorporated municipalities and along major thoroughfares and consists of single family residences, although there are multi-family developments and mobile home parks located along or near SR-32 and SR-125. The land use in the eastern segment of the planning area is devoted to agriculture and warm weather recreation at East Fork Lake.

3.6.1.2 Population

The current (2010) population within the Middle East Fork planning area is estimated to be 39,200 (Refer to Section 4.0). Between the census years 2000 and 2010, the Batavia Township population grew an estimated 31.2 percent. The adjacent township of Williamsburg to the east experienced an estimated population increase of 14.8 percent. The future population within the planning area is forecast to grow at an annual rate between 2-2.5 percent.

3.6.1.3 Current Wastewater Production

The majority of wastewater currently produced within the planning area is generated from the County's sewer system. A daily production of 3.6 mgd originates from the sewered areas. The number of on-site systems is estimated to be 4,370. These are located mainly in the east and central sectors of the planning area and contribute an additional 0.94 mgd (basis: all active) for a combined sanitary production of 4.54 mgd.

The updated hydraulic model was used to calculate the current wastewater production. A dry weather flow model run was developed to estimate the average dry weather flow. The wet weather peak flow rate was determined by evaluating the modeled system using a 5 year 6 hour design storm.

3.6.1.4 Collection/Conveyance and Treatment Facilities

The collection system inventory and treatment facilities are listed in the Exhibit 3.11.

EXHIBIT 3.11
Middle East Fork 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
7,143	71,446	166.9	1.5" to 36"	35	Middle East Fork WWTP	7.2

3.6.1.5 Delineation of Unsewered Areas

The vast unsewered areas located to the east and central portions of the planning area are served by on-site systems. These mainly agricultural areas have significant development potential. Planning forecasts suggest that residential growth is anticipated in areas north of SR-32 between Olive Branch-Stonelick Road eastward to Herold Road and south of the Village of Batavia, generally along SR-222 with continued commercial development along SR-32.

Exhibit 3.12 shows the sewered and unsewered area, WWTPs, sewers, pump stations and boundary for Middle East Fork FPA

3.6.2 Wastewater Management Challenges

The Middle East Fork planning area is the second most populous area in the County, second only to the Lower East Fork region. Continued development pressure will create the following wastewater challenges within this planning area:

- Collection system improvements aimed at providing adequate capacity to collect, convey and treat existing and projected flows, including the elimination of excessive surcharging and overflows;
- Address public health nuisances associated with on-site treatment systems;
- Augment treatment capacity for excess wet weather flows at the Middle East Fork WWTP and provide for future growth;

3.7 Nine Mile

3.7.1 Existing Conditions

The Nine Mile planning area consists of approximately 14,400 acres located in west-central Clermont County and includes most of Pierce Township and portions of Ohio and Union townships. This area is deeply incised by Nine Mile and Ten Mile Creek which flow westward into the Ohio River. There are no incorporated municipalities in the Nine Mile FPA other than a portion of Amelia that extends into the planning boundary. Of the total area noted, approximately 2,800 acres is served by the County's collection system and drains to the Nine Mile WWTP.

3.7.1.1 Land Use and Zoning Trends

Single family residential properties constitute the majority of the existing development which is located mainly in the northwest quadrant of the planning area along the SR-125 corridor and adjacent to I-275. There are some multi-family units scattered about the area and commercial developments located along SR-125 as well. Concentrated development in other areas, particularly the southern half of the planning area, is lacking due to steep topography. Planning forecasts suggest low density residential development (1 unit per 2 acres) will continue to characterize the southern half of the area, while more conventional residential development (2-4 units per acre) is anticipated along and south of SR-125 where minimal slope constraints exist.

3.7.1.2 Population

The current (2010) population within the Nine Mile planning area is estimated at 20,280 (Refer to Section 4.0). The population of Pierce Township where the Nine Mile FPA is mainly located grew at an average rate of 1.74 percent per year from year 2000 to 2010. The forecasted annual growth rate for Pierce Township of 2.1 percent will impact and likely produce a similar population increase within the planning area, thus creating a continued demand for residential housing and wastewater services.

3.7.1.3 Current Wastewater Production

There are an estimated 1,400 HSTSs located in the Nine Mile planning area. The estimated production from this source is 0.3 mgd (basis: all active). These units are located mainly in the southern region of the planning area. An average daily production of 1.47 mgd originates from the sewered area for a combined total of 1.77 mgd.

The updated hydraulic model was used to calculate the current wastewater production. A dry weather flow model run was developed to estimate the average dry weather flow. The wet weather peak flow rate was determined by evaluating the modeled system using a 5 year 6 hour design storm.

3.7.1.4 Collection/Conveyance and Treatment Facilities

The collection system inventory and treatment facilities are listed in the Exhibit 3.13.

EXHIBIT 3.13
Nine Mile/Ten Mile Creek 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
2,825	14,363	66.6	2" to 24"	13	Nine Mile WWTP	3

3.7.1.5 Delineation of Unsewered Areas

Unsewered areas mainly located in the southern half of the planning area are served by on-site systems. This area contains extensive wooded hillsides with steep slopes. Planning forecasts indicate there may be demand for development in these areas with hillside development limited to a maximum of 1 unit per 2.5 acres. Low density development (1 unit per 2 acres) will be encouraged on terrain near valley floors and on hillsides where slope is less than 25 percent. Conventional density development will be permitted where there are no slope constraints.

Exhibit 3.14 shows the extent of sewerred and unsewered areas, treatment facilities, sewers, pump stations and the boundary for the Nine /Ten Mile FPA

3.7.2 Wastewater Management Challenges

Wastewater management challenges in the Nine/Ten Mile planning area include the following:

- Collection system improvements aimed at providing adequate capacity to collect, convey and treat existing and projected flows, including the elimination of surcharging and overflows;
- Effective management of wastewater in areas generally located to the south of the existing service area within the Ten Mile drainage divide;
- Provision for excess flow equalization at the Nine Mile WWTP;

3.8 New Richmond

The New Richmond FPA includes approximately 21, 700 acres, located in the southwest portion of Clermont County, bordering on the Ohio River. This FPA includes most of Ohio Township and portions of Pierce, Monroe and Tate Townships. New Richmond, situated on the Ohio River is the planning area's lone incorporated municipality.

Ten Mile Creek and Twelve Mile Creek are the two major watercourses that drain the area, flowing westward to the Ohio River.

3.8.1 Existing Conditions

3.8.1.1 Land Use and Zoning Trends

Land use within the New Richmond FPA consists of widely scattered, low density residential development throughout the eastern portion of the planning area (Monroe Township), transitioning to moderate and high density urban development in and around the Village of New Richmond. Most of the commercial development has occurred along SR 52 which is aligned with and follows the Ohio River.

Physical limitations to the development of land in the area are steep slopes (>25 percent) found along the valley walls of the Ohio River and tributary streams and lowland flooding. These two constraints are characteristic of the Ohio River valley and its tributaries, the most prominent physical feature of the area and its most valuable natural asset.

A dominant feature adjacent to the Ohio River along SR 52 is the coal-fired Beckjord Generating Station located on the north end of New Richmond.

3.8.1.2 Population

The planning area's 2010 population is estimated at 10,080. Ohio Township where most of the FPA is located showed a slight (1 percent) decline in population from 2000 to 2010 while Monroe Township registered an estimated 5 percent decline in population over the same period. The Village of New Richmond in Ohio Township has grown from a population of 2,210 in the year 2000 to an estimated population in 2010 of 2,582, a 16.8 percent gain in population over the last ten year period.

3.8.1.3 Wastewater Production

Approximately 40 percent of wastewater generated within the planning area originates from individual on-site systems. The total number of on-site systems within the New Richmond planning area is estimated to be 2,560 units which are scattered throughout the eastern and central portions of the planning area. Based on this information, it is estimated that the sanitary wastewater production within the New Richmond planning area is 0.84 mgd which includes the estimated production of the on-site systems (all active basis) and the four permitted point sources described below:

- New Richmond WWTP, located in Ohio Township along US 52, which has a permitted flow of 550,000 gpd to Patterson Run (current flow of 270,000 gpd);
- Chestnut Mobile Home Park WWTP located in New Richmond, which has a permitted flow of 3,900 gpd to an unnamed tributary of Fagin Run.
- Hilltop Estates Mobile Home Park WWTP located in New Richmond along SR 132, which has a permitted flow of 75,000 gpd to an unnamed tributary of Fagin Run.
- Hi-View Estates Mobile Home Park WWTP located in Bethel along SR 222, which has a permitted flow of 37,800 gpd to an unnamed tributary of Twelve Mile Creek.

3.8.1.4 Collection, Conveyance and Treatment Facilities

The Village of New Richmond has expanded its service area to the north along (old) SR 52 to service the River Bluffs area and to the east along Bethel-New Richmond Road just past the corporate boundary. The collection system inventory and treatment facilities are listed in the Exhibit 3.15.

EXHIBIT 3.15

New Richmond 2010 State of the System (Unsewered)*

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
-	21,659	-	-	-	-	-

* table lists only sewers owned by the CCWRD

3.8.1.5 Delineation of Unsewered Areas

Exhibit 3.16 contains a map of the New Richmond planning area showing the extent of unsewered areas presently served by on-site systems.

3.8.2 Wastewater Management Challenges

With the large number of on-site systems in the New Richmond planning area and limited sanitary sewer service, the identified challenges to wastewater management include:

- Addressing the preponderance of roadside residential properties on small lots located along rural roads throughout the east and central portion of the planning area.
- Continuing vigilance over the proper construction and adequate maintenance of on-site systems whose operation best fits the current and future vision for growth within the planning area, recognizing that much of the unsewered areas are generally unsuitable for soil-based on-site systems.
- Supporting reasonable levels of growth and development through wastewater management improvement projects that are capable of providing maximum benefit to target areas.
- Target areas include: 1) providing limited sewer extensions to serve areas that are located adjacent to New Richmond and that are known to create a public health nuisance and 2) planning for the installation of trunk sewers that extend into the eastern portion of the service area such as along Bethel-New Richmond Road in anticipation of a regional solution to wastewater management in the southwestern reach of the County.

3.9 Felicity

The Felicity FPA includes a large area of approximately 64,200 acres, located in extreme southern Clermont County and situated between the New Richmond and Middle East Fork FPAs. This FPA includes all of Washington and Franklin Townships and the southern portions of Monroe and Tate Townships. Incorporated municipalities in the planning area include the Village of Felicity and the Ohio River towns of Chilo, Moscow and Neville. There are various small unincorporated towns and villages scattered through the area.

The entire planning area drains to the Ohio River, mainly through Bullskin, Big Indian and Bear Creek.

3.9.1 Existing Conditions

3.9.1.1 Land Use and Zoning Trends

Agriculture is the dominant land use throughout the entire planning area and is available for development. With the notable exception of some concentrated development along SR 52 which winds along the Ohio River through Chilo, Felicity, Moscow and Neville, low density, single family rural residences characterize the majority of area development. Most of the commercial development has occurred within or near the incorporated villages noted previously.

Physical limitations to the development of land in the area are steep slopes mainly along the western and southern portions of the planning area and lowland areas subject to flooding. Washington Township has no zoning requirements that would limit development in this portion of the planning area.

3.9.1.2 Population

The planning area's 2010 population is estimated at 10,820 (Refer to Section 4.0). The unsewered communities of Chilo (est. pop. 63) and Neville (est. pop. 100) each experienced double-digit population declines during the last ten years (2000 to 2010). The sewerred Village of Felicity (est. pop. 818) registered an 11.3 percent decline in

population over this same period. The Village of Moscow with a current population of 185, also a sewerred community, lost 24 percent of its population between year 2000 and 2010. The townships of Washington and Franklin showed similar although smaller population declines in the range of 3-4 percent for this period.

3.9.1.3 Wastewater Production

The majority of wastewater generated within the planning area originates from individual on-site systems. The total number of on-site systems within the Felicity planning area is estimated to be 2,980 units which are scattered throughout the area. It is estimated that the sanitary wastewater production within the Felicity planning area is 0.82 mgd which includes the estimated production of the on-site systems (basis: all active) and the two localized point source discharges described below:

- Felicity Regional WWTP, located in the Village of Felicity in Franklin Township on SR 133 which has a permitted flow of 250,000 gpd to Bullskin Creek (current average flow of 160,000 gpd).
- Village of Moscow WWTP located in Moscow in Washington Township which has a permitted flow of 24,000 gpd to the Ohio River (current average flow of 18,000 gpd).

3.9.1.4 Collection, Conveyance and Treatment Facilities

Wastewater collection and treatment facilities operate in the Village of Felicity (CCWRD) and the Village of Moscow. CCWRD commissioned a wastewater management study of the Washington Township/Village of Moscow area that was completed in 2002. The goal of the study was to assess the needs of the area and determine the best method of providing wastewater treatment. The study cited the



presence of failed on-site systems as a driving force to direct wastewater from Washington Township to the wastewater treatment facility located in the Village of Moscow.

The Village of Moscow WWTP includes a pumping station, bar screen and facultative lagoon treatment system consisting of three ponds in series. Two of the facultative ponds have been installed below the 25-year flood plain elevation which would not allow operability and accessibility as required by the *Recommended Standards for the Wastewater Facilities* (i.e. “Ten States Standards”), during a 25-year flood event. Additionally, the treatment facility is nearing design capacity. For these reasons, the study did not advocate directing sanitary wastewater generated within Washington Township to the Village of Moscow for treatment, but recommended continued use of on-site systems due to the forecast for continued slow area growth. The collection system inventory and treatment facilities are listed in the Exhibit 3.17.

EXHIBIT 3.17

Felicity 2010 State of the System

Sewered Area (acres)	Total Area (acres)	Length of Sewer (miles)	Range of Pipe Sizes (inches)	Pump Stations Pumping to this FPA	Wastewater Treatment Plant	WWTP Design Capacity (mgd)
802	64,174	7.8	4" to 12"	2	Felicity WWTP	0.25

3.9.1.5 Delineation of Unsewered Areas

Exhibit 3.18 contains a map of the Felicity planning area showing the extent of unsewered areas presently served by on-site systems. Clermont County provides sanitary service only to the Village of Felicity within the planning area.

3.9.2 Wastewater Management Challenges

With the preponderance of on-site systems located within the Felicity planning area and the desire to envision a southern regional wastewater management strategy, the identified challenges to wastewater management include:

- Continue the vigilance over proper construction and adequate maintenance of on-site systems whose operation best fits the current and future vision for growth within the planning area.
- Define the role of the Felicity FPA in serving local needs in the Village of Felicity and the Village of Moscow as well as the southern regional needs of the County. A potential southern regional treatment facility located at or near Point Pleasant along SR 52 in the Big Indian Creek Basin would be advantageous in terms of existing zoning and favorable wasteload allocation since the discharge would be to the Ohio River and could possibly serve existing infrastructure in adjacent planning areas.

Insert Maps

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3.18

4.0 FUTURE POPULATION AND FLOW PROJECTIONS

The population estimates for 2010 and projections to 2020 and 2030 were derived from the traffic zone database maintained by the Ohio, Indiana and Kentucky Council of Governments (OKI). This database includes population figures, both current and projected, and the area of each traffic zone. Individual properties in the traffic zones were considered developable if they met certain criteria specified by the County (refer to details in Section 4.3). Future flows were developed from projected population and developable acreage that will drain to the existing wastewater treatment plants. The details of the process for projecting the population, acreage and flows are explained in the following subsections.

4.1 Data Used for Developing Projections

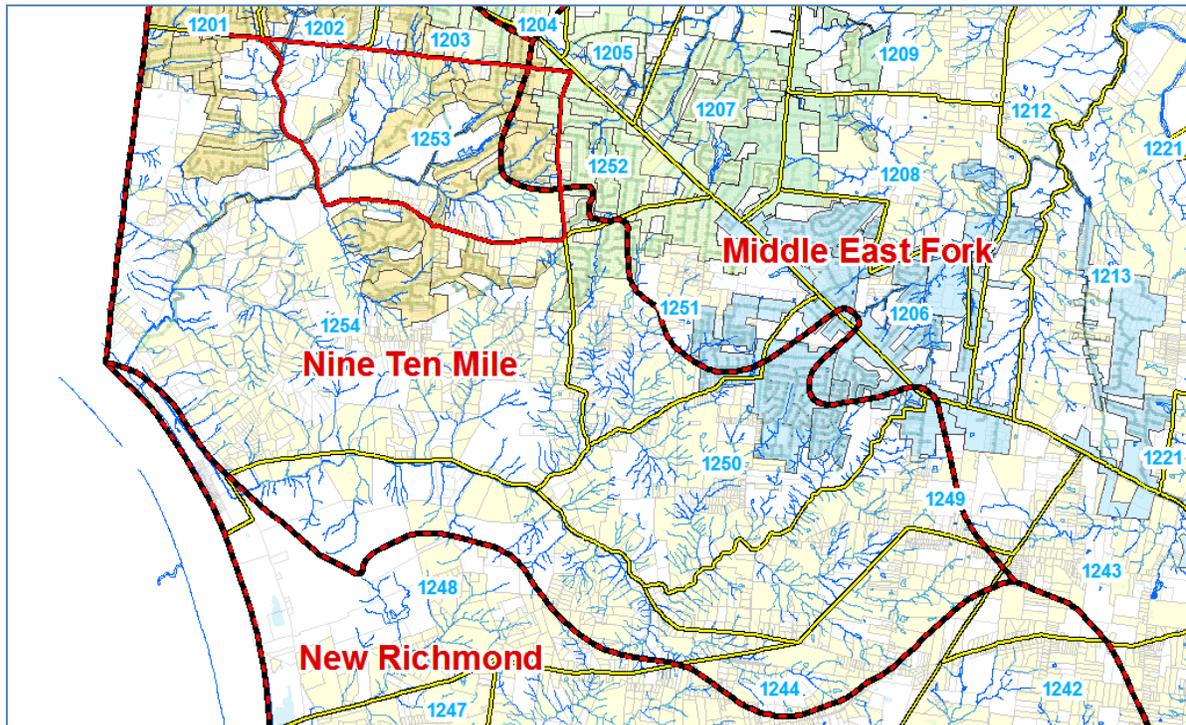
The Master Plan Update utilized flows projected to 2020 and 2030 for the analysis of potential projects. The future flows were developed from projected population and acreage that is anticipated to drain to existing wastewater treatment facilities.

The data used to estimate the future populations for Clermont County include:

- Traffic Analysis Zone (TAZ) data: A total of 128 traffic zones cover the nine facility planning areas analyzed in this report, making the traffic zones useful building blocks for projecting populations in the facility planning areas which often encompass segments of multiple political jurisdictions. As an example, Exhibit 4.1 shows the location of TAZ 1253 within the Nine/Ten Mile planning area.

- Township Future Land Use Plans: The purpose of a land use plan is to outline the future growth areas and development of the community. The plan serves as a blueprint for the community to refer to as development occurs and changes are observed. Future land use plans for the township, which has jurisdiction over a given TAZ, were consulted and incorporated during population allocations.
- GIS Maps containing the following information:
 - Orthographic photos
 - Property lines
 - Properties containing an HSTS
 - Existing subcatchments
 - Sewers
 - Manholes
 - Traffic Analysis Zones (TAZ)
 - Contours
 - Water bodies

EXHIBIT 4.1
TAZ 1253 in the Nine/Ten Mile FPA



4.2 Population Forecast

Population changes projected between 2010 and 2020 and between 2010 and 2030 were established for each TAZ using the following methodology:

- Total population change (POP_{tot}) was counted using a 1:1 ratio
- Employee population change (POP_{emp}) was counted using a 1:5 ratio
- Equivalent population change was calculated: $POP_{eq} = POP_{tot} + 1/5 * POP_{emp}$

The population projections for each exhibit are listed in Exhibit 4.2.

EXHIBIT 4.2
Population Projections 2020 and 2030

Facility Planning Area	2010 Area (acres)	2010 Equivalent Population	2020 Equivalent Population	2030 Equivalent Population
Loveland	3,219	6,822	7,219	7,365
Horner's Run Branch Hill	7,279	14,128	14,319	14,230
O'Bannon	26,753	23,126	27,014	29,163
Stonelick	43,529	13,698	15,932	17,159
Lower East Fork	22,114	51,964	60,298	64,930
Upper East Fork	15,348	2,270	3,033	3,492
Middle East Fork	71,272	39,259	48,833	54,465
New Richmond	21,657	10,075	14,145	16,626
Nine Ten Mile	14,041	20,278	24,741	27,312
Williamsburg	2,423	1,989	2,423	2,674
Felicity	64,175	10,816	11,719	12,127

where Equivalent Population = Residential Population + 1/5 * Employment Population

4.3 Population Allocation

GIS maps were used to evaluate properties where new development could take place within each TAZ. All properties currently undeveloped in TAZs were potentially developable if they met the following criteria:

- Size is greater than 10 acres with septic tanks
- Properties were not parks, institutions, water bodies or golf courses
- Topography has a slope that is less than 20%

This exercise was undertaken for each of the potentially developable properties in all of the TAZs. If the total area of the developable properties in a TAZ was more than 20% of the TAZ area, new subcatchments were created by combining these properties. Population changes projected for the TAZ areas for year 2020 and 2030 (from 2010) were allocated to these new sub-catchments comprised of developable properties on an area weighted basis. Based on engineering judgment, it was assumed that the projected population growth would occur in these developable areas until 2020 as well as 2030 (i.e. the new developable

area will remain unchanged from 2020 to 2030). If however, the developable area was less than 20% of the TAZ area, population changes were allocated to existing sub-catchments in the TAZ on a current population weighted basis.

In either case, future land use plans for the township, which has jurisdiction over a given TAZ, were consulted and incorporated during the allocation. Exhibit 4.3 shows the overall approach adopted for allocating the TAZ population changes projected for the future time horizons of 2020 and 2030.

4.4 Future Wastewater Production

Future flows were developed in the *InfoWorks* models by utilizing the area, population, rainfall-derived infiltration and inflow (RDII) factors, groundwater factors and a wastewater profile. The area and population were obtained using the process discussed. The other factors were developed using the following process:

- RDII factors used a 0.5% R1 factor for inflow and a 0.5% R3 factor for infiltration. No R2 factor was used.
- Groundwater was allocated at 30 gal/capita/day
- Wastewater profile was 100 gal/capita/day

Exhibits 4.4 through 4.8 show the forecasted planning areas for the modeled FPAs based on the approach discussed in this section.

EXHIBIT 4.3
Process of Allocating Population Changes Projected for the Future

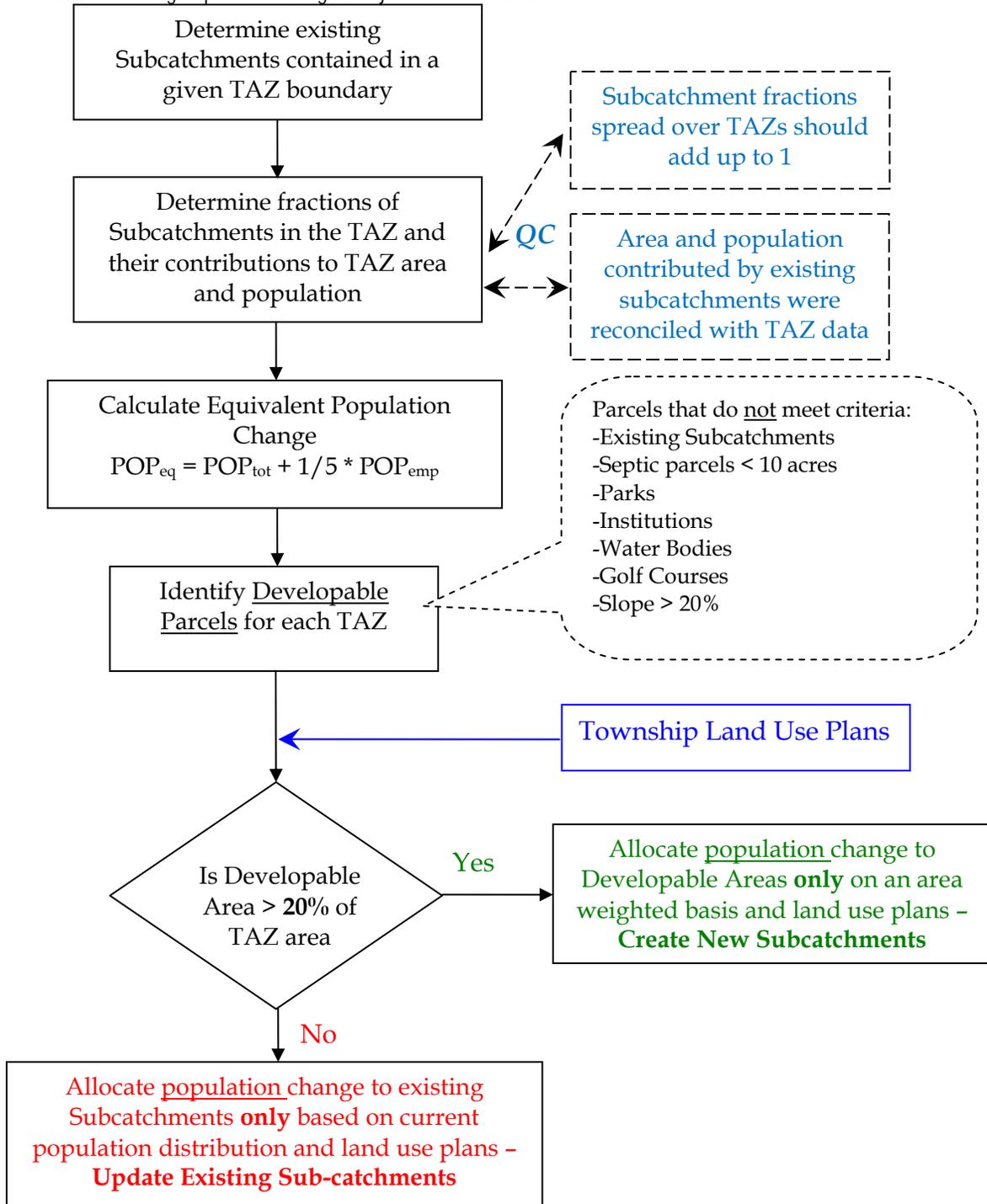


Exhibit 4.4: MAP – showing planning areas for Loveland/Horner’s Run/Branch Hill FPA

Exhibit 4.5: MAP – showing planning area for O’Bannon Creek FPA

Exhibit 4.6A&B: MAP – showing planning area for Lower East Fork Creek FPA

Exhibit 4.7A&B: MAP – showing planning area for Middle East Fork Creek FPA

Exhibit 4.8: MAP – showing planning area for Nine Mile/Ten Mile Creek FPA

5.0 NEEDS ASSESSMENT FOR SUSTAINABILITY

5.1 Collection and Conveyance

Capacity problem locations were identified in each of the five basin models for each of the three flow regimes considered (i.e. 2010, 2020 and 2030). A needs assessment determination was also conducted in unsewered areas. Different versions of the updated existing models and the new Loveland/Horner's Run model were developed to reflect flows for the year 2010 and projected flows for 2020, and 2030. The 2010 flows were based on updated populations resulting from growth within the County between the time when the original model was built and calibrated (2000) through the 2006 GIS data files furnished by the County. The 2020 and 2030 flows were based on population projections provided by Traffic Analysis Zone (TAZ) data supplied by OKI and available township land use and planning documents. The three modeled versions of each basin were analyzed using the 5 year 6 hour design storm provided by the County to identify the locations of system capacity issues.

The criteria for identifying problem areas are as follows:

- Any overflowing manhole in the sewer system,
- Over-utilized pipes that surcharge more than three feet above the crown of the pipe, and
- Over-utilized pipes in areas with known water-in-basement complaints

The Problems identified using these criteria are listed in Exhibit 5.1. The problems have been divided into three priority levels as follows:

- ***Priority 1(P1) Level*** - presence of excessive surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from existing (2010) modeled areas;

- **Priority 2(P2) Level** – presence of excessive surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from future (2020) modeled areas;
- **Priority 3(P3) Level** – presence of excessive surcharging or known water-in-basement issues, sanitary sewer or manhole overflows resulting from future (2030) modeled areas;

The models used in this analysis except for the Loveland/Horner's Run/Branch Hill model were built using the County's calibrated models and projecting the base flows, groundwater infiltration and inflow and infiltration responses.

Special Note: Field measured flow data were not available for this analysis.

EXHIBIT 5.1
Problems Identified

Modeled Area	Problem Number	Description of Problem	Priority Level		
			P1	P2	P3
Nine Mile	1	Nine Mile-Tabasco Road Sewer Capacity Problems I	X		
Nine Mile	2	Nine Mile-Tabasco Road Sewer Capacity Problems II	X		
Nine Mile	3	Legendary Run Sewer Capacity Problems		X	
Nine Mile	4	Oakland Farm Drive Sewer Capacity Problems		X	
Nine Mile	5	Pierce Lift Station Capacity Problems		X	
Lower East Fork	1	Shayler Run Upstream Sewer Capacity Problems	X		
Lower East Fork	2	Eastgate North Drive Sewer Capacity Problems	X		
Lower East Fork	3	Hall Run Sewer Capacity Problems	X		
Lower East Fork	4	Round Bottom Road Sewer Capacity Problems	X		
Lower East Fork	5	Wolf Pen - Pleasant Hill Road Sewer Capacity Problems	X		
Lower East Fork	6	Cook Road Near Lift Station Capacity Problems	X		
Lower East Fork	7	Elick Lane Sewer Capacity Problems	X		
Lower East Fork	8	Mt. Caramel-Tobasco Road Sewer Capacity Problems	X		
Lower East Fork	9	Clough Pike Sewer Capacity Problems	X		
Lower East Fork	10	Arcadia Lane Sewer Capacity Problems	X		
Lower East Fork	11	Founders Boulevard Sewer Capacity Problems		X	
Lower East Fork	12	Old SR 74 Sewer Capacity Problems		X	
Lower East Fork	13	Olive Branch-Stonelick Road Sewer Capacity Problems		X	
Lower East Fork	14	Binning Road Sewer Capacity Problems		X	

EXHIBIT 5.1
Problems Identified (continued)

Modeled Area	Problem Number	Description of Problem	Priority Level		
			P1	P2	P3
Lower East Fork	15	Ferguson Drive and Aicholtz Road Sewer Capacity Problems		X	
Lower East Fork	16	Creek Sewer Capacity Problems	X		
Lower East Fork	17	SR 28 Sewer Capacity Problems	X		
Lower East Fork	18	SR 131 Lift Station Capacity Problems	X		
Lower East Fork	19	Happy Hollow Lift Station Capacity Problems	X		
Lower East Fork	20	Meadow Drive Sewer Capacity Problems		X	
Lower East Fork	21	Viking Village Lift Station Capacity Problems		X	
Lower East Fork	22	Baldwin Road Sewer Capacity Problems		X	
Lower East Fork	23	State Route 28 Lift Station Capacity Problems	X		
Lower East Fork	24	Orchard Lift Station Capacity Problems	X		
Lower East Fork	25	Shepherd Lift Station Capacity Problems	X		
Lower East Fork	26	Nature Run Capacity Problems			X
Middle East Fork	1	Locust Lake Lift Station Capacity Problems	X		
Middle East Fork	2	Bethel Area Sewer Capacity Problems I	X		
Middle East Fork	3	Bethel Area Sewer Capacity Problems II	X		
Middle East Fork	4	Huntsman Trace Sewer Capacity Problems		X	
Middle East Fork	5	Rose Lane Sewer Capacity Problems		X	
Middle East Fork	6	Lucy Run Cemetery Road Sewer Capacity Problems		X	
Middle East Fork	7	Lucy Run Trunk Sewer Capacity Problems		X	
Middle East Fork	8	Foozer Sewer Capacity Problems		X	

EXHIBIT 5.1
Problems Identified (continued)

Modeled Area	Problem Number	Description of Problem	Priority Level		
			P1	P2	P3
Middle East Fork	9	Bethel Area Sewer Capacity Problems III		X	
Middle East Fork	10	Bethel Area Sewer Capacity Problems IV		X	
Middle East Fork	11	Bethel Area Sewer Capacity Problems V		X	
Middle East Fork	12	Haskell Road Sewer Capacity Problems		X	
Middle East Fork	13	Hartman Lane Sewer Capacity Problems		X	
Middle East Fork	14	Winemiller Sewer Capacity Problems		X	
Middle East Fork	15	Owensville Area Sewer Capacity Problems I		X	
Middle East Fork	16	Owensville Area Sewer Capacity Problems II		X	
Middle East Fork	17	Huntsman Trace Sewer Capacity Problems			X
Middle East Fork	18	Stable Trails Sewer Capacity Problems			X
Middle East Fork	19	Hartman Lane Sewer Capacity Problems			X
O'Bannon	1	Twin Oaks Sewer Capacity Problems	X		
O'Bannon	2	Redbird Road Sewer Capacity Problems	X		
O'Bannon	3	O'Bannon South Trunk Sewer Capacity Problems	X		
O'Bannon	4	Deerfield Sewer Capacity Problems	X		
O'Bannon	5	Upper Creek Sewer Capacity Problems	X		
O'Bannon	6	Middle Creek Sewer Capacity Problems		X	
O'Bannon	7	Deerfield Sewer Capacity Problems		X	
O'Bannon	8	Barre Lane Sewer Capacity Problems		X	

EXHIBIT 5.1
Problems Identified (continued)

Modeled Area	Problem Number	Description of Problem	Priority Level		
			P1	P2	P3
O'Bannon	9	Upper Creek Sewer Capacity Problems		X	
O'Bannon	10	Middle Creek Sewer Capacity Problems		X	
O'Bannon	11	Gibson Road Sewer Capacity Problems		X	
O'Bannon	12	SR 132 Sewer Capacity Problems		X	
O'Bannon	13	Main Street Sewer Capacity Problems		X	
O'Bannon	14	Upper Creek Sewer Capacity Problems		X	
O'Bannon	15	Twin Oak Sewer Capacity Problems		X	
O'Bannon	16	SR 48 Sewer Capacity Problems		X	
O'Bannon	17	Upper Creek Sewer Capacity Problems			X
O'Bannon	18	SR 132 Sewer Capacity Problems			X
Loveand/Horner's Run	1	Miami Trails Sewer Capacity Problems	X		

P1 - Near Term (2010)

P2 - Intermediate Term (2020)

P3 - Long Term (2030)

5.1.1 Loveland/Horner's Run/Branch Hill

Exhibit 5.2 illustrates and identifies capacity problems in Loveland/Horner's Run/Branch Hill planning area for 2010, 2020 and 2030 flows.

The analysis using the 2010 (existing condition) model shows some limited surcharging along Trailridge Court, in the area tributary to the Miami Trails WWTP. No surcharging or surface failure occurred in the areas tributary to the Wards Corner or Arrowhead WWTPs.

The 2020 (intermediate term) model analysis shows progressive surcharging along Trailridge Court, in the area tributary to the Miami Trails WWTP. No surcharging or surface failure occurred in the areas tributary to the Wards Corner or Arrowhead WWTP.

The 2030 (future) model analysis shows very little change to the surcharging along Trailridge Court, in the area tributary to the Miami Trails WWTP compared to the 2020 model outcome. No surcharging or surface failure occurred in the areas tributary to the Wards Corner or Arrowhead WWTP.

5.1.2 O'Bannon Creek

Exhibit 5.3 illustrates and identifies the problems in the O'Bannon Creek planning area for 2010, 2020 and 2030 flows.

The analysis using the 2010 (existing condition) model shows surcharging along Deerfield Road and sections that extend along creeks in the western portion of the basin and near the WWTP, conveying flows toward the O'Bannon Creek Regional WWTP.

The 2020 (intermediate term) model shows progressive surcharging along Deerfield Road, and in the western portion of the basin. There is new surcharging in the trunk sewers conveying flow to the WWTP from the west in the 2020 model outcome.

The analysis using the 2030 (future) model showed progressive surcharging in the western portion of the basin.

5.1.3 Stonelick Creek

The County has extended sanitary sewer service into the planning area's western and southern extremities, but the vast majority of the area is without sewer service.

Accordingly, the Stonelick FPA has not been modeled. Wastewater management challenges in the Stonelick Creek planning area include the following:

- Planning for the anticipated growth that is forecast to enter the planning area from the south, from the SR 32 corridor passing through Batavia Township and to a lesser extent from the east along SR 131.
- Addressing the concentration of small lot development located within established communities or along major roadways.
- Maintaining vigilance over the proper construction and adequate maintenance of on-site systems to prevent a public health nuisance, given that there are an estimated 3,600 on-site system in the planning area.
- Supporting reasonable levels of growth and development through wastewater management improvements that are capable of providing maximum benefit to targeted areas.

Due to the steep terrain and concern over water quality and use attainment goals in the Stonelick Creek, broad expansion of collection and conveyance infrastructure is not recommended at the present time. However, a practical initial stage of wastewater management in this area is to focus on and meet near-term needs in limited sectors of the planning area where needs have been expressed to address existing problems or to support moderate levels of growth. One such sector is the Newtonsville, Edenton, Belfast and Owensville quadrangle.

Location of the planned wastewater treatment facility in the Village of Newtonsville would meet an immediate need expressed by local residents, As well, this would provide the opportunity in the future to provide local sewers to the Village of Belfast that have known on-site problems, with flow conveyed to Newtonsville via pump station for treatment. On-site problem areas include Sutton Lane, Wilshire Circle and Goshen Road (southernmost reach of CR-57).

The unsewered area between Belfast and Owensville, including known on-site problem areas, is proposed to be served via the Owensville North extension along Belfast-Owensville Road. A local sewer extending east of Owensville along SR 50 is proposed to facilitate development east of Owensville and eliminate the Clermont Northeastern Local School treatment facility. Flows from these areas are proposed to be conveyed to the Middle East Fork Basin via the pump station located in Owensville.

5.1.4 Upper East Fork

The Upper East Fork planning area is without centralized sanitary service and has not been modeled. The need for collection and conveyance infrastructure in this planning area is limited by its small population, sparse development and proximity to existing sanitary sewers. As with other areas having a preponderance of on-site systems, the identified challenges to wastewater management in the Upper East Fork planning area include:

- Planning for possible growth that is likely to enter the Upper East Fork area from the south, via the SR 32 corridor that passes through Batavia Township.
- Continuing vigilance over the proper construction and adequate maintenance of on-site systems whose operation best fits the current and future vision for growth within the planning area, given that there are an estimated 990 on-site systems in the planning area with the largest concentration in the Village of Marathon.

Due to the general lack of growth and development in the area and growth projections that support continuance of this trend, installation of sewer service to this area is not practical or feasible at the present time. Over the next 20 years, wastewater management decisions should continue to be based on providing maximum benefit to targeted areas on an as-needed basis, driven by area development.

According to Jackson Township (personal communication with township zoning inspector), the area bounded by Hawley Road and Jackson Pike may develop to create mixed residential housing, although a timetable has not been put forth. Should development eventually occur, this area could be served from the existing sewer north of SR 32 that extends from Bauer Road to Half Acre Road.

5.1.5 Lower East Fork

Exhibit 5.4 shows a map identifying the problems in Lower East Fork for 2010, 2020 and 2030 flows.

The 2010 (existing condition) modeled analysis found problem areas with surcharging and overflowing manholes in the area of Hall Run, Shayler Run, upstream of the WWTP and in the upper part of the basin around and including the Cook and Highview Lift Stations.

The 2020 (intermediate future) modeled analysis found the 2010 problem areas to be projected to experience surcharging and overflowing manholes and in addition to these areas the trunk sewer draining to the WWTP from the east.

The 2030 (future) modeled analysis found more surcharging upstream of Hall Run and Shayler Run.

5.1.6 Middle East Fork

Exhibit 5.5 shows a map identifying the problems in Middle East Fork for 2010, 2020 and 2030 flows.



The analysis using the 2010 (existing condition) model showed surcharging in Bethel and capacity problems at the Locust Lake Lift Station.

The analysis using the 2020 (intermediate term) model showed additional surcharging in Bethel, surcharging along State Route 32, surcharging in Owensville, surcharging along Lucy Run, and some miscellaneous surcharging in a couple of other areas near State Route 125.

The analysis using the 2030 (future) model showed additional surcharging near State Route 32 and State Route 125.

The flows from the Village of Bethel are pumped via 10-inch force main, approximately 29,000 feet long, and discharge to the Middle East Fork FPA upstream of the Lucy Run Sewer, just north of State Route 125. Re-routing flows from Bethel was considered during the needs assessment that was performed for the Middle East Fork FPA. The two primary considerations that were investigated included the benefit to the Middle East Fork system in regard to conveyance and treatment and the best alternative for managing the flows from the Bethel Pump Station.

The resulting investigation indicated that re-routing of the Bethel flows would reduce the 2030 peak flow experienced in the Lucy Run Trunk Sewer but not significantly enough to eliminate the required improvements. Without the Bethel flows, the problem along Lucy Run would still require replacement of the entire stretch of sewer; however the size would be reduced by one pipe size in some locations. This scenario produces scant cost savings considering the cost of redirecting the Bethel flows elsewhere.

Alternatives for redirecting up to 2.4 MGD of flow from the Bethel Pump Station are somewhat limited. Three concepts were considered, including: conveyance of the flows to a neighboring jurisdiction (i.e. New Richmond or Williamsburg), conveyance of flows to a proposed southern regional treatment facility located in the Felicity FPA and conveyance of flow to a proposed treatment facility in the Bethel area.



Conveyance of wastewater flows westward into New Richmond would require construction of a force main to convey the flow into the New Richmond FPA, a long gravity sewer extending from the east end of the New Richmond FPA to the existing WWTP, and a substantial upgrade of the existing New Richmond WWTP whose current design flow is 0.55 MGD. This concept plan would also require a multi-jurisdictional agreement between the County and the Village of New Richmond to manage and treat these flows. Similarly, conveyance of flows from Bethel to the Village of Williamsburg would require costly conveyance, substantial expansion of the Williamsburg WWTP whose design flow is 0.5 MGD and a multi-jurisdictional agreement between both parties. The cost to accomplish either of these options is excessive and lacks merit.

Conveyance of the Bethel flows to a proposed southern regional WWTP, discharging to the Ohio River in the Felicity FPA was investigated. As with the other concepts, this plan would require construction of a new force main and long gravity sewer to convey the flows from Bethel to the proposed plant which would be sized to accommodate flows from both Felicity and Moscow (requiring additional sewer construction). Due to the scattered, sparse population and lack of projected population growth in the southern part of the County, this concept is not practical.

Siting and construction of a proposed treatment facility in the vicinity of Bethel and discharging to East Fork of the Little Miami River Lake would also be a costly proposition. The plant would be required to comply with Best Available Demonstrated Control Technology (BADCT) criteria, likely requiring enhanced nutrient controls and tertiary treatment facilities. Although this plant could serve as mid-southern regional treatment facility sized for the surrounding area; the cost would be prohibitive.

Therefore, based on the evaluation discussed above, proposed re-routing of the flows from the Village of Bethel away from the Middle East Fork basin to eliminate surcharging and capacity issues was eliminated from consideration.

5.1.7 Nine Mile

The 2010 (existing condition) modeled analysis found problem with surcharging and overflowing manholes in the area upstream of the WWTP.

The 2020 (intermediate term) modeled analysis found the 2010 problem areas to be projected to experience surcharging and overflowing manholes and in addition to these areas Pierce Lift Station.

The 2030 (future) modeled analysis projected more excessive surcharging of the 2010 areas. Exhibit 5.6 shows a map identifying the problems in Nine Mile for 2010, 2020 and 2030 flows.

5.1.8 New Richmond

The County has extended sanitary sewer service into the planning area's eastern fringe and the Village of New Richmond is serving its population to the west, but approximately half of the area is without sewer service. With the large number of on-site systems in the planning area and limited sanitary sewer service, the collection system has not been modeled. Identified challenges to wastewater management include:

- Addressing the preponderance of roadside residential properties on small lots located along rural roads throughout the east and central portion of the planning area.
- Continuing vigilance over the proper construction and adequate maintenance of on-site systems, estimated at 2,560 units, to prevent public nuisances, recognizing that much of the unsewered areas are generally unsuitable for soil-based on-site systems.
- Supporting reasonable levels of growth and development through wastewater management improvements that are capable of providing maximum benefit to target areas.

As-needed target areas include: 1) providing limited sewer extensions to serve areas that are located adjacent to and east of the New Richmond service area and that are known to create a public health nuisance and 2) planning for the installation of trunk sewers that extend into the eastern portion of the service area such as along Bethel-New Richmond Road in anticipation of a regional solution to wastewater management in the southwestern reach of the County.

5.1.9 Felicity

Alternatives to provide a broad-reaching collection and conveyance network to serve the Felicity planning area cannot be justified by the pattern of slow growth that will likely continue into the foreseeable future. Yet, there are areas of need in existing unsewered areas that have on-site system concentrations, notably Point Pleasant, Laurel and Point Isabel. With the preponderance of on-site systems located within the Felicity planning area and the desire to envision a southern regional wastewater management strategy, the identified challenges to wastewater management include:

- Continue the vigilance over proper construction and adequate maintenance of on-site systems, estimated at 2,980 units, whose operation best fits the current and future vision for growth within the planning area.
- Define the role of the Felicity FPA in serving local needs in the Village of Felicity and the Village of Moscow as well as the southern regional needs of the County.

A potential southern regional treatment facility located in the Big Indian Creek Basin would be advantageous in terms of existing zoning, favorable wasteload allocation since the discharge would be to the Ohio River and could possibly serve existing infrastructure in adjacent planning areas. One such scenario would consist of planning for a southern regional treatment facility between Moscow and Point Pleasant that would serve Felicity, Moscow, unsewered areas in northern Washington Township (i.e. up to Point Isabel),

unsewered areas in southern Monroe Township (i.e. up to Laurel), the Ohio River towns of Chilo and Neville. A detailed study of a proposed Clermont County Southern Regional Conveyance and Collection System plan is recommended to accomplish this objective.

In the intervening period, it is proposed that community treatment systems be considered at the following locations: Point Isabel, Point Pleasant, Laurel, Chilo and Neville. This alternative is an effective option for groups of four to 100 residences. Cluster collection and treatment systems represent an attractive and affordable sewage service option that would meet the needs of a dispersed or slowly growing population and support and maintain the rural character of these communities. While adverse topography encourages this approach, so do unsuitable soils that demand more than a conventional on-site system.

5.2 Wastewater Treatment Facilities

CCWRD currently owns and operates a total of nine wastewater treatment facilities that serve designated areas and which are governed under the National Pollutant Discharge Elimination System (NPDES). Four of these plants are located in the Loveland/Horner's Run/Branch Hill FPA, and one each in O'Bannon, Lower East Fork, Middle East Fork, Nine Mile and Felicity. Each is individually discussed below.

5.2.1 Loveland/Horner's Run/Branch Hill

There are four existing wastewater treatment facilities and 9 pump stations within the Loveland/Horner's Run/Branch Hill FPA. These include the Wards Corner Regional, Miami Trails, Arrowhead Park and Indian Lookout WWTPs. The Bramblewood WWTP that formerly served the Bramblewood Subdivision has recently been de-commissioned with its flow routed to the Wards Corner Regional facility via the recently completed Bramblewood trunk sewer.

Wastewater that is generated within the Clermont County side of the City of Loveland is collected, conveyed and treated at the Polk Run WWTP which is owned and operated by the Metropolitan Sewer District of Greater Cincinnati.

Wards Corner Regional WWTP. The Wards Corner Regional WWTP was placed into service in 2009 and replaced the former Wards Corner WWTP located on Loveland-Miamiville Road. This facility is served by a separate sanitary sewer system and discharges to a small stream that is tributary to the Little Miami River. This plant is the only CCWRD operated facility that is currently required to comply with an effluent total phosphorus limit of 1.0 mg/L. The plant has been designed to treat an average flow of 2.0 MGD and a peak flow of 6.0 MGD but currently treats less than 100,000 GPD. Wet stream processes include the following:



**Satellite Photo of Wards Corner
Regional WWTP**

Wet stream processes include the following:

- flow equalization
- fine screening
- activated sludge (two oxidation ditches)
- secondary clarification
- tertiary sand filtration
- ultraviolet light disinfection
- post aeration

The plant is in compliance with the terms and conditions of its governing NPDES permit. Based on the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study performed by Ohio EPA in 2007 and published in October 2009, the Little

Miami River is in full attainment with its use designation downstream of the Wards Corner Regional WWTP discharge. Monthly operating data from the Wards Corner Regional WWTP for the period (2009-10) are summarized in Exhibit 5.7.

EXHIBIT 5.7
Wards Corner Regional WWTP
Effluent Quality 2009-10 (through October)

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	0.062	0.16	0.011-0.27
cBOD5	mg/L	10	15	3.3	8.2	2.0-9.7
TSS	mg/L	12	18	2.7	7.8	1.0-9.0
NH4-N (S)	mg/L	0.4	0.6	0.14	0.62	0.1-0.66
NH4-N (W)	mg/L	3.0	4.5			
TP	mg/L	1.0	1.5	1.4	5.8	0.1-7.8

Miami Trails WWTP. The Miami Trails WWTP serves residents in the Belle Meade and Miami Trails subdivisions. The plant was originally built in 1989 and has been expanded three times due to rapid and sustained development in the area. This facility discharges to a small stream that is tributary to the Little Miami River and has been designed to treat an average flow of 0.4 MGD. Wet stream processes include the following:



Satellite Photo of Miami Trails

- coarse screening
- activated sludge (extended aeration)
- secondary clarification
- tertiary filtration

- chlorine disinfection

The plant is in compliance with the terms and conditions of its governing NPDES permit. Based on the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study performed by Ohio EPA in 2007 and published in October 2009, the Little Miami River is in full attainment with its use designation downstream of the Miami Trails WWTP discharge. Monthly operating data from the Miami Trails WWTP for the period (2007-10) are summarized in Exhibit 5.8.

EXHIBIT 5.8
Miami Trails WWTP
Effluent Quality 2007-10 (through October)

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	0.29	0.48	0.08-0.71
cBOD5	mg/L	10	15	3.7	7.5	2.0-10.2
TSS	mg/L	12	18	3.3	9.0	1.0-12.9
NH4-N (S)	mg/L	1.3	2.0	0.15	0.75	0.1-3.3
NH4-N (W)	mg/L	3.7	5.6			

Arrowhead Park WWTP. The Arrowhead Park WWTP serves the 360-unit Arrowhead Park Apartments complex and residents located on Hollow Lane. The plant was placed into service in 1976 and is located off Branch Hill-Guinea Pike, adjacent to the Little Miami Bike Trail. This facility discharges to a small stream that is tributary to the Little Miami River and has been designed to treat an average flow of 0.14 MGD. Wet stream processes include the following:



Satellite Photo of Arrowhead Park

- coarse screening
- 2-stage activated sludge with intermediate and final clarifiers
- chlorine disinfection

The plant produces an effluent that complies with the terms and conditions of its governing NPDES permit. Based on the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study performed by Ohio EPA in 2007 and published in October 2009, the Little Miami River is in full attainment with its use designation downstream of the Arrowhead Park WWTP discharge. Monthly operating data from the period (2007-10) are summarized in Exhibit 5.9.

EXHIBIT 5.9
Arrowhead Park WWTP
Effluent Quality 2007-10 (through October)

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	0.054	0.121	0.02-0.18
cBOD5 (S)	mg/L	15	23	4.6	11.5	2.0-12.9
cBOD5 (W)	mg/L	25	40			
TSS	mg/L	15	23	3.8	7.5	1.0-27.8
NH4-N (S)	mg/L	16	24	0.45	6.9	0.1-12.0
NH4-N (W)	mg/L	---	---			

Indian Lookout WWTP. The Indian Lookout WWTP serves approximately 200 homes in several local subdivisions off Branch Hill-Miamiville Road. The facility was placed into service in 1977 and was later expanded in 1988. The facility has a permitted flow of 0.045 mgd. Wet stream processes include the following:



Satellite Photo of Indian
Lookout WWTP

- coarse screening
- activated sludge (extended aeration)
- final clarification
- chlorine disinfection

The Indian Lookout WWTP is planned for decommissioning in the near future with its flow directed to the Wards Corner Regional facility via the proposed Indian Lookout trunk sewer and lift station improvements.

The plant produces an effluent that complies with the terms and conditions of its governing NPDES permit. Based on the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study performed by Ohio EPA in 2007 and published in October 2009, the Little Miami River is in full attainment with its use designation downstream of the Indian Lookout WWTP discharge. Monthly operating data from the period (2007-10) are summarized in Exhibit 5.10.

EXHIBIT 5.10
Indian Lookout WWTP
Effluent Quality 2007-10 (through October)

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	0.042	0.135	0.011-0.3
cBOD5	mg/L	10	15	7	16	2-14
TSS	mg/L	12	18	8	12	2-27
NH4-N (S)	mg/L	1.5	2.3	0.3	1.2	0.1-5.2
NH4-N (W)	mg/L	2.5	3.8			

5.2.1.1 Loveland/Horner's Run/Branch Hill Treatment Needs Assessment

Growth within the Loveland/Horner's Run/Branch Hill FPA, particularly the housing market, has been slow to recover from the economic downturn that began in 2008, a trend that will likely continue into the foreseeable future. Given these



circumstances, it is prudent to direct efforts toward near-term needs that are clearly visible and produce the most benefit.

The average flow discharged by the Miami Trails WWTP during the last three years is 75 percent of the design flow, signaling a need to consider re-rating the plant capacity after a comprehensive evaluation is completed to determine and defend a new design capacity. Regulatory initiatives to limit the discharge of phosphorus will likely not be imposed until the next permit cycle in 2014. It would be beneficial and advantageous to invest capital to decommission this treatment facility and direct the wastewater to the Ward's Corner Regional WWTP in the longer term as the plant flow continues to approach the design capacity.

The Arrowhead Park WWTP (NPDES Permit 1PH00014*ID) has a favorable wasteload allocation to the Little Miami River and includes a total phosphorus monitoring requirement. This permit will expire at the end of 2011 and likely contain more rigorous effluent criteria in the next permit cycle since the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study has been completed and published by Ohio EPA in October 2009. Additional capital investment in this facility would be required to enable the plant to comply with stringent effluent requirements. It would be beneficial and advantageous to invest in capital improvements that would eliminate the Arrowhead Park WWTP and direct the flow to the Wards Corner Regional WWTP.

The Wards Corner Regional WWTP has been designed for nutrient control but is under-loaded hydraulically. Efforts are underway and should be continued to consolidate infrastructure and direct tributary flows to this location, including planned improvements that decommission the Indian Lookout WWTP.

5.2.2 O'Bannon Creek

The O'Bannon Creek Regional Wastewater Treatment serves most of Goshen Township and portions of Miami and Stonelick Township and discharges to O'Bannon Creek. The plant is served by a separate sanitary sewer system and includes seven pump stations. This facility was placed into service in 1984 and later modified in 1992 and 2001. The current design average flow is 4.4 MGD. Wet stream processes include the following:



Aerial Photo of O'Bannon Creek Regional WWTP

- flow equalization
- coarse screening
- grit removal
- 2-stage activated sludge with intermediate and final clarifiers
- tertiary sand filters
- ultraviolet light disinfection

The facilities added in 2001 included the following:

- oxidation ditch
- final clarifier
- augmented tertiary sand filtration

- augmented ultraviolet light disinfection

The plant is in compliance with the terms and conditions of its governing NPDES permit. Based on the *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study performed by Ohio EPA in 2007 and published in October 2009, O'Bannon Creek is in full attainment with its use designation downstream of the O'Bannon Creek Regional WWTP. Monthly operating data from the O'Bannon Creek Regional WWTP for the five year period (2004-9) are summarized in Exhibit 5.11.

EXHIBIT 5.11
O'Bannon Creek Regional WWTP
Effluent Quality 2004-9

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	1.55	2.67	0.62 – 6.6
cBOD5	mg/L	8	12	2.5	5.0	0 – 13.7
TSS	mg/L	12	18	3.3	7.8	0 – 28.3
NH4-N (S)	mg/L	0.5	0.8	0.1	0.5	0 – 14.2
NH4-N (W)	mg/L	2.0	3.0	0.1	0.7	0 – 2.6
TP	mg/L	---	---	2.5	4.8	0.4 – 6.3

5.2.2.1 O'Bannon Creek Treatment Needs Assessment

Treatment needs for sustainability within this FPA should focus on the treatment of peak wet weather flows at the O'Bannon Creek Regional WWTP and regulatory initiatives to limit total phosphorus discharge. Regulatory initiatives to limit the discharge of phosphorus will likely not be imposed until the next permit cycle in 2015.

The O'Bannon Creek Regional WWTP has limited peak flow treatment capacity. This plant should be equipped to manage and treat flows equal to 2.5 times the design average flow, or 11 mgd. Currently, the peak sustainable flow is approximately 5.5 mgd. It is recommended that a plant hydraulic evaluation be conducted to identify hydraulic bottlenecks and unit operations that limit hydraulic throughput and invest in necessary plant modifications to augment peak flow

treatment. Planning for additional equalization volume should be considered after plant hydraulic improvements and proposed collection system improvements are completed.

Efforts are currently underway to extend and provide sanitary service to an area lying outside the County's jurisdictional boundary. This area, located in Harlan Township in Warren County, will include the expanded pet products manufacturing operation of Hartz Mountain Corporation and approximately 20 Warren County residences located nearby along SR 132. The combined flow of approximately 15,000 gpd will be conveyed to the O'Bannon Creek Regional WWTP via a proposed new sewer to be built along SR 132, north of Shiloh Road to the County line. In addition to contributing additional flow and load to the O'Bannon Creek Regional WWTP, this new sewer will open the area along SR 132 to further development.

5.2.3 Lower East Fork

The Lower East Fork Regional WWTP is the County's largest wastewater treatment facility and serves Miami and Union Townships. The plant is served by a separate sanitary system that includes 49 pump stations. The plant was placed into service in 1979 and modified in 1993 and in 2006. The design average flow is currently 9.0 MGD with a peak sustainable flow of 15.5 mgd. The plant discharges to a small stream tributary to the East Fork Little Miami River.



Aerial Photo of Lower East Fork

The plant is currently under construction to augment the peak flow treatment capacity. These plant improvements are slated for completion in 2012. Wet stream processes include the following:

- fine screening
- grit removal
- flow equalization
- activated sludge (oxidation ditches)
- final clarification
- tertiary filtration
- ultraviolet light disinfection
- post aeration

The plant is in compliance with the terms and conditions of its governing NPDES permit. The East Fork Little Miami River watershed was not part of the intensive stream survey of the Lower little Miami River conducted by Ohio EPA in 2007. Accordingly, no conclusions that reflect the current biological health and water quality of the East Fork Little Miami River are available; however, a total maximum daily load (TMDL) study is scheduled for the East Fork Little Miami River in 2015. Monthly operating data from the Lower East Fork WWTP for the five year period (2004-9) are summarized in Exhibit 5.12.

EXHIBIT 5.12
Lower East Fork Regional WWTP
Effluent Quality 2004-9

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	5.07	9.67	2.54-15.4
cBOD5	mg/L	10	15	2.0	7.55	2.0-14.3
TSS	mg/L	12	18	1.0	4.1	1.0-52
NH4-N (S)	mg/L	1.0	1.5	0.1	0.25	0.1-1.5
NH4-N (W)	mg/L	3.0	4.5	0.1	1.17	0.1-10.7

5.2.3.1 Lower East Fork Treatment Needs Assessment

Treatment needs for sustainability within the Lower East Fork FPA should focus on the continued treatment of peak wet weather flows at the Lower East Fork Regional WWTP. Regulatory initiatives to limit the discharge of phosphorus will likely not be imposed until the TMDL study slated for 2015 is completed or the plant is expanded, resulting in an increase in loading. The effective NPDES Permit for this facility (1PK00009*LD) contains a monitoring only instruction for total phosphorus and will expire in 2015.

The plant is currently under construction to effectively manage the treatment of excess flows which reach the plant during wet weather events. When completed in 2012, the plant will be capable of treating a peak wet weather flow rate of 21 mgd. This treatment rate in association with the available 10MG of equalization capacity will mitigate the risk of plant overflows.

During the most recent five year period (2006-2010) the annual average plant flow of 6.6 mgd is essentially unchanged from the previous five year period (2001-2005). Plant expansion is unwarranted in the near term, although a longer-range vision to expand the Lower East Fork WWTP to a design average flow of 14 mgd with a peak treatment rate of 28 mgd should be considered in the future. Based on growth projections for this sewershed presented previously, planning for the Lower East Fork WWTP design flow expansion should be initiated as 2020 is approached. The annual average plant flow is projected to be consistently in the 7.6 mgd range (85% of design flow) at that time.

5.2.4 Middle East Fork

The Middle East Fork Regional WWTP serves an area that includes portions of Stonelick, Batavia, Monroe, Tate and Williamsburg Townships. The plant is served by a separate sanitary sewer system which includes 35 pump stations. The plant has an average design flow of 7.2 MGD and discharges to the East Fork Little Miami River. Wet stream processes include the following:

- fine screening
- grit removal
- flow equalization
- activated sludge aeration
- final clarification
- post aeration
- ultraviolet disinfection



Aerial Photo of Middle East Fork WWTP

The plant is in compliance with the terms and conditions of its governing NPDES permit. The East Fork Little Miami River watershed was not part of the intensive stream survey of the Lower little Miami River conducted by Ohio EPA in 2007. Accordingly, no conclusions that reflect the current biological health and water quality of the East Fork Little Miami River are available; however, a total maximum daily load (TMDL) study is scheduled for the East Fork Little Miami River in 2015. Monthly operating data from the Middle East Fork WWTP for the five year period (2004-9) are summarized in Exhibit 5.13.

EXHIBIT 5.13
Middle East Fork Regional WWTP
Effluent Quality 2004-9

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	3.04	6.44	1.24-18.4
cBOD5 (S)	mg/L	12.8	19.5	3.6	7.4	0-21.3
cBOD5 (W)	mg/L	18.5	29	3.2	8.5	0-17.6
TSS (S)	mg/L	17	25	4.0	12.8	0-44.3
TSS (W)	mg/L	22	33			
NH4-N (S)	mg/L	1.57	2.35	0	1.0	0-11.5
NH4-N (W)	mg/L	5.83	8.75	0	2.3	0-8.93

5.2.4.1 Middle East Fork Treatment Needs Assessment

Treatment needs for sustainability within this FPA should focus on the treatment of peak wet weather flows at the Middle East Fork Regional WWTP and regulatory initiatives to limit total phosphorus discharge. Regulatory initiatives to limit the discharge of phosphorus will likely not be imposed until the next permit cycle in 2015 unless the plant is expanded, resulting in an increase in loading.

The Middle East Fork Regional WWTP has limited peak flow treatment capacity. This plant should be equipped to manage and treat flows equal to 2.5 times the design average flow, or 18 mgd. Currently, the peak sustainable flow is approximately 8.5 mgd. It is recommended that a plant hydraulic evaluation be conducted to identify hydraulic bottlenecks and unit operations that limit hydraulic throughput and invest in necessary plant modifications to augment peak flow treatment capacity. Planning for additional equalization volume should be considered after plant hydraulic improvements and proposed collection system improvements are completed.

5.2.5 Nine Mile

Although the Nine Mile Wastewater Treatment Plant discharges to Nine Mile Creek, it is modeled as a direct discharge to the Ohio River. This facility was constructed in 1984 and later modified in 2002 and is served by a separate sanitary sewer system. The current design average flow is 3.0 MGD. Wet stream processes include the following:

- coarse screening
- fine screening
- activated sludge (oxidation ditches)
- final clarification
- ultraviolet light disinfection



Aerial Photo of Nine Mile WWTP

The coarse screen installation was completed in 2010. On average, the plant runs a single oxidation ditch and clarifier and is in compliance with the terms and conditions of its governing NPDES permit.

In 2010, the Ohio River Sanitation Commission (ORSANCO) compiled a *Biennial Assessment of Ohio River Water Quality Conditions for 2005-2009*. The Nine Mile FPA is included in the pool located between the Markland and Mehl Dahl Dams. No consensus agreement between the states was reached on the interpretation of the data sets presented, so the aquatic life use was not assessed in the referenced report.

Monthly operating data from the five year period (2004-9) for the Nine Mile WWTP are summarized in Exhibit 5.14.

EXHIBIT 5.14
Nine Mile WWTP
Effluent Quality 2004-9

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	1.28	2.53	0.75 - 5.2
cBOD5	mg/L	19	30	3.3	6.2	0 - 15.4
TSS	mg/L	22.8	34.2	5.0	13.8	0 - 304
NH4-N (S)	mg/L	9.4	14.1	0.1	0.6	0 - 15.4
NH4-N (W)	mg/L	10.2	15.3	0.2	1.0	0 - 11.4
TP	mg/L	---	---	---	---	---

5.2.5.1 Nine Mile Treatment Needs Assessment

The current average wastewater flow is approximately 50 percent of the design average flow, thus plant expansion is not warranted for the foreseeable future. Containment and treatment of excess wet weather flows should be a priority at the WWTP since the flow produced by the 5-year, 6 hour design storm over a 24-hour period exceeds the peak sustainable plant flow by 0.3 million gallons currently. In addition, completion of the proposed 2020 collection system improvements will increase the peak hourly flow by 66 percent to 11.22 mgd which will continue to challenge the plant's ability to manage peak flows. A 750,000 gallon flow equalization basin is proposed at the WWTP for the intermediate term to retain excess wet weather flows. For the near term, excess flows can be equalized using the standby oxidation ditch.

5.2.6 Felicity

The Village of Felicity WWTP is owned and operated by the CCWRD and serves approximately 370 homes in the Village of Felicity. The only other wastewater treatment facility in this FPA is located in the Village of Moscow and is owned and operated by the Village.

The Felicity WWTP has a permitted flow of 0.25 mgd and discharges to an unnamed tributary of Bear Creek which discharges to the Ohio River. Wet stream processes include the following:

- coarse screening
- activated sludge
- final clarification
- chlorine disinfection



Aerial Photo of Felicity WWTP

The plant is in compliance with the terms and conditions of its governing NPDES permit.

In 2010, the Ohio River Sanitation Commission (ORSANCO) compiled a *Biennial Assessment of Ohio River Water Quality Conditions for 2005-2009*. The Felicity FPA is included in the pool located between the Greenup and Mehdahl Dams. No consensus agreement between the ORSANCO states was reached on the interpretation of the data sets presented, so the aquatic life use was not assessed in this report.

Monthly operating data from the period (2007-10) for the Village of Felicity WWTP are summarized in Exhibit 5.15.

EXHIBIT 5.15
Felicity WWTP
Effluent Quality 2007-10 (through October)

Parameter	Units	NPDES Limits		50 th Pct	95 th Pct	Range
		30-day	7-day			
Flow	MGD	---	---	0.18	0.53	0.10-1.01
cBOD5 (S)	mg/L	10	15	4.0	9.6	2.0-10.4
cBOD5 (W)	mg/L	15	23			
TSS (S)	mg/L	15	23	3.0	7.8	1.0-8.8
TSS (W)	mg/L	20	30			
NH4-N (S)	mg/L	1.5	2.3	0.15	5.2	0.1-7.83
NH4-N (W)	mg/L	2.3	3.5			

5.2.6.1 Felicity Treatment Needs Assessment

The current average wastewater flow is approximately 70 percent of the design average flow, thus plant expansion is not warranted for the foreseeable future as growth in this facility planning area is slow. The peak daily to average daily flow registered at the WWTP is consistently in the range of 5:1. Adequate flow equalization volume has been provided at the WWTP to contain a peak flow up to 3 times design average flow.

Alternatives for the development of an expanded collection and treatment system cannot easily be supported by the slow growth anticipated for the area at the present time, yet a regional solution to wastewater management in the southwestern reach of the County should be contemplated. One such scenario would consist of planning for a regional treatment facility between Moscow and Point Pleasant that would serve Felicity, the sewered Village of Moscow, and unsewered areas of Franklin and Washington Townships, particularly the Ohio River towns of Chilo and Neville. A detailed study of a proposed Southern Regional Treatment Facility is recommended.

5.2.7 Stonelick Creek

Centralized wastewater collection and treatment facilities do not presently exist within the Stonelick planning area; however, CCWRD is planning for an initial stage of proposed improvements to address existing home sewage treatment system problems in and around the Village of Newtonsville. Location of a proposed treatment facility in the Village of Newtonsville that will initially serve local residents and, in the future, potentially serve the Village of Edenton via pump station, may result in stringent requirements, including phosphorus limitations, if discharge to Stonelick Creek is planned. Stonelick Creek is seasonally dry and obtaining an NPDES permit for this new discharge may be a challenge unless flow is directed to the Middle East Fork Basin by way of the Owensville interceptor.

It is recommended that these improvements move forward immediately to address existing on-site problems and meet local community support of centralized sanitary service.

5.2.8 New Richmond

Centralized wastewater treatment facilities in the New Richmond planning area consist of the New Richmond WWTP which began service in 1996 and three other small privately owned and operated “package” treatment systems serving mobile home parks.

Approximately one-half of the planning area’s unsewered land is unsuitable for on-site systems, yet there are an estimated 2,560 units which are scattered throughout the eastern and central portions of the planning area.

The projected land use for the planning area does not suggest dense areas of development will occur. This, in turn, does not make a strong case for the planning and development of a centralized wastewater collection and treatment system for this area beyond that which presently exists in New Richmond.

5.2.9 Upper East Fork

There are no wastewater treatment facilities that are governed by NPDES permits in the Upper East Fork planning area. An existing onsite system concentration is located in the unincorporated community of Marathon. The Upper East Fork planning area's need for a centralized, publically-owned and operated collection and treatment system is diminished by a small population, sparse development and proximity to an existing centralized system. The Village of Williamsburg located in the newly created Williamsburg FPA owns and operates the nearest collection system.

For these reasons, it is recommended that limited action be taken in planning for centralized treatment facilities in the Upper East Fork area.

Insert Maps:

5.2

5.3

5.4A&B

5.5A&B

5.6

6.0 ALTERNATIVES EVALUATION FOR CAPACITY NEEDS

6.1 Evaluation of Alternatives

The approach to alternatives development is based on the growth and flow projections presented in previous sections. Alternatives were developed and evaluated to meet the collection system needs of Clermont County through consideration of future growth, I/I conditions, capacity enhancement, and storage within the collection and treatment systems. The approach included the following steps:

- Assessment of the 2010, 2020 and 2030 modeled pipes to determine where the peak flow exceeded the capacity of the sewer;
- I/I reduction analysis to determine if this alternative alone would resolve capacity issues;
- Upsizing the pipes to carry the peak flow rate for the year 2030 condition without surcharging;
- Development of conveyance alternatives sized to the 2030 condition without excessive surcharge;
- Select storage sites where flow containment could eliminate upsizing of long stretches of sewer.
- Assessment of treatment needs based on the projected flows and anticipated regulatory initiatives

6.1.1 Collection and Conveyance

6.1.1.1 Unsewered Areas

Alternatives for providing wastewater collection and conveyance infrastructure to unsewered areas within the County were explored and are summarized below. For purposes of this study, it is assumed that the City of Milford, located in the Milford FPA, the Village of Williamsburg, located in the Williamsburg FPA, the Village of

Batavia located in the Middle East Fork FPA and the Village of New Richmond located in the New Richmond FPA will continue to manage and operate their respective wastewater collection, conveyance and treatment facilities. However, for existing on-site problem areas and extension of sewer service to unsewered areas susceptible to potential future on-site problems, it is recommended that these matters be resolved, provided that County objectives for growth and economic development are met.

Loveland/Horner's Run/Branch Hill - Given the continued suburban density development that is characteristic of the area, alternatives to address the number of on-site systems in existing unsewered areas should focus on areas that have on-site problems adjacent to existing sewer areas and pocket areas where capital investment can be prioritized to align with development. The recent regionalization of wastewater collection, conveyance and treatment facilities to serve this planning area provides a wastewater management system that serves current developments in the area and future suburban growth. Accordingly, this regionalized service is judged to be the most cost effective means of addressing the area's on-site systems in existing unsewered areas.

The initial stage of this regionalization is in-place with construction of the Wards Corner Regional WWTP with consolidation of other wastewater infrastructure in progress or in planning. This wastewater management system will also address on-site system concerns within the Miami-Goshen-Stonelick well field adjacent to the Village of Miamiville.

Pocket areas where sanitary service should be considered include the land adjacent to and south of the Belle Meade subdivision (east of I 275), the Todd farm property west of I 275 along Ward's Corner Road, the Huber property along Loveland-Miami Road and areas bounded by the Little Miami River and



Loveland-Miamiville Road just west of Miamiville. This approach to unsewered areas would focus capital investment and sustain economic vitality consistent with County-wide wastewater management objectives in the planning area.

O'Bannon Creek – Alternatives that range from limited to extensive expansion of the sanitary service to address on-site systems in existing unsewered areas were examined in the O'Bannon Creek planning area. The recommended approach is to expand sanitary service to: 1) areas experiencing on-site problems or areas that pose a public nuisance through sewer extension, notably areas that are adjacent to an existing sewer and 2) targeted areas through integrated consideration of land use, development and on-site problem issues where capital investment is prioritized to align with development patterns and projected areas of wastewater infrastructure need. The latter would include the opportunity for extending the existing service area into neighboring jurisdictions, where desirable, to sustain area growth and economic vitality consistent with County-wide objectives. The planned SR 132 sewer extension north of Shiloh Road in Goshen Township will serve the Hartz Mountain pet products manufacturing facility in Warren County and limited adjacent residences. While this approach to unsewered areas would limit capital investment compared to other alternatives, such as extensive expansion of sanitary service, it is more in-line with prevailing economic conditions and would achieve wastewater management objectives in the planning area.

Stonelick Creek – Alternatives framed around moderate to extensive expansion of sanitary service are not practical for the Stonelick Creek planning area due to the predominance of sparsely populated areas and generally steep topography. For this reason, basin-wide wastewater management alternatives were not evaluated. The recommended approach for this planning area is to focus on and invest in target



areas that meet critical needs within the planning area, notably the Newtonsville-Owensville-Belfast-Edenton quadrangle where on-site problems exist and community support has been expressed for centralized sanitary service.

A proposed treatment facility located in Newtonsville would align with community support for centralized service in this area and could potentially serve the Village of Edenton. Areas in and around Owensville, notably east on SR 50 and north along SR 132 would be served by local sewers with conveyance to the Middle East Fork Basin via the Owensville pump station. Wastewater management in non-critical unsewered areas is recommended to consist of on-site systems using best practices for design, construction and operation.

Lower East Fork – The Lower East Fork planning area is a densely developed area, the vast majority of which is served by the County’s sanitary system. With this level of service in-place, continued extension of the collection system is the preferred means by which effective and reliable wastewater management can be provided to unsewered areas. As a result, alternatives for the entire basin should be limited to specific improvement projects in known development areas where on-site problems exist, such as Klondyke Road and Wolfpen-Pleasant Hill Road areas that are located adjacent to existing sewer areas and undeveloped areas that are likely to experience development in the foreseeable future, such as planned commercial development in the southern portion of the planning area along Aicholtz Road in Union Township.

Middle East Fork – The recommended approach in the Middle East Fork planning area is to address critical on-site problems areas and provide effective wastewater management in the unsewered areas through logical expansion of sanitary service. With the extension of sanitary service to the Owensville area, resolution of existing unsewered areas in the southern portion of Stonelick Creek FPA is being addressed by the County. This service affords the elimination of significant concentrations of



on-site systems and provides the basic infrastructure necessary to support moderate growth along the SR 50 and SR 132 corridors. Continuance of this approach of gradual sewer extension is recommended to serve unsewered areas in this location in combination with proposed modifications to the Owensville pump station and conveyance capacity improvements downstream of the pump station.

In the southern portion of the planning area, unsewered areas generally bounded by SR 132, SR 125 and Lindale-Mt. Holly Road located in Pierce and Monroe Townships should be addressed via sewer extension to eliminate existing on-site problems.

Nine Mile/Ten Mile – The recommended wastewater management approach in the Nine Mile planning area should focus on areas that have on-site problems adjacent to existing sewer areas and pocket areas where capital investment can be prioritized to align with development. Expansion of sanitary service especially to areas located in the eastern rim of the FPA is not practical and was not considered.

Proposed improvements include construction of a local sewer to serve on-site problem areas located on Fulton Grove Road (southern Union Township). As development moves eastward, on-site problem areas on East and West Concord Road in Pierce Township should be addressed along with the elimination of the package treatment system that serves the mobile home park located between Lindale and Amelia along SR 132, however this is not a proposed project at this time.

New Richmond – The development and projected land use patterns for the New Richmond planning area east of the Village of New Richmond do not support significant expansion of sanitary service. Accordingly, the practical alternative to effective wastewater management in unsewered areas consists of limited sewer extensions that serve on-site problem areas that are adjacent to the New Richmond service area, including areas along Bethel-New Richmond Road.

Problem areas immediately adjacent to the service area boundary of New Richmond are recommended to be resolved provided that County objectives for growth and economic development are met.

Felicity - The Felicity planning area has a strong rural character with scattered and sparsely populated development, primarily along or near the Ohio River. As such, practical alternatives for providing effective and reliable wastewater management plans are limited as in other regions of the County.

Alternatives for the development of an expanded collection and treatment system cannot easily be supported by the slow growth anticipated for the area at the present time, yet a regional solution to wastewater management in the southwestern reach of the County should be contemplated. One such scenario would consist of planning for a regional treatment facility between Moscow and Point Pleasant that would serve Felicity, Moscow, unsewered areas in northern Washington Township (i.e. up to Point Isabel), unsewered areas of southern Monroe Township (i.e. up to Laurel), the Ohio River towns of Chilo and Neville. A feasibility study of a proposed Clermont County Southwest Regional Treatment Facility is recommended for this far-reaching plan.

In the near term, community treatment centers are recommended in areas that have concentrations of on-site systems. These include the Ohio River towns of Point Pleasant, Chilo and Neville and to a lesser extent, the Villages of Laurel and Point Isabel. Community treatment centers are environmentally sound, financially responsible solutions for small community wastewater problems where conventional, centralized systems are not practical or affordable and where individual on-site systems are inappropriate because of unacceptable soil conditions.

Each community treatment system would collect wastewater from each home via small diameter gravity sewer. These sewers would use septic tanks to remove most of the wastewater solids and convey the effluent from the tanks to a central location

for treatment and disinfection. Treatment is proposed to consist of re-circulating media filtration to aerate and treat the incoming wastewater and enhance nitrogen removal. Prior to adopting this approach, it is advisable to proceed in step-wise fashion in accordance with the following plan:

- Hold public meeting;
- Discuss the possibility of the project with local organizations and residents;
- Assess history of local problems and level of resident interest
- Identify funding sources for project;
- Perform an income survey to determine grant assistance qualification;
- Apply for grant or other assistance;
- Perform study to determine the most practical means of conveyance and treatment and evaluate site options for the community.

As the need for a centralized southern regional treatment facility becomes more of a practical solution to effective and reliable wastewater treatment for unsewered areas in this planning area, these community treatment systems would be converted to pumping stations or desirably be replaced by gravity sewers.

6.1.1.2 Capacity Constraints

The problems identified in the sewerred (modeled) areas were evaluated using the *Infoworks* model and alternatives were selected that balanced the storage in the collection system versus storage or upgrades that would be necessary at the wastewater treatment plants. If existing storage is available, such as with the equalization basins in the Lower East Fork basin, then preference was given to additional storage. Storage was also recommended when a storage tank could eliminate the need to upsize a long reach of pipe.

6.1.2 Wastewater Treatment

Clermont County is faced with near, intermediate and long-term wastewater treatment challenges. In the near-term, the County must implement measures to increase the treatment of peak flow rates induced by wet weather events either through expanded peak flow treatment facilities, on-site storage or a combination of both. In the mid-term, the County must focus on nutrient control initiatives, particularly phosphorus reduction in treated plant effluent, to comply with water quality and use attainability requirements for the Little Miami River Basin. For the two plants located on the East Fork of the Little Miami River, the nutrient limitations will be derived from a total maximum daily load (TMDL) study scheduled for 2015. Longer term, the County must plan for plant expansion, guided by growth and development in the planning areas which will result in continually increasing volumes of wastewater being generated, both as a result of growth and the gradual but progressive elimination of unsewered areas. The balance of this chapter summarizes the short, mid and long term improvements recommended to address these challenges.

6.1.2.1 Near-Term Improvements

In the near-term, the County must address peak wet weather flow treatment issues at the O'Bannon Creek Regional, Middle East Fork Regional and Nine Mile Creek WWTPs. Based on the performance of the majority of these plants over a five year period and the alternatives considered, the near-term improvements are recommended as follows:

O'Bannon Creek Regional WWTP - The peak sustainable flow (i.e. the flow rate that can be sustained for at least 24 hours, while producing an effluent that complies with NPDES requirements) at the O'Bannon Creek Regional WWTP is 5.0 mgd. The County should implement the following strategy to increase the treatment of peak wet weather flows at the O'Bannon Creek Regional WWTP:

- Perform a plant-wide hydraulic evaluation to identify bottlenecking in pipes, structures and unit operations that limit hydraulic throughput;
- Complete plant modifications to augment peak flow treatment to a minimum rate equal to 2.5 times the design average flow of 4.4 mgd, or 11 mgd – this improvement in combination with the existing 2.5 million gallons of equalization volume will enable the WWTP to contain and treat flows associated with the design storm under existing conditions (Note: the peaking factor of 2.5 is conservative in relation to the design storm modeling outcome in the O’Bannon Creek sewershed where the peak hour to average day ratio varies from 1.8 to 2.1; generally accepted engineering practices typically utilize peaking factors in the range of 2.0-3.0 unless site conditions indicate otherwise);

Middle East Fork Regional WWTP – The peak sustainable flow (i.e. the flow rate that can be sustained for at least 24 hours, while producing an effluent that complies with NPDES requirements) at the Middle East Fork Regional WWTP is 8.5 mgd. The County should implement the following strategy to increase the treatment of peak wet weather flows at the Middle East Fork Regional WWTP:

- Perform a plant-wide hydraulic evaluation to identify bottlenecking and structures and unit operations that limit hydraulic throughput;

Complete plant modifications to augment peak flow treatment to a minimum rate equal to 2.5 times the design average flow of 7.2 mgd, or 18 mgd – this improvement in combination with the existing 3.0 million gallons of equalization volume will enable the WWTP to contain and treat the flows associated with the design storm under existing conditions (Note: the peaking factor of 2.5 is conservative in relation to the design storm modeling outcome in the Middle East Fork sewershed where the

peak hour to average day ratio varies from 1.5 to 2.7; generally accepted engineering practices typically utilize peaking factors in the range of 2.0-3.0 unless site conditions indicate otherwise);

6.1.2.2 Mid-Term Improvements

Facilities Discharging to the Little Miami River Basin - In the mid-term, the County must plan to address treatment plant expansion and nutrient control initiatives that will likely be developed to control the discharge of total phosphorus and perhaps total nitrogen in the Little Miami Basin. The *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries* study, which excluded the East Fork of the Little Miami River, has been completed and published by Ohio EPA in October 2009. The study, which included field work completed in 2007, noted that the overall higher quality discharge from the wastewater treatment facilities is responsible for significant restoration of the biological integrity of the Little Miami River.

However, the report maintains that the Little Miami River is over-enriched, especially in the lower segment of the river where populations are highest and most of the larger wastewater treatment facilities exist, suggesting that in-stream phosphorus targets are not being met in the Little Miami River. As a result of their findings, Ohio EPA recommends that the highest standard of wastewater treatment, including total phosphorus removal, be employed by all NPDES facilities discharging into the Little Miami River watershed. This study formed the basis for the TMDL Report which was finalized and approved in March 2011.

Monitoring of the East Fork of the Little Miami River, which drains a large portion of Clermont County, is scheduled to begin in 2012 with the TMDL Report scheduled for completed in 2015.

Based on the regulatory initiatives and findings of recent water quality and biological assessments on the Little Miami River, the County should plan to control the discharge of total phosphorus at the O'Bannon Creek Regional, Lower East Fork Regional, Middle East Fork Regional and Miami Trails WWTPs at the mid-term level. Options to consider include chemical precipitation, biological phosphorus removal or a combination of both.

The Lower East Fork Regional plant has an oxidation ditch system that can and should be modified to remove phosphorus biologically through construction of staged anaerobic and anoxic zones preceding the existing aerated basins.

The O'Bannon Creek facility has split-flow treatment that utilizes an oxidation ditch and a two-stage activated sludge system followed by tertiary filtration. Both of these treatment trains are recommended to be modified to remove phosphorus biologically.

It is recommended that the Middle East Fork Regional WWTP utilize and convert existing tankage to provide anaerobic zones and perform modifications to the aeration tanks, including internal sludge recycling to accomplish biological phosphorus removal.

Phosphorus limits imposed on the Miami Trails WWTP should be met with low-cost chemical precipitation, as this plant is planned for elimination with flow conveyance to the Wards Corner Regional WWTP via new interceptor sewer along Branch Hill-Miamiville Road, pump station and force main.

Treatment plant expansion of 14 mgd is recommended at the Lower East Fork Regional WWTP as discussed previously in Section 5.2.3.

Nine Mile WWTP – The peak sustainable flow (i.e. the flow rate that can be sustained for at least 24 hours, while producing an effluent that complies with NPDES requirements) at the Nine Mile WWTP is 5.5 mgd. The County should implement the following strategy to address the treatment of peak wet weather flows at the Nine Mile WWTP:

- Construct 0.75 million gallons of off-line equalization storage capacity at the WWTP to contain and treat the flows associated with the design storm under existing conditions.

6.1.2.3 Long-Term Improvements

Beyond 2020, the long term management of excess flows derived from peak wet weather events will be necessary at the O’Bannon Creek Regional, Middle East Fork Regional and Nine Mile Creek WWTPs after the impact of proposed project completion both at the plant and collection system is assessed.

6.2 Project Prioritization

6.2.1 Collection, Conveyance and Treatment

Project prioritization is based upon scoring criteria developed by CCWRD. These criteria are listed in Exhibit 6.1.

EXHIBIT 6.1
CCWRD SCORING CRITERIA

CCWRD Criteria	Description	Weight
Regulatory Requirement	Project is required by mandate or order to achieve or maintain regulatory compliance or reduce risk of non-compliance.	21%
Capacity Need	Project is necessary to address near future (<5 years) or far future (>5 years) capacity restrictions.	12%
Operational Improvement (Maintenance/Sustainability)	Project will decrease required maintenance costs/effort or improve ability to operate/maintain infrastructure while prolonging or renewing the useful life of the asset.	16%
Safety, Public Health and Customer Service	Project will improve safety, health and general welfare of the public and may also contribute to maintaining or reducing service rates.	12%

EXHIBIT 6.1
CCWRD SCORING CRITERIA

CCWRD Criteria	Description	Weight
System Reliability/Risk Reduction	Project enhances the reliability of service and reduces risk (i.e. loss of service, reduced service, overflows and backups).	12%
Economic Development	Project supports/maintains existing economic development, supports development initiatives or encourages new development.	9%
Conform with Master Plan	Project is identified in or in conformance with Water or Wastewater Master Plan.	OMITTED
Stakeholder Confidence	Project enhances the confidence of ratepayers, regulators, elected officials and/or the general public by demonstrating that a quality product is being delivered, quality of life is being improved and/or environmental impacts are being reduced.	9%
Cost Containment/Revenue Enhancement	Project will result in increased revenues or reduced operational and maintenance costs or reduced future capital expenditures.	9%
		100.0%

Each project (i.e. collection, conveyance and treatment) was scored individually based upon the criteria contained in Exhibit 6.1 and prioritized for each time horizon: 2010, 2020 and 2030.

6.2.1.1 Near-Term (Priority 1)

Excessive surcharging (defined as > 3 feet above pipe crown) or presence of known water-in-basement (WIB), sanitary sewer overflow (SSO), or manhole (MH) overflows resulting from existing (2010) modeled areas.

6.2.1.2 Intermediate Term (Priority 2)

Excessive surcharging (defined as > 3 feet above pipe crown) or presence of known water-in-basement (WIB), sanitary sewer overflow (SSO) or manhole (MH) overflows resulting from future (2020) modeled areas.

6.2.1.3 Longer Term (Priority 3)

Excessive surcharging (defined as > 3 feet above pipe crown) or presence of known water-in-basement (WIB), sanitary sewer overflow (SSO) or manhole (MH) overflows resulting from future (2030) modeled areas.

The recommended alternatives for the modeled FPAs are shown in Exhibits 6.2 through 6.8.

6.2.2 Wastewater Treatment

Segregation of the thirteen proposed treatment projects into near term (Priority 1), intermediate term (Priority 2) and longer term (Priority 3) has been based on engineering judgment guided by current treatment plant capacity, proposed collection and conveyance projects presented previously and impending regulatory requirements.

6.2.2.1 Peak Wet Weather Flow Considerations

The prioritization of proposed wastewater treatment projects is based upon scoring criteria developed by CCWRD (listed previously in Exhibit 6.1) and peak wastewater flows associated with the design storm (Refer to Exhibit 6.9). The most critical near-term areas of need include the following:

- Hydraulic limitations that impact the effective treatment capacity of peak wet weather flows at the O'Bannon Creek Regional and Middle East Fork Regional WWTPs;
- Insufficient excess flow equalization capacity at the O'Bannon Creek WWTP.

EXHIBIT 6.9
Peak Wet Weather Flows to WWTPs

Modeled Area	Wastewater Treatment Facility	Existing Peak WWTP Treatment Capacity(mgd) ¹	2010 Peak Daily Flow (with collection system projects completion - mgd)	2020 Peak Daily Flow (with collection system projects completion - mgd)	2030 Peak Daily Flow (with collection system projects completion - mgd)
Lower East Fork	LEF Regional WWTP	21.0 ²	20.2	22.0	25.0
Middle East Fork	MEF Regional WWTP	8.5	9.5	21.1	22.0
O'Bannon Creek	O'Bannon Creek Regional WWTP	5.0	13.4	23.1	23.8
Nine Mile	Nine Mile WWTP	5.5	3.8	5.5	5.6
Felicity	Felicity WWTP	0.6	---	---	---
Loveland/Horner's Run/Branch Hill	Miami Trails WWTP	0.7	1.4	1.9	1.9
	Arrowhead Park WWTP	0.2	.06	0.1	0.1
	Wards Corner Regional WWTP	6.0	0.7	3.7	3.7

¹ Bramblewood and Indian Lookout WWTPs have not been included due to recent or planned elimination
² Based on completion of LEF WWTP Improvement Project No. 6402-60044, currently under construction.

6.2.2.2 Regulatory Initiative Impacts

In-stream total phosphorus concentrations have been a significant concern in the Little Miami River watershed, particularly along the main stem of the Little Miami River. Several waste water treatment facilities have expanded treatment capacity and improved effluent quality which has likely contributed to healthier aquatic life communities that are now being observed (Refer to *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries*, 2009). This study formed the basis for the TMDL Report for the Lower Little Miami River which was finalized and approved in March 2011.

Despite the improved biological performance, statistical analysis has shown that the total phosphorus concentrations in the main stem of the river have not changed significantly based on the last three Ohio EPA surveys on this part of the river which occurred in 1993, 1998, and 2007. However, stream flow conditions were considerably different between these surveys and perhaps with higher stream flow in 2007 the nutrient concentrations would have been lower. The confounding factor in determining if in-stream improvements in total phosphorus concentrations have in fact occurred is that there are two major differences between 1993 and 1998 surveys and the 2007 survey. Specifically, waste water treatment improved, but also the stream flows were low for 2007. Additional surveys are needed, when in-stream flows are comparable, to derive meaningful conclusions on the improvement of in-stream phosphorus levels. Ohio EPA continues to recommend that the highest standard of wastewater treatment, including total phosphorus removal, be employed by all NPDES facilities discharging into the Little Miami River watershed.

Biological and water quality monitoring of the East Fork of the Little Miami River is scheduled to begin in 2012 with the TMDL Report targeted for completion in 2015. The findings of this future study and TMDL Report will have a greater impact on the County than the Lower Little Miami River TMDL since its larger wastewater treatment facilities discharge to the East Fork Little Miami River. Based on the findings of recent water quality and biological assessments on the Little Miami River and the Lower Little Miami River TMDL, the most critical areas of need related to regulatory initiatives for treatment include the following:

- Nutrient (i.e. total phosphorus) control measures at the O'Bannon Creek Regional, Lower East Fork Regional and Middle East Fork Regional WWTPs.

6.2.2.3 Consolidation and Regionalization Measures

With the completion of the Wards Corner Regional WWTP in 2009, the foundation is in-place for effective consolidation and regionalization of wastewater collection, conveyance and treatment in the northwest sector of the County. The Wards Corner Regional facility has a design flow of 2 mgd but currently treats less than 0.1 mgd. Continuation of this process of consolidation and regionalization is recommended to consist of the following:

- Elimination of the Arrowhead Park WWTP with flow directed to the Wards Corner Regional WWTP via pump station, force main and interceptor sewer (Refer to Exhibit 6.2);
- Elimination of the Miami Trails WWTPs with flow directed to the Wards Corner Regional WWTP via pump station, force main and interceptor sewer (Refer to Exhibit 6.2).

Elimination of these plants will immediately contribute 0.4 mgd of additional flow to the Wards Corner Regional WWTP.

6.2.2.4 Expansion of Existing Treatment Facilities

The planned expansion of the Lower East Fork Regional Plant to 14 mgd will facilitate future growth and development in this planning area.

Insert Maps:

6.2

6.3

6.4

6.5

6.6

6.7

6.8

7.0 SUMMARY OF RECOMMENDED PLAN

7.1 Near-Term Capital Improvements

The data collected to prioritize the candidate projects and to score individual projects are summarized in Appendices A and B respectively. A multi-attribute utility prioritization analysis of the proposed projects was performed and the projects were ranked based on their total benefit scores. The cost estimates prepared for this document are indexed to May 2010. A parametric costing tool developed for estimating project construction and capital costs for various facilities was utilized to prepare the estimates.

Resources used in development of the costing tool include:

- R.S. Means
- Richardson Process Plant Estimating Standards
- Mechanical Contractors Association - Labor Manual
- National Electrical Contractors Association - Labor Unit Manual (NECA)
- United States Environmental Protection Agency References and Standards
- Various Municipalities Facility Construction Data
- CH2M HILL Historical Data
- Vendor Quotes on Equipment and Materials where appropriate.

The estimates are based on the assumption the work will be done on a competitively bid basis and the contractors will have a reasonable amount of time to complete the work.

These cost estimates are considered a Class 4 - Planning Level estimate as defined by the American Association of Cost Engineering (AACE) and as designated in ASTM E 2516-06. It is considered accurate to +50% to -30% based up to a 15% complete project definition.

The agreed-to assumptions for cost estimate derivation for sewer construction are as follows:

- Average depth of pipe (12 feet)
- Street width impact (10 feet)
- Service lateral connections determined by property count
- Water services replaced (1 per 2,000 feet)
- Manhole impact (1 per 300 feet)
- Dewatering included if construction is in or along waterway
- Traffic maintenance required if on-road
- Clearing and grubbing required if off-road
- Sewage flow maintained
- No rock excavation

The costs listed are project capital costs that include construction, administration, engineering, contingencies, and other “soft” costs based on the following assumptions:

- Construction contingencies:
 - 30% for construction costs (CC) < \$350K
 - 25% for \$350K < CC < \$1,100K
 - 20% for CC > \$1,100K
- Engineering and Construction Administration (9% CC)
- Land Acquisition and Rights of Way (6% CC)
- Planning and Preliminary Design (5% CC) - includes flow monitoring for model calibration by CCWRD

- Miscellaneous (2% CC) – includes permits, inspections and geotechnical

The total CC multiplier is in the range of 1.42 to 1.52.

A list of the proposed projects prioritized by their total benefit score for short term capital improvements is shown in Exhibit 7.1.

EXHIBIT 7.1

Summary of Proposed Projects for Near Term Capital Improvements

Note: Some of the identified projects may not require implementation as a result of CCWRD's efforts to reduce infiltration and inflow.

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P1-06	Obannon Creek Sewer Upgrade (MH 5351 - OBNWW)	4,800 LF			Involves laying 4,837' of open cut sewers ranging from 27"-54".	63.7	\$2,501,000
MEF-P1-01	Bethel Collection Improvements I (MH 100493 - MH 2552)	4,900 LF			Involves laying 4,931' of open cut sewers ranging from 10"-15".	60.1	\$2,440,000
MEF-P1-02	Bethel Collection Improvements II (MH 2689 - MH BETHELPS)	11,000 LF			Involves laying 10,997' of open cut sewers ranging from 21"-30".	60.1	\$5,211,000
OBN-P1-02	Creek Sewer Upgrade (MH 5935 - MH 5783)	15,600 LF			Involves laying 15,997' of open cut sewers ranging from 12"-21".	60.1	\$6,181,000
OBN-P1-04	Paxtonwoods Sewer Upgrade (MH 5133 - MH 5208)	3,000 LF			Involves laying 555' of 10" open cut sewers and 2,421' of 12" open cut sewers.	60.1	\$1,155,000
OBN-P1-05	Redbird Road Sewer Upgrade I (MH 5350 - MH 5351)	1,800 LF			Involves laying 1,760' of 27" open cut sewers.	60.1	\$888,000
LEF-P1-01	Shayler Run Upstream Sewer Upgrade (MH 9840 - MH 9159_branches to MH 777/MH 419)	4,900 LF	3 MG		Involves laying 4,826' of open cut sewers ranging from 10"-24" and providing 3 MG of storage.	55.3	\$10,295,000
LEF-P1-03	Hall Run Sewer Replacment and EQ Expansion	14,500 LF	2 MG		Involves laying 14,460' of open cut sewers ranging from 8"-21" and providing 2 MG of storage.	55.3	\$15,672,000
LEF-P1-04	Wolf Pen-Pleasant Hill Road Sewer Upgrades (MH 8235-MH8144)	4,500 LF	3.6 MG	7 MGD	Involves laying 4,402' of open cut sewers ranging from 10"-30", providing 3.6 MG of storage and upgrading list staion to 7 MGD.	55.3	\$13,724,000
LEF-P1-05	Cook Road Sewer Upgrade (MH 5033 - MH 10050)	3,500 LF		6.5 MGD	Involves laying 3,159' of 12" open cut sewers and 266' of 18" open cut sewers and upgrading lift stations to 6.5 MGD.	55.3	\$3,416,000
LEF-P1-07	Mt. Caramel-Tobasco Sewer Upgrade (MH 8491-MH 9659)	3,200 LF			Involves laying 3,184' of open cut sewers ranging from 10"-18".	55.3	\$1,803,000
LEF-P1-08	Clough Pike Sewer Upgrade (MH 226- MH 9646)	2,800 LF			Involves laying 453' of 10" open cut sewers and 2,297' of 12" open cut sewers.	55.3	\$1,051,000
OBN-P1-T1	OBN Regional WWTP Modifications Phase 1 (augment wet weather flow treatment capacity to 11 mgd)				OBN Regional WWTP Modifications Phase 1 (augment wet weather flow treat	53.8	\$8,340,000
MEF-P1-T1	MEF Regional WWTP Modifications Phase 1 (augment wet weather flow treatment capacity to 18 mgd)				MEF Regional WWTP Modifications Phase 1 (augment wet weather flow treat	53.8	\$4,183,000
LEF-P1-06	Elick Lane Sewer Upgrade (MH1843-MH 2002)	1,300 LF			Involves laying 1,244' of 10" open cut sewers.	50.5	\$584,000
SLC-P1-T1	Village of Newtonsville WWTP (will address to address existing on-site issues)				Village of Newtonsville WWTP (will address to address existing on-site issues)	44.7	\$2,800,000
NML-P1-T1	NML WWTP Modifications Phase 1 (provide 0.75MG EQ capacity)				NML WWTP Modifications Phase 1 (provide 0.75MG EQ capacity)	42.6	\$8,423,000
LEF-P1-09	Arcadia Lane Sewer Upgrade (MH 1546-1653)	700 LF			Involves laying 640' of 10" open cut sewers.	41.4	\$281,000
NML-P1-01	Nine Mile-Tabasco Road Sewer Upgrade I (MH 6544 - WWTP)	6,000 LF			Involves laying 5,650' of 24" open cut sewers and 299' of 21" open cut sewers.	38.5	\$2,734,000
LEF-P1-15	Orchard Lift Station Upgrade			2.2 MGD	Involves upgrading lift station to 2.2 MGD.	38.5	\$1,282,000
LEF-P1-16	Shepherd Lift Station Upgrade			2.5 MGD	Involves upgrading lift station to 2.5 MGD.	38.5	\$1,305,000
MEF-P1-03	Locust Lake LS/FM Upgrade	2,600 LF (F.M.)		1 MGD	Involves laying 2,628' of 8" force main and upgrading lift station to 1 MGD.	35.8	\$2,189,000
OBN-P1-03	O'Bannon Trunk Sewer Improvements (MH 5787 - MH 5439)	15,000 LF			Involves laying 14,994' of open cut sewers ranging from 12"-54".	28.2	\$9,667,000
LEF-P1-10	SR 28 Sewer Upgrade (MH 8139- MH 4207)	3,300 LF			Involves laying 3,291' of 15" open cut sewers.	27.3	\$1,917,000

EXHIBIT 7.1

Summary of Proposed Projects for Near Term Capital Improvements (continued)

Note: Some of the identified projects may not require implementation as a result of CCWRD's efforts to reduce infiltration and inflow.

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
LHR-P1-01	Miami Trails Sewer Upgrade (MH 7503 - Miami Trails WWTP)	4,500 LF			Involves laying 4,485' of open cut sewers ranging from 10"-15".	24.7	\$2,925,000
NML-P1-02	Nine Mile-Tabasco Road Sewer Upgrade II (MH 6625-6615)	1,800 LF			Involves laying 1,161' of 21" open cut sewers and 610' of 24" open cut sewers.	24.6	\$1,051,000
LEF-P1-11	SR 131 Lift Station Upgrade	1,400 LF		3 MGD	Involves laying 1,381' of 15" open cut sewers and 19' of 35" open cut sewers and upgrading lift station to 3 MGD.	24.6	\$1,938,000
LEF-P1-12	Happy Hollow Lift Station Upgrade	140 LF		4 MGD	Involves laying 131' of 18" open cut sewers and upgrading lift station to 4	24.6	\$1,516,000
LEF-P1-13	Viking Village Lift Station Upgrade			1.1 MGD	Involves upgrading lift station to 1.1 MGD.	24.6	\$1,198,000
LEF-P1-14	State Route 28 Lift Station Upgrade			3 MGD	Involves upgrading lift station to 3 MGD.	24.6	\$1,347,000
MEF-P1-04	Lucy Run Sewer Upgrade (Phase I) (MH 3264 - MH 3239)	7,100 LF			Involves laying 7,146' of 42" open cut sewers.	24.6	\$4,862,000
OBN-P1-01	Deerfield Road Collection Improvements (MH 4757 - MH 5567)	8,800 LF			Involves laying 8,761' of 12" open cut sewers.	24.6	\$4,977,000
LEF-P1-02	Eastgate North Drive Sewer Upgrade (MH 7547-9968)	1,500 LF			Involves laying 397' of 12" open cut sewers and 1,102' of 15" open cut sewers.	18.3	\$631,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

7.2 Intermediate Term Capital Improvements

A list of the proposed projects prioritized by their total benefit score for intermediate term capital improvements is shown in Exhibit 7.2.

EXHIBIT 7.2

Summary of Proposed Projects for Intermediate Capital Improvements

Note: Some of the identified projects may not be required as a result of CCWRD's efforts to reduce infiltration and inflow.

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P2-08	SR 132 Sewer upgrade (MH 6097 - MH 6076)	18,700 LF			Involves laying 18,654' of open cut sewers ranging from 18"-30".	63.7	\$9,909,000
OBN-P2-09	Goshen Sewer Upgrade (MH 6227 - MH 5755)	18,100 LF			Involves laying 18,148' of open cut sewers ranging from 15"-42".	60.1	\$9,991,000
OBN-P2-12	Deerfield Road Storage		2 MG		Involves providing 2 MG of storage.	60.1	\$6,443,000
OBN-P2-13	Fay Road Sewer Upgrade (MH 5765 - MH 5787)	5,000 LF			Involves laying 4,981' of 12" open cut sewers.	60.1	\$1,857,000
OBN-P2-10	SR 48 Sewer Upgrade (MH 5410 - MH 5351)	2,000 LF			Involves laying 1,414' of 10" open cut sewers and 627' of 12" open cut sewers.	57.4	\$866,000
MEF-P2-08	Bethel Lift Station Storage		1.5 MG		Involves providing 1.5 MG of storage.	46.9	\$4,685,000
LEF-P2-T1	LEF Regional WWTP Modifications (nutrient removal facilities)				LEF Regional WWTP Modifications (nutrient removal facilities)	45.6	\$3,950,000
OBN-P2-T2	OBN Regional WWTP Modifications Phase 2 (nutrient control facilities)				OBN Regional WWTP Modifications Phase 2 (nutrient control facilities)	45.6	\$1,850,000
MEF-P2-T2	MEF Regional WWTP Modifications Phase 2 (nutrient removal facilities)				MEF Regional WWTP Modifications Phase 2 (nutrient removal facilities)	45.6	\$3,150,000
LHR-P2-T2	Miami Trails WWTP Elimination	19,000 LF, 5,000 LF (F.M)		2 MG	Miami Trails WWTP Elimination. Involves laying 19,000' of open cut sewers ranging 8"-15", 5,000' of 4" force mains and upgrading lift stations to 2 MG.	35.7	\$13,757,000
OBN-P2-T3	OBN Regional WWTP Modifications Phase 2 (augment EQ capacity)				OBN Regional WWTP Modifications Phase 2 (augment EQ capacity)	42.6	\$9,000,000
MEF-P2-13	Owensville P.S. and F.M. Upgrade (STLOUSFM - MH 3220)	6,100 LF (F.M.)		4 MGD	Involves laying 6,142' of 15" force mains and upgrading lift station to 4 MGD.	42.1	\$3,954,000
LEF-P2-21	Meadow Drive Sewer Upgrade (MH 4648- MH 10070/Longfield PS)	1,890LF		3 MGD	Involves laying 1,890' of 12" open cut sewers and upgrading lift station to 3	38.5	\$2,066,000
LHR-P2-T4	Arrowhead Park WWTP Elimination (flow to be directed to Wards Corner Regional WWTP)	2,500 LF			Arrowhead Park WWTP Elimination (flow to be directed to Wards Corner Regional WWTP). Involves new lift station and laying 5,000' of force main.	35.7	\$1,906,000
NML-P2-04	Legendary Run Sewer Upgrade (MH 9563 MH 9488)	1,500 LF			Involves laying 1,483' of 12" open cut sewers.	33.7	\$662,000
NML-P2-06	Oakland Farm Drive Sewer I (MH 9480 MH 455)	1,200 LF			Involves laying 1,116' of 10" open cut sewers.	33.7	\$442,000
NML-P2-05	Pierce Lift Station Upgrade			1.5 MGD	Involves upgrading lift station to 1.5 MGD.	33.7	\$1,225,000
MEF-P2-05	Bethel Collection Improvements III (MH 9465 - MH 9468)	1,800 LF			Involves laying 1,821' of open cut sewers ranging from 12"-15".	33.7	\$1,001,000
MEF-P2-06	Bethel Collection Improvements IV (MH 9437 - MH 2689)	6,300 LF			Involves laying 2,188' of 15" open cut sewers and 4091' of 18" open cut sewers.	33.7	\$3,025,000
MEF-P2-07	Bethel Collection Improvements V (MH 2606 - MH 2689)	1,300 LF			Involves laying 1,305' of 10" open cut sewers.	33.7	\$648,000
MEF-P2-11	Owensville Collection Improvements I (MH 3148 - MH 3119)	3,100 LF			Involves laying 1,037' of 12" open cut sewers and 2,054' of 15" open cut sewers.	33.7	\$1,694,000
MEF-P2-12	Owensville Collection Improvements II (MH 3116 - MH 3100)	300 LF			Involves laying 318' of 12" open cut sewers.	33.7	\$192,000
MEF-P2-19	Huntsman Trace Sewer Upgrade (MH 2952 - MH 3490)	8,300 LF			Involves laying 7,146' of 12" open cut sewers and 1,198' of 15" open cut sewers.	33.7	\$3,452,000
MEF-P2-20	Chapel Sewer Upgrade (MH 2895 - MH 2364)	3,500 LF			Involves laying 2,362' of 12" open cut sewers and 1,138' of 15" open cut sewers.	33.7	\$1,570,000

EXHIBIT 7.2

Summary of Proposed Projects for Intermediate Capital Improvements (continued)

Note: Some of the identified projects may not require implementation as a result of CCWRD's efforts to reduce infiltration and inflow.

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
OBN-P2-11	Redbird Road Sewer Upgrade II (MH 7756 - MH 5350)	5,000 LF			Involves laying 4,981' of 18" open cut sewers.	33.7	\$2,092,000
MEF-P2-18	Rose Lane Sewer Upgrade (MH 3016 - MH 3018)	800 LF			Involves laying 830' of 10" open cut sewers.	31	\$324,000
MEF-P2-23	Locust Lake Sewer Upgrade (MH 2869 - LOCUSTPS)	200 LF			Involves laying 171' of 12" open cut sewers.	31	\$94,000
OBN-P2-07	Twin Oak Sewer Upgrade (MH 7741 - MH 7753)	1,900 LF			Involves laying 1,919' of 10" open cut sewers.	31	\$1,004,000
MEF-P2-16	Haskell Sewer Upgrade (MH 3427 - MEFWW)	4,600 LF			Involves laying 794' of 24" open cut sewers and 3,796' of 42" open cut sewers.	30.9	\$2,834,000
NML-P2-03	Nine Mile-Tabasco Road Sewer Upgrade III (MH 6714 - MH6721)	3,700 LF			Involves laying 3,625' of 21" open cut sewers.	27.3	\$1,523,000
LEF-P2-17	Founders Boulevard Sewer Upgrade (MH 2101- MH 2130)	1,200 LF			Involves laying 1,168' of 21" open cut sewers.	27.3	\$518,000
LEF-P2-18	Old SR 74 Sewer Upgrade (MH 2214- MH 2251)	800 LF			Involves laying 742' of 12" open cut sewers.	27.3	\$401,000
LEF-P2-19	Olive Branch-Stonelick Road Sewer Upgrade (MH 9850- MH 9843)	2,500 LF			Involves laying 2,438' of 21" open cut sewers.	27.3	\$1,029,000
MEF-P2-09	Lucy Run Sewer Upgrade (Phase II) (MH 8133 - MH 3264)	8,400 LF			Involves laying 6,030' of 27" open cut sewers and 2,323' of 36" open cut	27.3	\$4,131,000
MEF-P2-10	Lucy Run Sewer Upgrade (Phase III) (MH 3239 - MEFWW)	6,000 LF			Involves laying 5,981' of 42" open cut sewers.	27.3	\$4,105,000
MEF-P2-14	Hartman Lane Sewer Upgrade (MH 9395 - MH 3427)	7,700 LF			Involves laying 7,652' of 24" open cut sewers.	27.3	\$3,360,000
MEF-P2-15	Winemiller Sewer Upgrade (MH 3317 - MH 9393)	3,900 LF			Involves laying 3,934' of 21" open cut sewers.	27.3	\$1,802,000
MEF-P2-17	SR 132 @ Elmwood Road Sewer Upgrade (MH 3214 - MH 3205)	3,600 LF			Involves laying 3,645' of 21" open cut sewers.	27.3	\$1,591,000
MEF-P2-21	Foozer FM/Sewer Upgrade (MH 9354 - FOOZERPS; FOOZERFM - MH 12901)	700 LF/8,000 LF (F.M.)			Involves laying 656' of 15" open cut sewers, 20' of 12" open cut sewers and 8,005' of 15" force mains.	27.3	\$5,450,000
MEF-P2-22	Upper Lucy Run Sewer Upgrade (MH 3488 - MH 8133)	6,000 LF			Involves laying 3,389' of 21" open cut sewers and 2,618' of 24" open cut sewers.	27.3	\$2,716,000
MEF-P2-24	SR 132 @ SR 125 Sewer Upgrade (MH 12901 - MH 3490)	7,100 LF			Involves laying 7,080' of 24" open cut sewers.	24.6	\$3,838,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

7.3 Longer Term Capital Improvements

A list of the proposed projects prioritized by their total benefit score for long term capital improvements is shown in Exhibit 7.3.

EXHIBIT 7.3

Summary of Proposed Projects for Long Term Capital Improvements

Note: Some of the identified projects may not require implementation as a result of CCWRD's efforts to reduce infiltration and inflow.

Project Number	Project Description	Conveyance	Storage	L.S. Upgrade	Details	Total Benefit Score	Project Capital Costs
NML-P3-T2	NML WWTP Modifications Phase 2 (augment EQ capacity)				NML WWTP Modifications Phase 2 (augment EQ capacity)	42.6	\$2,300,000
MEF-P3-T3	MEF Regional WWTP Modifications Phase 3 (augment EQ capacity)				MEF Regional WWTP Modifications Phase 3 (augment EQ capacity)	42.6	\$10,175,000
LEF-P3-20	Ferguson Drive and Aicholtz Road Sewer Upgrade (MH 356- MH 11962)	4,200 LF			Involves laying 226' of 10" open cut sewers and 3,885' of 12" open cut sewers.	41.2	\$2,029,000
LEF-P3-22	Nature Run Upgrade			0.6 MGD	Involves upgrading lift station to 0.6 MGD.	38.5	\$1,119,000
LEF-P3-T2	LEF Regional WWTP Design Flow Expansion (ADF = 14 mgd)				LEF Regional WWTP Design Flow Expansion (ADF = 14 mgd)	35.7	\$15,000,000
NML-P3-07	Oakland Farm Drive Sewer II (MH 6875 - MH 6721)	2,100 LF			Involves laying 2,047' of 15" open cut sewers.	33.7	\$826,000
NML-P3-08	Pierce F.M Upgrade (MH Pierce Pump Station-MH 9484)	1,200 LF			Involves laying 1,129' of 12" open cut sewers and 56' of 10" force mains.	33.7	\$522,000
NRH-P3-01	Sewer Extensions immediately adjacent to the New Richmond sewer area to serve homes currently served by on-site systems.	3,000 LF			Involves laying 3,000' of 8" open cut sewers.	21	\$1,642,000
NML-P3-09	Sewer Extensions along Fulton Grove Road to serve homes currently served by on-site systems	3,000 LF			Involves laying 3,000' of 8" open cut sewers.	21	\$1,622,000
SLC-P3-01	Sewer Extensions in the Owenville area to serve homes currently served by on-site systems. Owenville-Belfast Road north of Owenville.	7,000 LF			Involves laying 7,000' of 8" open cut sewers.	16.2	\$1,830,000
SLC-P3-02	Sewer Extensions in the Owenville area to serve homes currently served by on-site systems. SR 50 east to the Clermont Northeastern Local School treatment facility.	6,000 LF			Involves laying 6,000' of 8" open cut sewers.	16.2	\$1,571,000

The costs listed are project capital costs that include construction costs, administration costs, engineering costs, contingencies, and other soft costs. These costs are escalated to represent costs for Cincinnati, Ohio for May 2010 using an ENRCCI = 7837.

The results from the multi-attribute utility prioritization analysis of the proposed projects are shown in a graphical form for the short, intermediate and long term capital improvements in Exhibits 7.4, 7.5 and 7.6 respectively. Exhibit 7.7 shows the benefit score by criteria weight composition of 50 projects with highest priority among all the projects evaluated and Exhibit 7.8 shows the cumulative project costs corresponding to these projects. (Note: Not all projects listed in prior exhibits may be required based on the successful efforts of CCWRD to remove inflow via separation of foundation drains from the sanitary sewer system (Ref. Article 3.6.7 of Clermont County Water Resources Department's *Standards and Provisions*) and to remove infiltration from the sanitary system via other means).

EXHIBIT 7.4
Benefit Score by Criteria Weight Composition for Near Term Capital Improvements (P1)

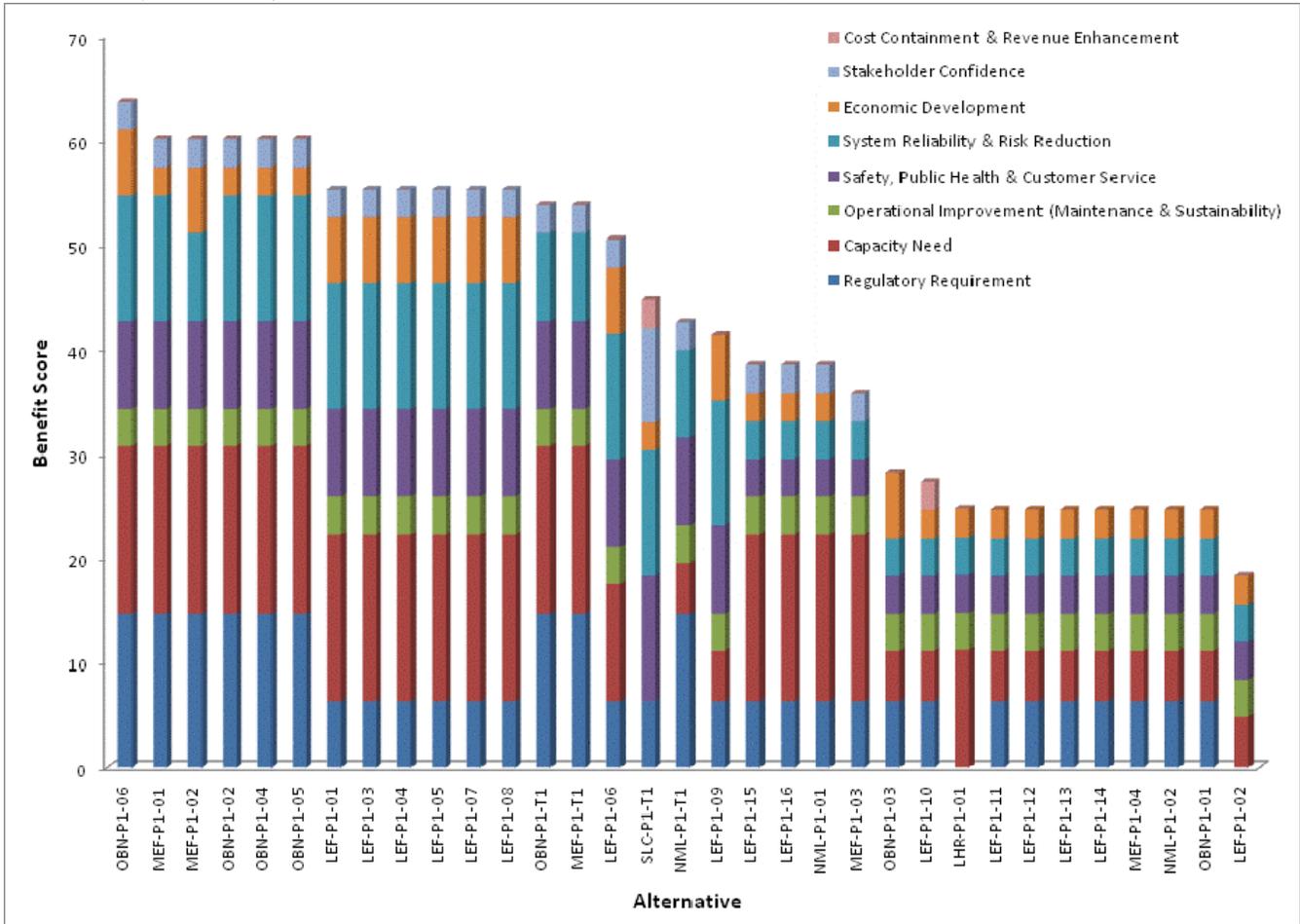


EXHIBIT 7.5
Benefit Score by Criteria Weight Composition for Intermediate Term Capital Improvements (P2)

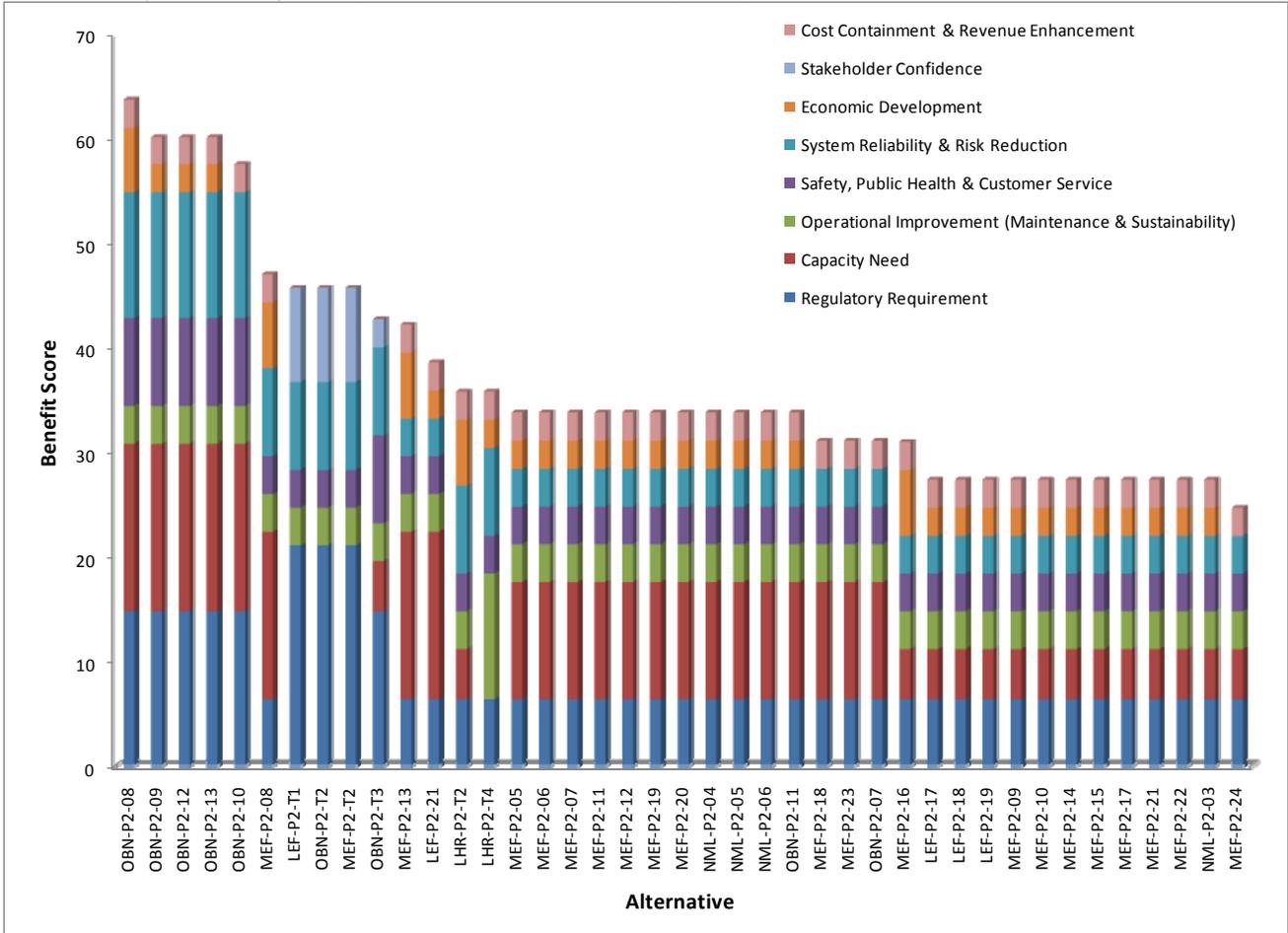




EXHIBIT 7.6
Benefit Score by Criteria Weight Composition for Long Term Capital Improvements (P3)

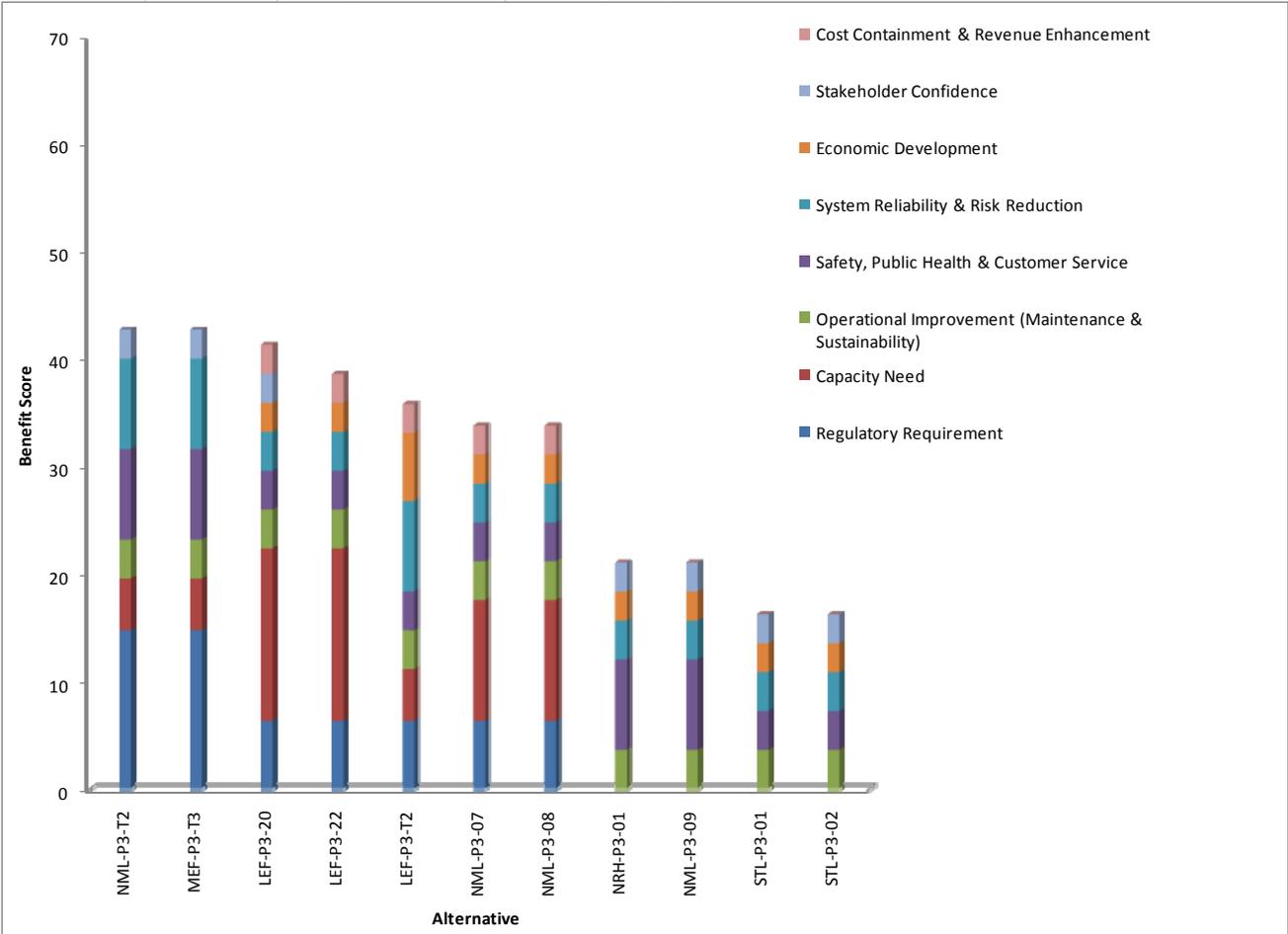


EXHIBIT 7.7
Benefit Score by Criteria Weight Composition - Top 50 Projects

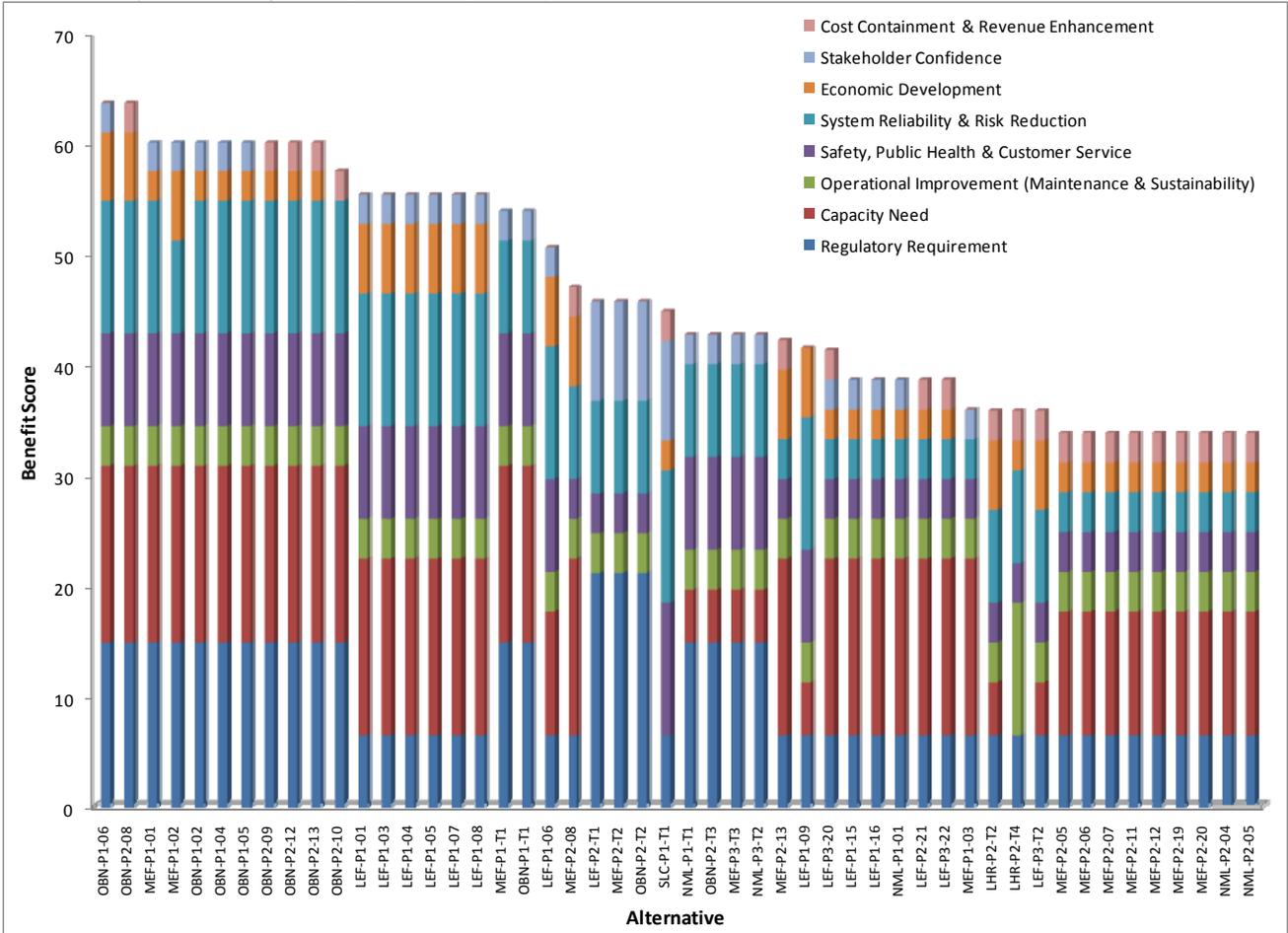
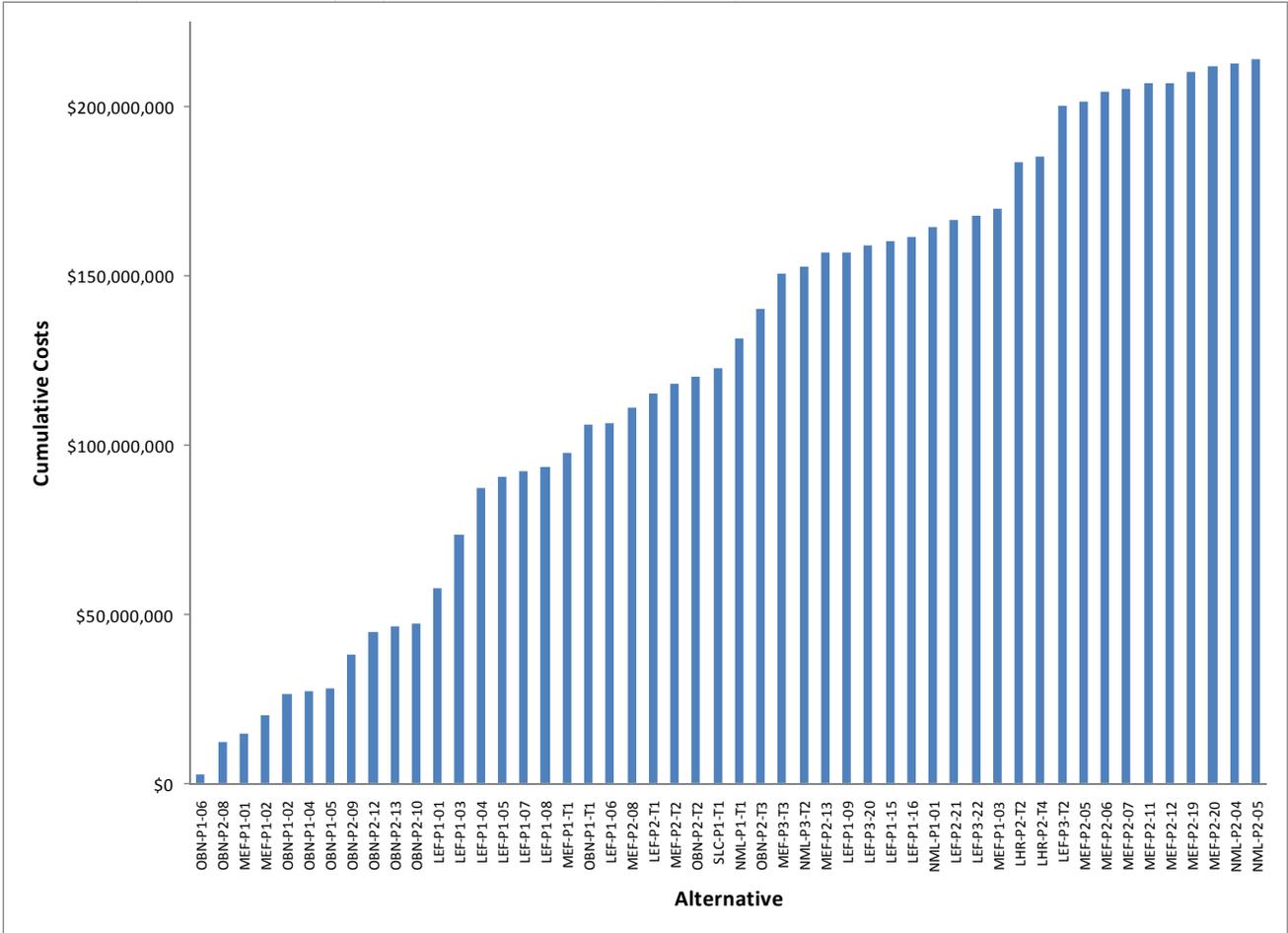


EXHIBIT 7.8
Cumulative Project Costs Ordered by Project Total Benefit Score – Top 50 Projects



7.4 Infiltration and Inflow Reduction

Modeling of the County's sewerage areas has revealed the presence of infiltration and inflow (I/I) in the sanitary sewer system. I/I can enter the wastewater conveyance system through sewers and manholes and consumes pipe and treatment capacity. A significant number of I/I sources may be located on private property. Without an aggressive, enforceable program to locate and repair these private property defects, often at homeowner expense, a significant portion of I/I sources remain. CCWRD has recently updated its *Standards and Provisions* (September 2010) to include funding for eligible homeowners to remove the connection of foundation drains from the public sewer system

A program for managing and reducing I/I throughout the County's collection system helps to sustain the operation of existing infrastructure through operation, maintenance, and management of the collection system. The traditional methodology for I/I control involves locating the sources of I/I, then removing or sealing out the unwanted water. Flow monitoring and maintenance programs are often employed to identify sub-basins with relatively high I/I followed by allocation of source detection resources to identify and pinpoint I/I sources. Based on I/I severity and type of defects found, the challenge is to determine the appropriate level of I/I reduction that can be cost effectively implemented.

After the updated collection system models were developed, an evaluation of I/I reduction was performed on the Nine/Ten Mile Basin. This was accomplished to determine whether I/I reduction could be used as a method to eliminate the capacity problems that the modeling was showing throughout the County. For the evaluation it was assumed that an I/I reduction program could eliminate 10% of the I/I from the system. This is a conservative assumption based on I/I removal programs in other municipalities. The results of this evaluation showed that although the peak flows were lowered by I/I reduction, this reduction in flow did not address the significant capacity constraints in the system. Therefore, I/I reduction is not considered a means to resolve capacity problems identified

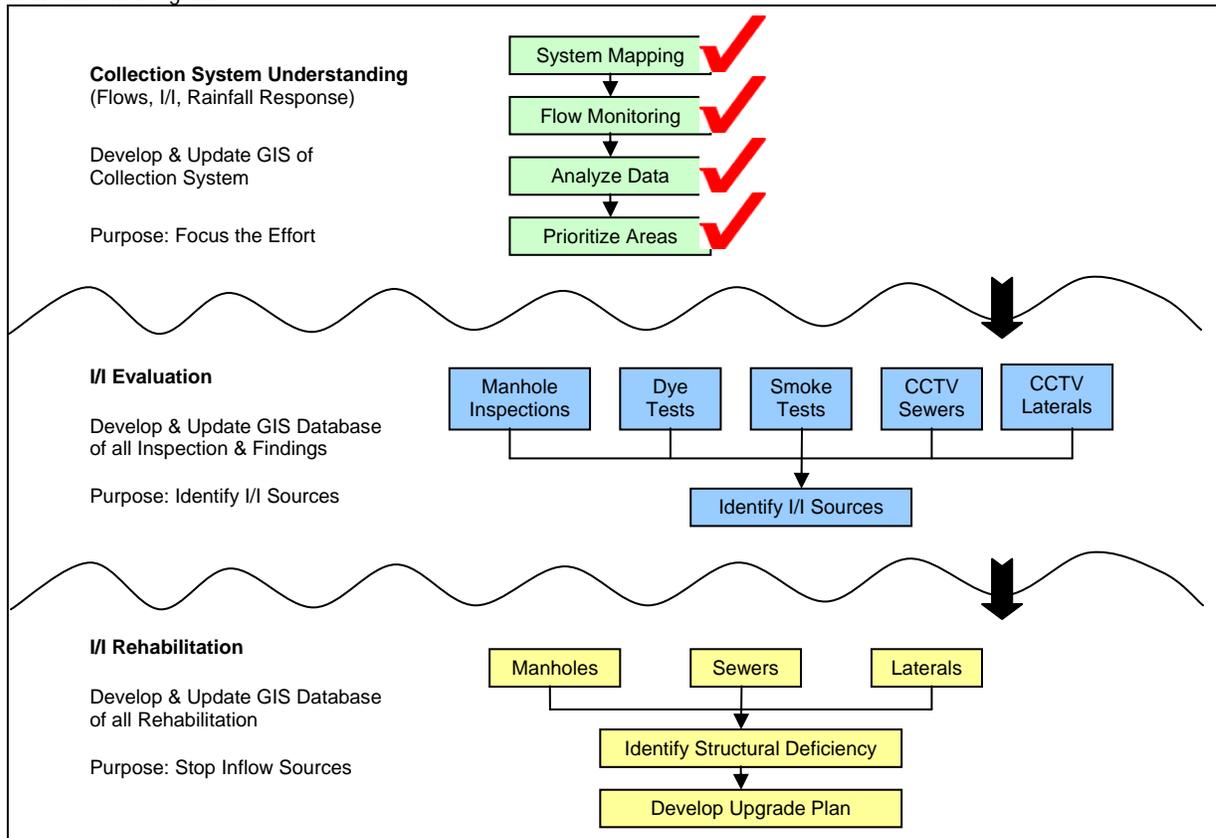
through modeling. However, the County should continue with preventative maintenance and I/I reduction programs that help relieve capacity constraints and extend the useful life of the sewers.

The County recognizes the need to exclude extraneous water from its collection system and has a staff devoted to I/I investigation activities; however, I/I control is a significant challenge. Since the sources of I/I were never intended to exist, they are not located in any “designed” or “standard” location. Each source must be located before it can be addressed, and finding the source requires a site-specific investigation. Consequently, removal of I/I is a continuous and repetitive process of identification, evaluation and repair.

The County should sustain its program of I/I evaluation and rehabilitation to protect sewer capacity and WWTP peak flow treatment capability. Since previous flow monitoring has shown I/I intrusion into the sanitary sewer system, the flow monitoring basins should be prioritized and investigated more fully to determine sources.

Exhibit 7.9 summarizes the structure of the proposed I/I program. Red checks show tasks the County has initiated or is in the process of initiating. System mapping should be updated on a regular basis. Flow monitoring should occur regularly and be repeated throughout the collection system as needed about every five years. Program elements such as smoke and dye tests should occur as needed. Manhole and sewer rehabilitation will result from the CCTV inspections.

EXHIBIT 7.9
I/I Reduction Program



I/I identification and removal is an ongoing effort. As the County sewer system ages and more flow enters the system, the need to research, test, develop, and implement effective means of I/I reduction in order to minimize sewer system capacity problems continues. This effort is essential to achieving a sustainable, cost-effective, and long-term program for addressing capacity constraints in the collection system.