Delaware County Regional Sewer District

Sanitary Sewer Master Plan

Technical Memorandum #1

November 19, 2015

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Glossary of Terms

ADF	Average Daily Flow
ACWRF	Alum Creek Water Reclamation Facility
Areas of existing need	Neighborhoods in need of centralized sewer, due to failing or a high potential of failing on-lot or off-lot discharging sewage systems.
BOH	Board of Health; Delaware General Health District
CBOD5	Carbonaceous Biological Oxygen Demand; parameter identifying the quantity of organic material in wastewater
CCTV	Closed Circuit TV; used to inspect sewer lines
Comprehensive Plan	Master plans that map out future proposed land uses and densities.
Constructed wetland	A wastewater treatment system that primarily uses man-made wetlands biology to bring about organic treatment processes.
Critical mass	Minimum population density level needed to make central sewer service cost feasible.
DCRPC	Delaware County Regional Planning Commission
DCRSD	Delaware County Regional Sewer District
Drainage area	A prescribed boundary for natural surface water drainage.
Floodplain	The areas subject to being inundated by a 100 year flood event.
Geographic Information System (GIS)	A computer-based information system that enables capture, modeling, manipulation, retrieval, analysis, and presentation of geographically reference data.
GIS Layer	Geographically reference data relating to a specific attribute or data type, such as bedrock.
HSTS	Home Sewage Treatment Systems
I/I	Inflow and Infiltration; storm or groundwater that enters a sewer system
Institutional knowledge	The aggregate data and knowledge contained, or retrievable by the major partners compiling this study related to the topics addressed herein.
LSWRF	Lower Scioto Water Reclamation Facility
MGD	Million gallons per day

MORPC	Mid-Ohio Regional Planning Commission
NPDES Permit	National Pollutant Discharge Elimination System; the primary permit governing the allowable discharge of pollutants from a treatment facility
ODOT	Ohio Department of Transportation
OECC	Olentangy Environmental Control Center
OEPA	Ohio Environmental Protection Agency
Off-lot system	A wastewater treatment system such as aeration with either collector tile or local stream discharged off the lot being served.
On-lot system	A wastewater treatment system such as septic tank, leach field, or mound located on the lot being served.
Package plant	Small wastewater treatment plant, generally less than 100,000 gallons per day treatment capacity.
PACP	Pipeline Assessment and Certification Program; a standard for the characterization of inspected sewer conditions
POTW	Publicly Owned Treatment Works
PS	Pump Station
RAS	Return Activated Sludge, flow stream within wastewater treatment process
Service areas	Existing and proposed areas designated for central sewer service.
SSO	Sanitary Sewer Overflow
TMDL	Total Maximum Daily Load; a report describing the calculation of the maximum level of pollutants a waterbody can receive and still meet the water quality standard. This report also attempts to identify sources of pollutants of concern.
TSS	Total Suspended Solids; a pollutant of concern listed in water treatment plant permits to be primarily removed
Watershed	The area drained by a stream, river, or river system;
WIB	Water in Basement; an event where the sewer line backs up and flows into basements
WQM(P)	Water Quality Management (Plan)
Zero-discharge	A wastewater treatment system that does not discharges to a receiving stream. In Delaware County there are 3 plants that Land Apply effluent, or recycle treated wastewater effluent as irrigation water.

Section 1 – Executive Summary

Delaware County Regional Sewer District (District) has undertaken a sanitary sewer master planning process that will incorporate forecasts of development, utility needs, and population growth. This information will allow the District to continue its practice of sustainable infrastructure management, and ensure that its planning practices are adaptable to meet changing environmental regulations and growth trends. This memorandum serves as the initial step in the Master Plan process which documents relevant historical and planning information provided by the District (and collected from stakeholders), to formulate conclusions about data that will be used to develop the Master Plan. Although the resources collected for this effort reflect the varying applications and planning methodologies of the groups that developed them, this memorandum will focus on outcomes with direct influence on wastewater flows and loads within the District planning boundary. A list of documents that will serve as the basis for planning, along with a summary of their content, is provided in Table 2-1.

The information reviewed for Technical Memorandum 1 was gathered from a wide variety of sources representing a diverse set of interests within and adjacent to Delaware County. In its completed format, the Master Plan will incorporate elements of development within its planning boundary (land use and density), and the condition and capacity of District conveyance and treatment systems, into a recommended capital improvement plan for the planning horizon. The Master Plan will also provide recommendations on future revenues required to support recommended capital improvements. This memorandum presents several key indicators that provide insight into past and potential future growth within the District as well as areas where a change in equipment or practice could improve service life or reduce costs. These indicators most notably include:

- Population Trends
- Measured (actual) sewer flows and loads
- Planning documents by stakeholders, which define land use, zoning and transportation improvements
- Diverse stakeholder feedback

1.1 Population Trends

A summary of the population growth and projections from DCRPC is shown in Table 1-1. **The population forecasts within the service area shows that the population within Delaware County in 2035 is projected to be 54% greater than in the 2010 census, an average of 7% annual growth.** This growth rate represents a departure from the higher growth rate in the 1990's and early 2000's, but one that is higher than that seen in the last half decade prior to 2010.

Table 1-1 25-Year Population Forecast (DCRPC Estimates)						
Year	2010	**2015**	2020	2025	2030	2035
Population in jurisdictions served by District	103,000	**117,000**	126,000	137,000	148,000	159,000
Total County Population	174,000	**193,000**	211,000	228,000	246,000	264,000

Table 1-1 illustrates that approximately 60% of the County population is currently served by the District. Projecting specifically where growth and infill development may happen is a task that is critical to infrastructure decision-making. The bulk of this growth is anticipated to be in the townships bordering Franklin County (Liberty, Orange, Concord, and Genoa Townships) and along major transportation thoroughfares (US23, I71, US36/SR37, SR3, SR315, and Sawmill Parkway).

1.2 Sewer Flows and Loads

In sanitary sewer planning, population growth rates are used as one measure to predict the amounts of average dry weather flow in the collection system that must then be conveyed and treated. Application of the DCRPC population projections, combined with historical flows and known population in the District, allows prediction of future sewer flows and geographic loading. **As illustrated in Table 1-2 up to 36% more dry weather flow can be anticipated in 2035 compared to 2014**.

Table 1-2 Land Use and Sewer Flow Forecast					
Year	**2014**	**2020**	**2025**	**2030**	**2035**
Average Dry Weather Flow (MGD)	9.93	10.8	11.6	12.6	13.5
Wet Weather Flow[1] (MGD)	20.8	22.5	24.4	26.3	28.2
[1]Wet Weather flow based on historical peak daily flow rate. Facilities however, are sized to accept peak hour influent flow in accordance with their NPDES permits.					

The current wet weather peaking factor (ratio of wet weather flow to dry weather flow) is approximately 2.2 and is within the expected range for a separate (not combined with stormwater flows) sanitary system. Despite much of the District's collection system being less than 20 years old, there is opportunity to strengthen the wet weather integrity of newly installed sewers. Increased collaboration between District Sewer Inspectors, Maintenance, and District planning will offer the opportunity to improve material selection, installation processes, and inspection procedures that can be employed to maximize long term effectiveness of newly installed sewers.

Preliminary review of documents and data for the District's water reclamation facilities highlight several notable and instructive conclusions about flow, loading, and general planning (to include operation and maintenance), presented below.

OECC

- Flow - Flow data indicates that the average daily flow of the 4.5-MGD ADF capacity South Plant has remained steady at 3.0-3.5 MGD. Consistent operation at 75% of dry weather capacity is one common threshold to begin expansion planning – the District is already in preparation to restore the 1.5-MGD ADF North Plant, which currently sits idle.
- Loading - Influent waste strength is weaker than the original design, indicating that the plant has more organic capacity than hydraulic capacity remaining. This is an important consideration with regard to the ability of the facility to accept more flow. Due to the high quality of the Olentangy River receiving stream, OECC has potential for more stringent nutrient restrictions in future permits.
- General Planning - OECC was most recently expanded in the late 1990's and the South Plant is reaching the 20-year life expectancy of several major systems and components (microprocessor controls, electronics within the electrical system, gearboxes, bearings, etc.)

ACWRF

- Flow - ACWRF flow data indicates that the average flow of the 10-MGD ADF capacity facility has slowly and steadily increased with time, to 5.3-MGD. Should these flow trends continue, it may be 12-15 years before ACWRF reaches the 75% ADF threshold where expansion would be considered.
- Growth - New development in Orange and Genoa Townships (as well as Berlin and Berkshire to the north) must resolve collection system bottlenecks to convey future flows to ACWRF. Availability of gravity options for future flow will reduce pump station failure risk, facility maintenance and electrical requirements of pumped alternatives.
- Loading - Influent waste strength for CBOD5 and TSS are moderately stronger than the original design criteria. Upon further evaluation in the condition and capacity assessment phase of the master plan, this increase may have the effect of reducing the remaining hydraulic capacity of the facility in relation to the biological load.
- General Planning - When compared to other municipal utility dischargers in the Alum Creek and Big Walnut watersheds, ACWRF operates very efficiently. It is likely that nutrient restrictions will become more stringent on waterways within Delaware, and as such these requirements should continue to be incorporated into the Districts planning process.

LSWRF

The Lower Scioto Water Reclamation Facility was planned to accept wastewater from Concord Township and western Liberty Township. During its construction, in the late 2000's, new housing construction in this sewershed decreased significantly, although this sewershed is anticipated to receive future develop. LSWRF is a 1.4-MGD ADF with provisions to expand to 2.8-MGD ADF. At this time the plant is being evaluated to determine what work is needed to be able to accept flows. In addition to undergoing condition assessment from siting idle, other collection system improvements are needed in order to convey significant flows to the facility.

1.3 Planning Documents

A number of stakeholders have updated their plans since the 2008 Master Plan and these changes have had a direct impact on the District's current Master Planning efforts (due to changes in their trends, priorities, and goals). Stakeholders with updated or otherwise clarified plans include ODOT and the Delaware County Engineer, as well as the land use plans for Liberty, Berlin, Genoa, and Berkshire Townships. Orange Township also has significant potential for impact to the District; however, its planning documents have remained relatively consistent.

ODOT regularly updates its plans for the central Ohio transportation thoroughfare corridors in northern Franklin and southern Delaware Counties. **The largest potential ODOT impacts to areas served by the District include studies of additional I-71 interchanges at Big Walnut Road (North of Gemini Parkway) and SR 36/37,** as well as planned improvements at the I-71/36/37 interchange and I-270/US23 improvements. The Delaware County Engineer has a number of roadway expansions identified in response to traffic volume increase or anticipated future demand – most notably the extension of Sawmill Parkway (extending north from the existing terminus at Hyatts Road to US 42), and improvements to several arterial streets that connect to SR315 and US23. These improvements include widening roads to add new lanes or bike lanes, drainage upgrades, or reconfiguring intersections to reduce traffic backups.

Township planners are often presented with requests to modify their growth or zoning plans on a case-by-case basis, as presented by specific development projects. Berlin, Berkshire, Concord, Genoa, and Liberty Townships all have large amounts of undeveloped or agricultural density land compared with Orange Township. In the case of Liberty and Genoa Townships, much of this undeveloped property has been acquired by developers or had some level of pre development planning done. The undeveloped parts of these six Townships represent the areas most likely to experience growth in population and the need for sanitary sewer capacity in the near term. All six of these Townships have documented their desire to maintain a rural

character and high quality of life (and availability of services) for residents by limiting the amount of high density growth within their boundaries.

In addition to the Township and municipal planning documents noted in this memorandum, data from other sources may be instructive to District planning and will therefore be carefully considered. These data sources include local school systems as well as the long and short term plans for other nearby utilities and municipalities.

1.4 Stakeholder Feedback

Inclusion of stakeholders in the planning process is a vital element to successful plans, particularly those who are affected by District operations. In preparation for this Master Plan update, several meetings and workshops were conducted to permit the gathering of information and perspectives. The diverse range of stakeholders in Delaware County can generally be described in the following categories:

- County residents and customers
- Sewer District Representatives: Delaware County Commissioners, Administration, and District Staff
- Township Trustees and Zoning officials
- Property holders and the building industry that construct new developments
- Planning Organizations: Government entities that serve a role in shaping infrastructure in Delaware County

Each group has distinct and varied interests in the District's future and input received to date from these groups is represented within this Technical Memorandum. Generally the District, Townships and Planning organizations communicate their planning intent through written documents which have been vetted internally and have incorporated input from their local constituencies to various degrees. Broadly, the characterization of the feedback received is as follows:

- Development community seeks an early understanding of District policies during Master Plan development, particularly those regarding change in rate structure and Capital Improvement Plan funding.
- Many constituent groups desire understanding on how potential rate increase would be allocated between existing infrastructure maintenance and proposed new construction.
- Land Developers and homeowners have expressed concerns over the way funding for future improvements related to overcoming capacity limitations will be handled.

- Residents are concerned about the changes that increased sewer availability could bring including increased traffic and reduced availability of public services.

The following sections of this technical memorandum provide detailed information on general themes noted in this Executive Summary, in addition to general financial information gathered to date. Exhibits and tables are provided where necessary to illustrate foundational concepts of the Master Plan.

Section 2 – Data and Document Collection Overview

A number of comprehensive planning and zoning resources are available for townships within Delaware County, in addition to planning documents maintained by individual regional organizations and state departments. The DCRPC develops and maintains a number of township level planning documents and ensures they are completed in a coherent and consistent way. Municipalities wholly or partially within Delaware County, including Columbus, Dublin, Westerville, Delaware, Powell, Sunbury, and Galena also maintain various planning reports and studies charting their projected growth. Information from the Ohio Department of Transportation, Mid Ohio Regional Planning Commission, and Del-Co Water were also reviewed for their potential to add pertinent information to the final report. The information most relevant to existing and potential future sewage flows has been the focus of the data review. A summary of documents and brief overview is included in Table 2-1.

Table 2-1 Data and Document Collection Summary			
Category Type Title	**Date**	**Summary**	**Source**
		Key for Government Planning Reports	
		New/updated information, significant changes or key growth area =	
		New/updated information, minor changes to past or relevant growth area =	
		No new information, similar growth to past projections or less impactful growth area =	
Planning & Development			
Township Comprehensive Plans			
Berkshire Township	8/11/2008 (Update in Progress)	Recommends continued growth contiguous to existing areas. Concerns about the ability of the rest of the Township services to keep up with higher density growth.	DCRPC
Berlin Township	9/8/2014	Details existing and projected future development patterns. Anticipates future residential growth at varying densities. Future build out goals include maintaining 1-2 acre minimum lot size similar to Berkshire and Genoa Townships.	DCRPC
Brown Township	7/10/2001	Anticipated maintaining close to existing level of build out for the near future. Farmland with pockets of low density housing is to be expected. HSTS or Delaware City sewer system will be used.	DCRPC
Concord Township	2/23/2004 (Update in Progress)	The Comprehensive Plan was developed prior to the Lower Scioto WWTP being built. The ability to direct gravity flow to this facility will have had a significant impact on their utility planning. The 2004 plan desired managed low density growth on the magnitude of the existing. HSTS and package plants were the only means of wastewater treatment at the time. A draft version of a 2015 update to this plan has been reviewed and projects increasing growth east of the Scioto as well as in the southern portion of the township adjacent to Dublin and Shawnee Hills.	DCRPC
Delaware Township	N/A	No Plan. Zoning map highlights mainly farmland and low density residential development. Future treatment likely to be handled by Delaware City system.	DCRPC
Genoa Township	12/8/2008 (Update in Progress)	Recommends continued low density development across the Township. HSTS systems and sewer where available are recommended to be used.	DCRPC
Harlem Township	1/23/2008	Recommends continued low density development across the Township with the exception of the southern part of the Township. HSTS systems and sewer where available are recommended to be used. Sewer in the southern part of the Township may be available in the future but would be provided by the City of Columbus. The City of Columbus is currently developing preliminary alignments for a proposed trunk sewer that will provide capacity to the agreement service area with the City in Harlem Township.	DCRPC
Kingston Township	7/2/2008	Township is zoned primarily low density residential or agricultural. There are currently no sanitary sewers available except in the Northstar area. All others are served by HSTS. Future low density development suggests that HSTS will be the primary means of providing sewage service for the foreseeable future.	DCRPC
Liberty Township	3/20/2006	Liberty Township is subject to extensive development along the northern boundaries of existing development. Proposed densities range from 0.75-1.25 units per developable acre for residential development however significant commercial development has occurred in the past along major transportation corridors and would be anticipated to continue. The Perry-Taggart trunk line opened up the northern portion of the Township to additional development prior to the 2008 recession. Future growth is anticipated to follow existing single family densities with the potential for denser development along the major thoroughfares of Sawmill Parkway, US 23, and SR 315. Increased availability of sewer service will likely lead to smaller lot sizes and greater infill development.	DCRPC
Marlboro Township	N/A	No Plan. Zoning map shows almost entirely farmland. No Sewer likely in the near future due to distance from existing WWTPs and low existing densities. All HSTS.	DCRPC
Orange Township	7/19/2010 (Update in Progress	Orange Township has had significant development in the 1990s and 2000s with most of the Township being built out with residential subdivisions, commercial, and light industrial development. The northwest edge of the Township is the main area remaining undeveloped though there is significant pressure along US 23. Sanitary Sewer service is provided both by ACWRF and OECC, with some of the flow pumped (prior to the plant influent stations).	DCRPC

	The Township has sewer service for all areas however local capacity and conveyance is not necessarily available.		
Oxford Township	12/12/2006	Township is zoned primarily low density residential or agricultural with the exception of Ashley. There are currently no sanitary sewers available outside of Ashley. All areas are served by HSTS. Future low density development suggests that HSTS will be the primary means of providing sewage service for the foreseeable future. Oxford Township has stated in their 2000 Comprehensive Plan that they do not desire the increased development density that could come with expansion of sanitary sewers. Any future addition of sewers in this area would likely be related to zero effluent systems or an expansion of the Ashley service area.	DCRPC
Porter Township	2000	Township is zoned primarily low density residential or agricultural. There are currently no sanitary sewers available. All areas are served by HSTS. Future low density development suggests that HSTS will be the primary means of providing sewage service for the foreseeable future.	DCRPC
Radnor Township	N/A	No Plan. Zoning map shows almost entirely farmland. No Sewer likely in the near future due to distance from existing WWTPs and low existing densities. All HSTS.	DCRPC
Scioto Township	8/10/2005	The bulk of Scioto Township is zoned for agriculture or low density residential with all home sewage service provided by on site treatment systems. It is anticipated that this type of densities and growth will continue in the Township. Longer term, the location of the Lower Scioto WWTP will allow for sewers to be installed in the direction of Scioto Township and may facilitate denser development in the future.	DCRPC
Thompson Township	N/A	No Plan. Zoning map shows almost entirely farmland. No Sewer likely in the near future due to distance from existing WWTPs and low existing densities. All HSTS.	DCRPC
Trenton Township	1/7/2004	Trenton Township does not have any sanitary sewers provided by Delaware County. While zero discharge systems are permitted, the existing and proposed density of the Township likely makes sanitary sewers unfeasible in the near term.	DCRPC
Troy Township	4/15/2002	No sewer likely from County in near term. Central Olentangy Service Area includes parts of the south central has been discussed with treatment provided by the City of Delaware. Currently all HSTS or Delaware City Sewers.	DCRPC
Incorporated Area Plans			
Ashley	7/19/2005	Map of areas zoned for development beyond existing built areas.	
Delaware Collection System Master Plan	2004	Plan lays out Design Criteria for existing and future sewers as well as existing and future capacity projections and constraints. Identifies and proposes alternatives for providing sewer service to existing areas and new service for growth areas.	City of Delaware
Dublin	N/A	Dublin maintains a significant sanitary sewer system which contracts with the City of Columbus for treatment for their approximately 6mgd of sewage. There are no plans to have DCRSD handle any sewage flows in the near future.	Dublin Website
Galena		Galena has developed maps for long term zoning and density. These plans have been developed in concert with Columbus and DCRSD.	DCRPC
Ostrander		The Village of Ostrander maintains zoning and density maps with the DCRPC. These maps show existing and proposed future developable areas.	DCRPC
Powell – Draft Comprehensive Plan	8/9/2015	Provides existing land use summary as well as recommendations for future land use and transportation improvements. This includes projections for northward growth along Sawmill Parkway.	DCRPC
Shawnee Hills Comprehensive Plan	12/12/2011	Detailed existing zoning and plans for future growth as well as existing sanitary facilities. Current sewer system flows to the City of Columbus. No sewage is planned to be sent to DCRSD.	Land Use Plan on DCRPC website
Sunbury - Proposed Sewer Extension		Plan outlines proposed sewer and new residential and commercial development areas from Sunbury to I-71 along 36/37.	Sunbury
Westerville	N/A	Discussions with the City of Westerville determined that only small areas of the City are planned or are already served by DCRSD. Areas currently under development or already developed are covered by existing service agreement.	Conversation Record
Zoning Maps			
Maps & Use Plans	Multiple	These maps have been updated at various times over the last 10 years and represent a snapshot of future projected development densities.	DCRPC
Columbus Far North Area Plan	9-15-2014	Long range plan for Columbus north of 270. Focuses on the type of development/density that already exists in the area and highlighting areas for new development and the type and density that is envisioned.	DCRPC
County Departments and Public Entities			
DelCo Water	2014 (For Master Plan)	Provided their shapefiles, master planning documents, and information related to the cost sharing of new assets.	DelCo Water
DCRPC Annual Reports	Updated annually, 2001 through 2014	Includes growth rates, lot approval numbers, acres rezoned, developments approved, highlights of large developments, building permits issued by year, density review.	DCRPC
Delaware Strategic Plan	2014	Compiled in 2014 by Regionomics, this report details population growth and other projections for Delaware County.	DCRPC
Delaware County Building		Total Number of Building Permits issues by Township & Municipalities from 1993 through June 2014. Total Number of Unincorporated Area Building	DCRPC

Permits		Permits for Townships & Municipalities from 2007 through June 2015. Approved lots from 1987 through 2014.	
Delaware County Sewer Permits		Microsoft Access File with county numbers, property addresses, permit numbers, issue date & inspection date.	DCRSD
Delaware County Census Data		Shows general growth on 10 year increments. Last census was taken in 2010.	US Census Bureau, DCRPC and MORPC.
MORPC, Balanced Growth Plans for Big Walnut, Olentangy, and Scioto Watersheds		Provided multiple reports related to the longer term development of southern Delaware County, primarily focused on transportation issues. Sustaining Scioto Report and Balanced Growth Plans both related to Delaware County.	MORPC
Delaware County Health Department		The Health Department reviews soils reports and provides insight on the installation of HSTS. They also maintain a comprehensive list of existing HSTS within the county as well as ensuring that they do not become a nuisance.	Health Department Records
County Engineer		County engineer sources provided detailed plans for new transportation projects at various stages of implementation, primarily over the next 5 years.	Delaware County Engineer
Regulatory			
State Water Quality Management Plan Including Section 208 Areawide Waste Management Plans	2006	Adopted by Delaware County in April 2006, the State 208 Plan allowed the County to provide sanitary sewer service in the unincorporated areas of the County. The Agency's review of water quality conditions and wastewater facility needs found that large scale regional planning is appropriate and necessary.	OEPA DSW Water Quality Management Program
TMDL's			
Olentangy River Watershed TMDL	8/27/07 (Update in Progress)	Identifies impairment and restorative measures on various segments of the Olentangy River in Delaware and Franklin County.	OEPA
Big Walnut Creek TMDL	8/19/05	Identifies impairment restorative measures on various segments and branches of Big Walnut Creek, including Alum Creek in Delaware and Franklin County.	OEPA
NPDES Permits			
Scioto Reserve	Current	LAMP Permit	DCRSD
Scioto Hills	Current	Discharge Permit	DCRSD
OECC	Current	Discharge Permit	DCRSD
Northstar	Current	LAMP Permit	DCRSD
LSWRF	Current	Discharge Permit	DCRSD
Bent Tree	Current	Discharge Permit	DCRSD
ACWRF	Current	Discharge Permit	DCRSD
Tartan Fields	Current	LAMP Permit	DCRSD
Sewer District			
Planning			
Capital Improvement Plan	10/14	District prepared a CIP outlook in late 2014 to reflect budgeting that would projects that would accommodate more aggressive development. Improvements were delineated by category, need, type and schedule.	DCRSD
RSD Central Alum Creek Sewer Study	2010	Report to identify approach for providing sanitary sewer service to Alum Creek WRF tributary area B.	DCRSD
RSD Crownover Farms Study (Exhibits A & B)	2014	Report to identify service to new development along Alum Creek, east of Africa Road.	DCRSD
Flow Monitoring Data - Portable Sewer Meters	2015	Flow data from various monitoring stations and plants. Contains location map, time & date, velocity, flow and graphs.	DCRSD
GIS Shapefiles	2015	Sewer layers maintained by the District.	DCRSD
Sewer Inspection Conditions Assessment	2015	PACP & MACP Classifications completed by District Staff as part of cleaning activity.	DCRSD
CSO & SSO Annual Reports	Varies	2011-2014 Annual Reports to OEPA for each Facility	DCRSD

Collection System - Pump Stations			
Equipment Summary	Varies	Pump description and test data & OEM Pump O&M manuals. Undated test data.	DCRSD
Operations Data	Varies	Pump Runtimes, data files, and operator reports (2010-2014) for all pump stations.	DCRSD
Maintenance Data	2012-2015	Description of problem areas and pipe repairs	DCRSD
Plans and As Builts	Varies	Plans for Vinmar, Scioto Reserve, Peachblow, Cheshire, Maxtown, Leatherlips, Golf Village, East Alum Creek and Alum Creek	DCRSD
Service Agreements			
Sunbury 208 Plan	July, 2004	Identifies area surrounding Sunbury (Delaware Co. Townships) as potential area to be served by Sunbury sewers and WWTP.	DCRSD
City of Columbus	11/12/91	Agreement between City of Columbus and Delaware County	DCRSD
	6/4/09	Memo between City of Columbus and Delaware County for Lower Big Walnut Service Area	DCRSD
	7/12/12	Modification to Agreement between City of Columbus and Delaware County	DCRSD
City of Delaware	1/29/07	Agreement between City of Delaware and Delaware County for Area SW of City of Delaware	DCRSD
	9/22/08	Amendment to service area between City of Delaware and Delaware County for Area S & SW of City of Delaware	DCRSD
	4/1/09	Map detailing Service Area agreements between City of Delaware and Delaware County	DCRSD
City of Dublin	8/22/94	Agreement between City of Dublin and Delaware County	DCRSD
	4/24/00	Agreement between City of Dublin and Village of Shawnee Hills	DCRSD
City of Westerville	4/22/02	Agreements between City of Westerville and Delaware County	DCRSD
	7/17/14		DCRSD
Concord/Scioto Community Authority	9/30/13	Resolution between Concord/Scioto Community Authority and Delaware County regarding a Subdivider's Agreement	DCRSD
	10/3/13	Modification to Agreement between Authority and Delaware County	DCRSD
Delaware County	6/2/69	Creation of DCRSD	DCRSD
Delaware County - Cheshire Elementary School Sub-District	7/13/11	Memo establishing surcharge fee for Cheshire Elementary School Sanitary Sewer Improvements	DCRSD
Delaware County - Cheshire Pump Station Sub-District	7/18/11	Establishing Capacity Fees	DCRSD
Delaware County - Leatherlips Sub-District	9/25/06	Amending capacity fees	DCRSD
Delaware County - Liberty Park Pump Station Sub-District	6/2/14	Establishing Capacity Fees	DCRSD
Delaware County - Liberty Township	10/28/13; 1/9/14; 3/20/14; 6/2/14	Multiple resolutions: Sanitary Sewer Extension & funding formula; Amending user charges; Sanitary Sewer Improvements; Establishing Capacity Fees	DCRSD
Delaware County - Perry Taggart Sub-District	1/8/07	Amending capacity fees	DCRSD
Delaware County - Regional 1A	9/25/06	Service Area Modifications	DCRSD
	7/18/11		DCRSD
	8/20/12		DCRSD
	3/21/13		DCRSD
Delaware County - Subdivider's Agreement	10/01/13	Agreement between Delaware County & Donald Kenney for Scioto Reserve Gold Club Community Subdivision	DCRSD
Union County	1/28/98	Agreement between Union County and Delaware County	DCRSD
Village of Galena	11/24/03	Resolution to separate from DCRSD	DCRSD
	3/7/05	Settlement Agreement and release between Village of Galena and Delaware County	DCRSD
	11/2003	Wastewater Planning Study for planning area, sewer system, and existing treatment evaluation.	DCRSD
Village of Shawnee Hills	12/12/11	Sanitary House Lateral Connection Specifications	DCRSD
Treatment Plants			
Operations & Maintenance Manuals			

	OECC Manual	July 1979	For North train only (out of service)	DCRSD
	OECC Centrifuge Manual	2008	Equipment Manufacturers Manual	DCRSD
	ACWRF Manual	6/27/03	Complete Plant Manual, less figures	DCRSD
	OECC Equipment Summary	January 2008	Inventory of large machinery & preventative maintenance; List of model & serial numbers & general preventative maintenance procedures	DCRSD
Operations Data				
	OECC Equipment Run Times	2015	Description of general practice on equipment run times	DCRSD
	OECC Weekly Plant Reports	1/2006 - 12/2014	Influent, Effluent & Process Control data only from 2006 - 2014	DCRSD
	ACWRF Operations Lab Sheets	1/2012 - 6/2015	Process control and biosolids data only from 2012 - Mid 2015. multiple Three samples per day;	DCRSD
	OECC - Solids Hauling Costs		Cost and volume of for sludge hauling contractor - excludes cost & volume hauled by County since 2014	DCRSD
	OECC & ACWRF - Polymer Costs		Annual expense for polymer 2010-2014	DCRSD
	OECC & ACWRF - Solids Hauling	2012-2014	Annual totals for Solids Hauled	DCRSD
	OEPA Sewage Sludge Report	2010 - 2014	2010-2014 Annual Reports for Scioto, OECC, Lower Scioto, Hoover Woods, Bent Tree and ACWRF	DCRSD
	Monthly Operating Reports (OEPA 4500 Forms)	1/13 - 3/15	MOR's for Scioto Reserve, Scioto Hills, OECC, Northstar, Bent Tree, ACWRF, Tartan Fields and Hoover Woods	DCRSD
Maintenance Data				
	DCRSD maintenance records	6/4/13 – 5/21/15	2 years of maintenance tasks for pump stations and treatment facilities	DCRSD
	DCRSD maintenance schedule	2016-2017	2 years of preventative maintenance schedule (asset & location, not specific maintenance activity)	DCRSD
Financial				
	Asset List		1/13 - 3/15	DCRSD
	Bond Trust Agreements		Trust Agreement for outstanding revenue bonds, if applicable. Included 2007 and 2014	DCRSD
	Comprehensive Annual Financial Reports		Three years of annual reports from 2012-2014	DCRSD
	Budget Reports		Reports by Facility	DCRSD
	Sewer Capacity Charge		Surcharge and Capacity Fees for plants	DCRSD
	Sewer Customer Quantity		2015-1997 Table of growth of residential users equivalents and income growth	DCRSD
	User Charges and Revenue Data		Revenue Summary from 2012 to 2014	DCRSD

Section 3 – Planning and Development

3.1 Stakeholder Outreach

Residential housing construction and development of commercial properties that support population increase have been the historical drivers of growth in Delaware County. Stakeholders in this industry including property owners, prospectors, developers, and contractors have been extensively involved in the planning and construction of new sanitary sewer infrastructure, most of which has historically been turned over to the County upon completion. Availability of sanitary sewer service is one of the primary concerns of these stakeholders as utility service is a significant factor for development of new homes and businesses. While alternative sewerage technologies and providers exist outside of District service, a large portion of currently anticipated development is within the Southern and Central portions of the County where there is limited access to other sewer providers. Developments in these areas to date, have mitigated the lack of downstream public trunk sewer or capacity constraints by constructing package treatment plants, pump stations, or home sewage treatment systems. All of these alternatives require additional maintenance either by the home owner or the District (over the long term) but may be cost effective to the developer in order to facilitate more immediate construction.

Several stakeholder meetings were undertaken to communicate the master planning process, scopes, schedule, as well as gather information relevant to the planning effort. **Generally, the stakeholder groups active in the master planning feedback process have communicated the following themes:**

- Seek an early understanding of District policies during development, particularly those regarding change in rate structure or increases and Capital Improvement Plan funding.
- Desire understanding on how a potential rate increase would be allocated between funding CIP and maintenance projects.
- Express concern that future development will have to pay for more than a ‘fair-share’ or address indirect issues to overcome local capacity limitations.
- Believe residents value the quality of life in Delaware County and prefer to avoid changes in zoning that sewer availability might bring.
- Desire to ensure current Township planning is being considered in the Master Plan
- Seek understanding on the locations where future sewer availability is proposed

3.2 Infrastructure Planning Reports

Various entities maintain forward-looking planning reports regarding population, transportation, land use & zoning, and other utility or infrastructure investments related to Delaware County. Entities involved with infrastructure planning may be categorized into tiers based on their ability to influence growth. **DCRSD, DelCo Water, Ohio Department of Transportation, and the Delaware County Engineer have the most direct roles in shaping future growth as they can both plan for it and construct the infrastructure necessary to make development feasible.** Many of the municipalities within the County have these same abilities within their own boundaries and have the potential to expand their reach into Township areas through annexation. The groups described above actively plan to accommodate existing utility customers and residents as well as providing for the extra demand created by projected additional users. Conclusions from these various plans forecast the potential future infrastructure support systems in Delaware County including; **expanding or extending roadways, securing more reservoir capacity for drinking water supply, and facilitating project coordination across regional stakeholders. The plans from this primary tier of Planners all anticipate a continuation of growth in the County, primarily along the existing major thoroughfares and along the edges of areas that have already been developed.**

Planning, Zoning, and Township organizations planning roles pertain to the location and type of development, controlled primarily by permission (via permits) and not through the construction of actual assets. The ability to grant permission controls the type and density of growth, and the location to a certain extent, but is not the impetus for development. MORPC, other regional groups, and individual stakeholders have the ability to influence decisions, but not to directly construct assets or provide allowances for new growth on a large scale. The plans created by these groups provide the framework within which the development occurs. The townships have created plans that both facilitate growth, and provide constraints as to the type of development that will be permitted. In some cases, the constraints placed on new development are due to already overtaxed roads and services. In other cases, the inability to provide adequate utilities to facilitate higher density growth has been the primary restriction on higher density development. While each township and municipality is preparing for growth, they differ significantly on the type, location, and timing they forecast.

Individual property developers and constructors have historically been the direct drivers of growth as they have the ability to build new structures and infrastructure as approved by local government. They respond to market forces and provide infrastructure to fulfill that demand. This group is required to work with the local governments and utility providers both public and private. Private developers control the timing, location, land use, and to a certain extent the density of new development within the limits of the local zoning plans. These factors are typically influenced by the demand, availability of adequate utility service, and the approval of the local governments and planning commissions. Because developer plans can change significantly due to changes in economic conditions, expectations for development are best considered within a wide timeframe. The overall conclusion from developers, however, is that

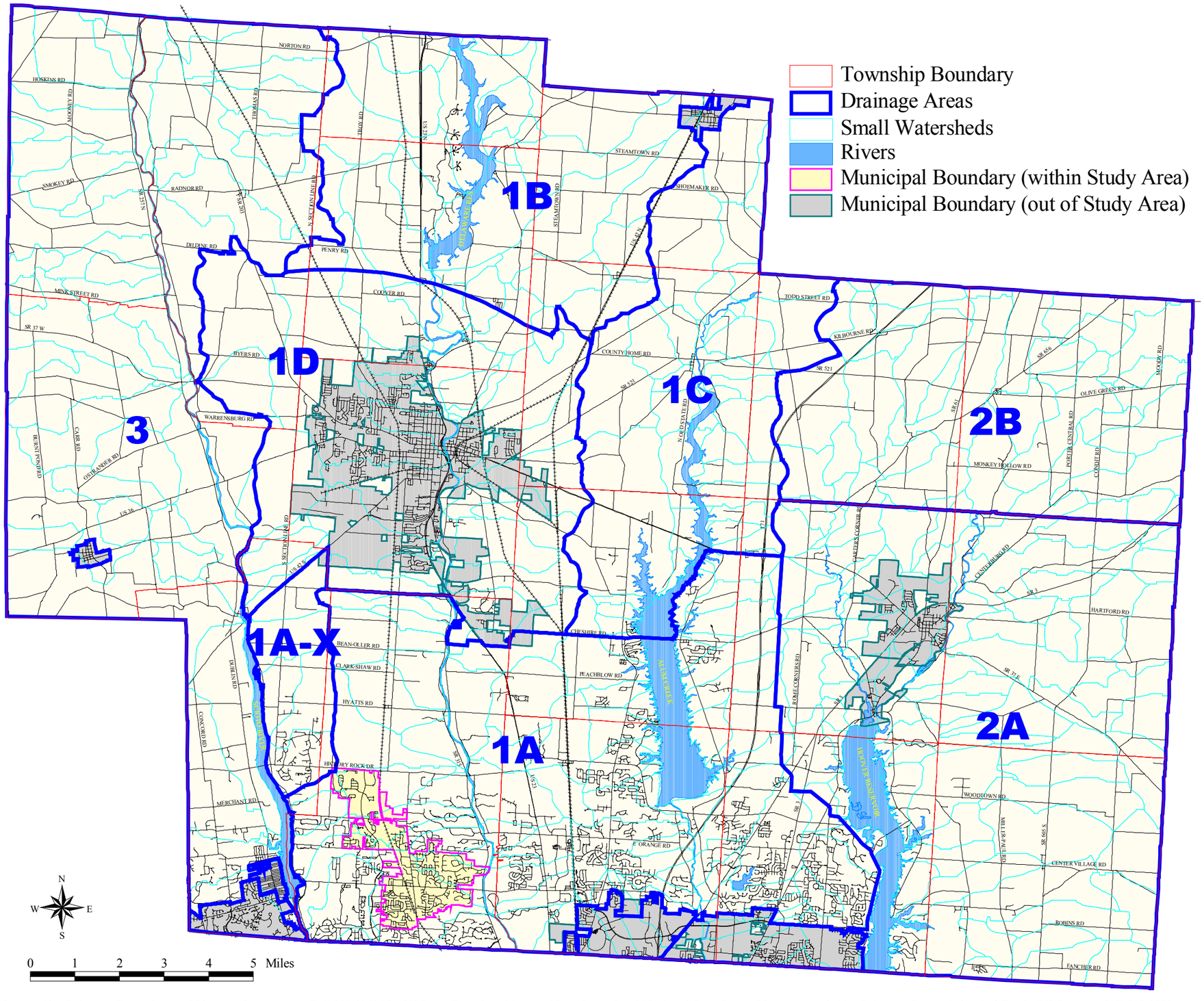
growth will continue in regions proximate to already developed areas or major thoroughfares where utility service is available within the county.

3.2.1 Delaware County Regional Sewer District (DCRSD) Master Plan (2008)

The Delaware County Regional Sewer District produced a Sanitary Sewer Master Plan in 2004, which was updated in 2005 and 2008. The updates included a snapshot of population growth immediately preceding the 2007-2008 recession as well as proposed future growth over the next decade. The Plan and update provided significant detail on the county land and water resources, existing and projected development, and an overview of sanitary assets. Figures 3-1 and 3-2 illustrate the 2005 Master Plan Drainage Areas and a current Sewer Map, respectively of DCRSD's infrastructure. Major elements of the 2005 report and its update in 2008 include:

- Updated planning and zoning forecast by townships, and translation of those conditions into sewer flows.
- Updated waste flows for existing areas representative of build out conditions
- Natural Resource Inventory of the County
- Overview of existing HSTS (including extensive sampling by the Health Department) and the suitability of those systems based on various criteria
- Future growth areas based in part upon local Comprehensive Plans and other weighted factors
- Alternatives for providing future service to areas identified as likely for near term growth

Despite the slowdown in development after the completion of these reports, the conclusions drawn remain much the same although the projected timeframes have changed.



Prepared by: Delaware County Regional Planning Commission | (740) 833-2260 | DALIS Data (Township / Municipal Boundaries, Road / Railroad Centerline and Rivers) provided by: Delaware County Auditor's Office DALIS Project | (740) 833-2070.

Map 2a: Study Areas Map

In order to determine the desirability and cost feasibility of sewer extensions and new treatment facilities, drainage areas were established based on the County's four major watersheds.

The drainage areas were labeled:

- Drainage area 1A
- Drainage area 1A-X
- Drainage area 1B
- Drainage area 1C
- Drainage area 1D
- Drainage area 2A
- Drainage area 2B
- Drainage area 3

The majority of development is located in the current sewer service area, drainage area 1A.

2008 DCRSD Sewer Map
Figure 3-1

LEGEND

- Flow Meter
- Air Release
- Treatment Plant
- DCRSD Pump Station
- Private Pump Station
- DCRSD Force Main
- Private Force Main
- Gravity Main 18" or Larger
- Gravity Main with No ID
- DCRSD Gravity Main
- Private Gravity Main

DATA SOURCE: Delaware Co. Regional Sewer District

0 Miles 1

NORTHSTAR WTP
NORTHSTAR PS
BENT TREE WTP
EAST ALUM CREEK PS
CHESHIRE PS
SUMMERWOOD PS
PEACHBLOW PS
VINMAR FARMS PS
HOOVER WOODS WTP
ACWRF WTP
ALUM CREEK PS
MAXTOWN PS
OECC WTP
DEER RUN PS
LAKES OF POWELL PS
LEATHER LIPS
TARTAN FIELDS WTP
TILLINGHAST PS
CONCORD PS
THE OAKS PS
TARTAN PHASE 20 PS
TROTTERS GAIT PS
SELDOM SEEN PS
SCIOTO BLUFFS WTP
SCIOTO RESERVE WTP
SCIOTO RESERVE NORTH PS
LSWRF WTP
GOLF VILLAGE NORTH PS
GOLF VILLAGE PS
QUAIL MEADOWS
SHERBORNE MEWS PS
SCIOTO HILLS PS

HDR

SEWER MAP

DELWARE CO. REGIONAL SEWER DISTRICT

FIGURE 1

3.2.2 Mid Ohio Regional Planning Commission (MORPC)

The Mid Ohio Regional Planning Commission (MORPC) produces a number of reports and studies related to the northern parts of Franklin and southern parts of Delaware County. These documents focus on transportation, traffic, source water, zoning, business and industrial development, education and healthcare access, recreation opportunities, and environmental conditions and highlight the past growth trends and detail ways to address future population increases. MORPC's publications highlight recommended changes to infrastructure, and include reports on waterways and how the changing dynamic of the County moving from rural to suburban has impacted them. Though much of the studied area has now developed, the MORPC plans describe what much of the infill is likely to be as well as any areas where a change in density may be likely. They also provide long term transportation and access studies for southern Delaware and northern Franklin Counties. **The major transportation highlights from MORPC's plans include improved interchanges at Polaris, US 23, US 36/SR 37, US 33, and SR 315. They also detail potential new highway access points at Big Walnut Road and in Kingston Township in northern Delaware County.** These new access points would serve to relieve existing pressure on local roads and are anticipated to spur further development in central Delaware County, if and when they occur.

Source Water and Balanced Growth Plans

MORPC has developed growth plans for each of the three major watersheds in Delaware County (Olentangy, Big Walnut [Alum Creek is included within Big Walnut on this MORPC report], and Upper Scioto). These plans solicited input from many of the same stakeholders as the Delaware County Sanitary Sewer Master Plan as well as downstream municipalities in Franklin County and environmental organizations. These plans outline what MORPC sees as a balanced approach to growth within the watersheds, specifically in terms of areas to be developed and areas that may better protect the environment by remaining as farmland. MORPC provides input on population growth and distributions as well as priority areas (in MORPC's opinion) for future sewer expansion. These plans, while not endorsed by all of the political entities within the planning area, provide an additional forecast of data describing the likely locations of near term growth. **These plans are generally consistent with what DCRSD and DCRPC have observed for residential, commercial and thoroughfare development.**

3.2.3 DelCo Water

DelCo Water is the primary provider for potable water used in the Township areas of Delaware County and is a private investor-owned utility. They provide water for many of the same customers the Regional Sewer District provides service for, and as such, are involved in planning for a similar geography. The DelCo Water Master Plan (2014) was developed with the goal of ensuring adequate supply of service to keep up with the growing community as well as the needs of existing residents. Additionally, as the water usage will roughly correlate to sewer flows, it is a good indicator of another utility's growth assumptions for the County for similar assets. Although the service area for DelCo Water extends beyond the reaches of the area sewers, the areas of highest growth are on the southern edge of Delaware County where ¾ of the DelCo Water treatment facilities are located as well as the bulk of their treatment capacity. According to 2012 consumption data, approximately 92% of the water used from the DelCo system was used in Delaware County, where both the population and consumption rates per person are significantly higher than other parts of the DelCo Water service area.

The DelCo Water planning period extends through 2035 with projections for each 5 year period and alternatives to keep up with the growth in demand where it occurs. Projections for demand within the existing service area can be seen in the table below which is from the DelCo Water Master Plan.

TABLE 3-1
Overall DelCo Water Demand Forecast

Year	2015	2020	2025	2035
Water Production (MGD)	15.34	18.42	21.20	26.86

This represents an approximate 20% increase in potable water demand projected over the next 5 years and a 38% increase over the next 10, primarily within Delaware County. This additional usage must be carefully considered and balanced against the knowledge that its impact on Delaware County wastewater treatment and pump stations may be lessened due to use of Home Sewage Treatment Systems, Zero Discharge systems, and the fact that some of this water is used for irrigation of lawns. Water service is initiated for new commercial, residential, and industrial developments by contacting DelCo Water, who will verify adequate supply and distribution is available in the area of request. If availability is confirmed, DelCo Water provides a letter stating that the water requested will be available in the quantities that are needed. Additional assets necessary to get the water from the existing DelCo system to the new development area are the responsibility of the developer; however DelCo Water

determines the size of the connection. New water pipes larger than 16” may involve cost sharing between the developer and DelCo Water, but all mains smaller than that size are solely constructed and funded by the party requesting the water service.

3.2.4 Ohio Department of Transportation (ODOT)

The Ohio Department of Transportation is tasked with the construction, maintenance, and planning for interstate highways and other state roads within Ohio, with ODOT District 6 handling the mid-Ohio region, including Delaware County. Due to the substantial growth this area has seen in the past few decades (both in terms of population and traffic), ODOT has been heavily involved in developing and implementing projects to handle these increases. Notable examples of past and current changes include major projects at I71 and the Polaris/Gemini exits, and major overhauls to the SR315/US23/I270 interchange which is currently underway. Projects are also currently revising the I270 interchanges with Cleveland Avenue and US33, planning for future upgrades at the I71 exit at US36/37, and slope stabilization and intersection upgrades at 315 and Powell Road. Longer term planning has also been undertaken for proposed new exits off I71 between 36/37 and Gemini, particularly around Big Walnut Road. Looking forward, it is anticipated that ODOT will continue to advance projects to improve access, enhance safety, and reduce traffic throughout the major thoroughfares within Delaware County under their jurisdiction.

3.2.5 Delaware County Engineer

The Delaware County Engineer plans, constructs, and maintains arterial roads within the County. Responding to the growth of the last 20 years, and their anticipated future growth, a number of new roads or road widening projects have been planned or constructed. While the projects expanding existing roads are constructed to handle current traffic with an eye on future growth, new roads, particularly multilane ones, open up new areas to development. **Examples of both are planned over the next few years with major proposed work on Home Road and on Sawmill Parkway anticipated to spur significant development upon completion.** Currently, projects planned through 2017 are available in some form for review, though a number of far reaching studies on longer term transportation plans are available from both the County Engineer and MORPC. **This slate of projects, summarized below, indicated areas where the development pressure will be greatest in the near term.** While these longer term plans are less certain, they do identify current and potential future issues and provide a first take at potential ways to remediate them.

2015 Projects:

- Blue Church Road over Little Walnut Creek (Kingston Township)
- Home Road Realignment West of US 23 (Liberty Township)
- East Powell Road Improvement (Orange Township)

- Home Road & Steitz Road Intersection Improvements (Liberty Township)
- Orange Road Improvements (US 23 Intersection)
- Sawmill Parkway Extension North of Hyatts Road (Liberty/Delaware Township)
- South Old State Road Improvements (Orange Township/Columbus)
- Vans Valley Road Bridges (Two bridges west of Miller-Paul)
- Worthington Road, Phase 1 (Powell Road to Africa) (2015-16)

2016 Projects:

- Liberty and Jewett Road Intersection (Liberty Township)
- Panhandle Road over Olentangy River (Delaware Township)
- South Old 3C Highway Improvements (Genoa Township)
- Stratford Road over Beecher Run Rehab (Delaware Township)
- Worthington & Big Walnut Road Intersection (Genoa Township)

Projects for 2017 and Beyond:

- Home Road & SR 315 Intersection Improvements (2017+)
- Home Road from Perry Road to west of US 23 (2017+)
- Lewis Center & Bale Kenyon Intersection Improvements (2017+)
- Lewis Center & Worthington Road Intersection (2017+)

3.3 Historical and Projected Growth

3.3.1 Population Projections

Population within Delaware County has been rising steadily since the 1970s in Liberty, Orange, Concord, and Genoa Townships and has expanded over the past 15 years to include large areas of Berkshire and Berlin Townships. **Table 3-2 illustrates the population distribution within Delaware County. Review of the recent growth rate of the total County population as well as the areas served by the District provides a reasonable basis for projecting the growth rate that the County may expect in the near future. Projections for long term growth, based on recent growth, are less conclusive and must take into account those systems that impact long term population change; transportation, quality of life and community amenities, etc. Approximately 85% of residents in Townships, and approximately 60% of the total County population are served by the Delaware County Regional Sewer District.** The City of Delaware has historically contained a large portion of Delaware County's population, but the ratio of County to City residents has changed considerably in the last 25 years. Between the 1970 and 1990 census, population growth patterns changed in two significant ways. First, population growth began to increase significantly (from the historic rates of 10-20% to 25-30%) between 1970 and 1990. These changes not only represented a major change in the growth rate, but also represented nearly a doubling of the population within the 20-year window from approximately 36,000 to 67,000 people. Second, population growth began to be distributed largely in areas contiguous to Franklin County in Orange, Liberty, Concord, and Genoa Townships.

The next major change in population occurred between 1990 and 2010. During this period, the growth rate adjusted to levels between 50% and 60% per decade. These rapid growth years represented one of the largest population increases by percentage in the entire nation. For most of the years between 2000 and 2008, Delaware County added between 5,000 to 10,000 citizens per year. The high rate of growth in these years translated to a total population increase from 67,000 people to 175,000 people by the 2010 census. This population change was almost entirely centered on the southern edge of the county, however, it began to move north toward Sunbury and Delaware as new land was rezoned and new subdivisions were built out.

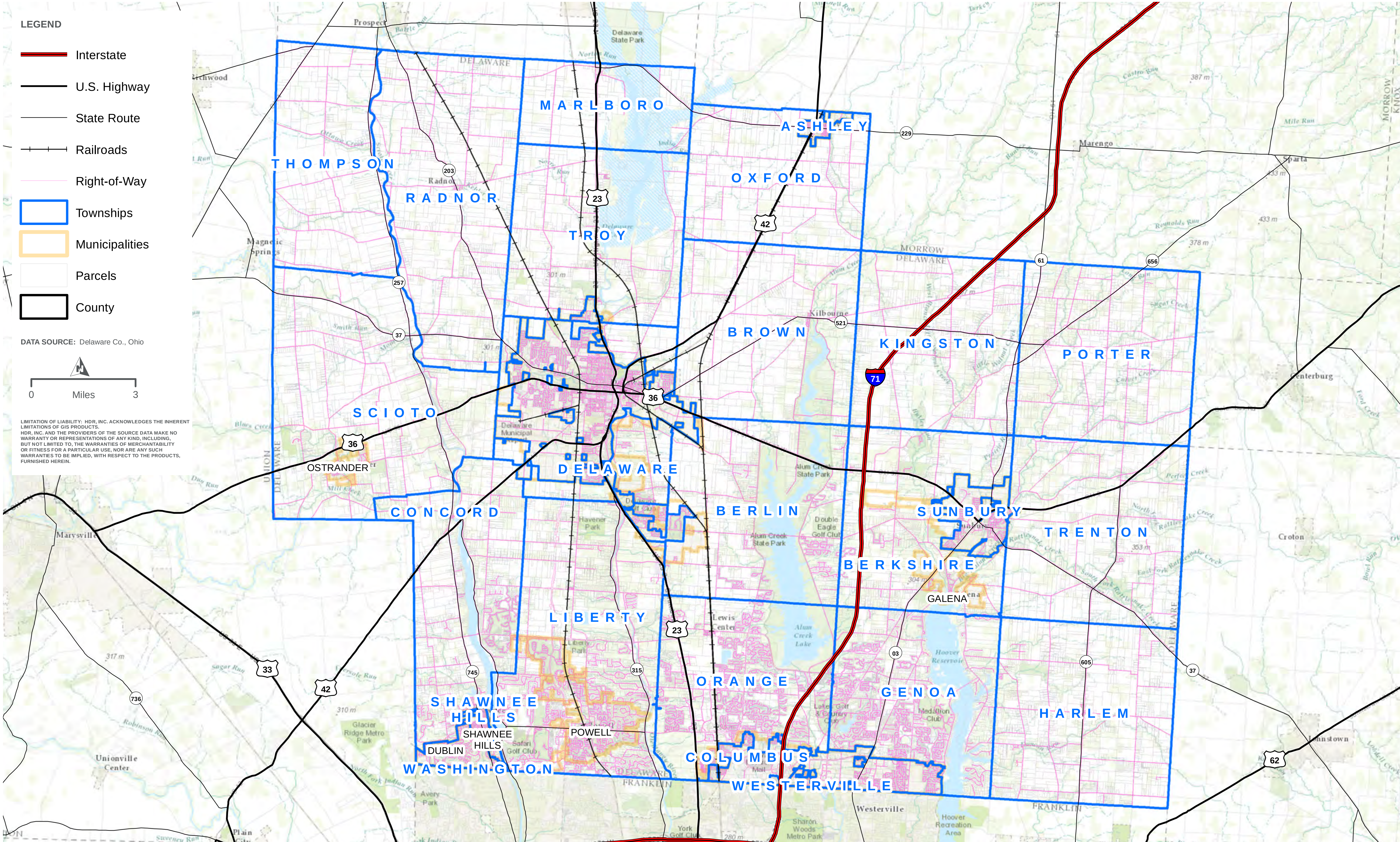
Between 2008 and 2015, a period of low population growth (due in large part to the documented recession) has led to population growth below 10% per year. The estimated population of the County in 2015 is 193,000 which represents a 10% increase over the 2010 census. The bulk of this population growth since 2010 has occurred in

areas served by the Delaware County Sewer District in Berlin, Concord, Genoa, Liberty, and Orange Townships.

While much of the commercial development over the last 20 year occurred along the major transportation routes within the county, population growth was driven by the large number of suburban developments undertaken. These residential developments have primarily filled in areas around the major thoroughfares and have steadily moved north into available agricultural land.

Table 3-2
Delaware County Population (based on DCRPC Estimates)

	Census 2000	Census 2010	July 2011	July 2012	July 2013	July 2014	July 2015
Berkshire Township	1,946	2,428	2,492	2,536	2,598	2,668	2,853
Belin Township	3,313	6,496	6,649	6,753	6,902	6,995	7,175
Brown Township	1,290	1,416	1,451	1,475	1,509	1,448	1,465
Concord Township	4,088	9,294	9,496	9,624	9,826	10,301	10,604
Delaware Township	1,559	1,964	2,014	2,048	2,096	2,040	2,064
Genoa Township	11,293	23,090	23,718	24,152	24,752	24,811	25,242
Harlem Township	3,762	3,953	4,043	4,103	4,191	4,047	4,138
Kingston Township	1,603	2,156	2,212	2,251	2,305	2,214	2,255
Liberty Township	9,182	14,581	14,980	15,256	15,637	15,673	16,308
Marlboro Township	227	281	288	292	300	286	293
Orange Township	12,464	23,762	24,420	24,872	25,495	25,935	27,104
Oxford Township	854	987	1,013	1,029	1,052	1,003	1,008
Porter Township	1,696	1,923	1,972	2,006	2,054	1,986	2,052
Radnor Township	1,335	1,540	1,580	1,607	1,645	1,570	1,603
Scioto Township	2,122	2,350	2,412	2,452	2,509	2,417	2,464
Thompson Township	558	684	700	712	730	709	712
Trenton Township	2,137	2,190	2,246	2,284	2,337	2,218	2,239
Troy Township	2,021	2,115	2,158	2,185	2,229	2,143	2,152
Township Total	**61,450**	**101,210**	**103,844**	**105,637**	**108,167**	**108,464**	**111,731**
Columbus (in Delaware County)	1,891	7,245	7,398	7,481	7,621	8,519	9,667
Delaware	25,243	34,753	35,656	35,925	36,459	36,609	37,800
Galena	305	653	664	666	669	735	768
Sunbury	2,630	4,389	4,543	4,606	4,715	4,760	5,057
Shawnee Hills	419	681	696	708	723	721	770
Powell	6,247	11,500	11,788	11,979	12,237	12,376	12,975
Ashley	1,216	1,330	1,341	1,341	1,345	1,342	1,347
Ostrander	405	643	650	651	654	747	844
Dublin (in Delaware County)	4,283	4,018	4,108	4,181	4,259	3,999	4,018
Westerville (in Delaware County)	5,900	7,792	7,949	8,013	8,130	8,357	8,444
Total Incorporated Areas	48,539	73,004	74,793	75,551	76,812	78,165	81,690
Total County	**109,989**	**174,214**	**178,637**	**181,188**	**184,979**	**186,629**	**193,421**



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COUNTY AND MUNICIPAL BOUNDARIES

DELAWARE CO., OHIO

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3.3.2 Building Permits

Approved Building permits for both Townships and municipalities are available for review through annual Planning Commission reports. The issuance of Township building permits is a direct indicator of residential development activity and rate of growth within the County. Permit summary reports are available from 2001 through 2014 and contain a financial review, lot split and transfer statistics, subdivision statistics and review, rezoning statistics and review, building permit statistics, population projections, GIS reviews, and staff updates.

Table 3-3 contains information regarding the total number of building permits issued in unincorporated areas from 2007 through June 2015. The table shows the total number of permits issued in each township per year for single, multi family and commercial properties. **Table 3-3 illustrates that 90% of single family, 100% of multi family and 85% of commercial development within the Townships occurs within area serviced by the District.** Building permits within Powell, large parts of Columbus (within Delaware County) and parts of Westerville (Areas 1 and 3) represent construction that would have sewer service provided by the District.

Table 3-3
Delaware County Building Permits - Unincorporated Areas

Township - New Residential									
Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015 (Jan - June)**
Single Family Units									
Berkshire	37	17	34	19	21	26	37	45	53
Berlin	40	30	20	35	30	26	19	28	10
Brown	2	3	5	2	3	4	3	6	0
Concord	68	57	40	61	64	63	46	29	8
Delaware	1	3	1	4	9	6	7	1	2
Genoa	123	66	69	74	69	94	63	38	30
Harlem	19	17	5	5	13	9	21	13	10
Kingston	12	1	4	3	2	1	9	5	4
Liberty	73	65	30	45	67	104	116	82	35
Marlboro	2	0	1	0	0	0	0	2	0
Orange	192	129	111	119	124	160	159	155	77
Oxford	5	1	0	0	1	1	1	1	1
Porter	6	3	1	5	6	5	13	10	6
Radnor	3	3	0	0	1	3	6	6	2
Scioto	5	10	4	3	8	7	8	9	5
Thompson	7	0	0	2	2	2	1	0	1
Trenton	7	3	2	3	3	3	4	4	3

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015 (Jan - June)
Single Family Total	**608**	**411**	**328**	**382**	**425**	**519**	**514**	**437**	**253**
Multi Family Units									
Berkshire	A	A	12	4	4	0	1	A	A
Concord	12	10	0	3	11	20	21	3	8
Genoa	25	6	0	8	14	22	47	1	0
Liberty	2	4	0	4	6	11	17	7	2
Orange	36	13	18	3	12	21	55	54	7
Multi Family Total	**75**	**33**	**30**	**22**	**47**	**74**	**141**	**65**	**17**
Single & Multi Family Total	**683**	**444**	**358**	**404**	**472**	**593**	**655**	**502**	**270**
Township - New Commercial Units									
Berkshire	5	2	6	3	4	1	1	1	11
Berlin	2	2	1	0	1	1	4	2	0
Brown	1	3	1	2	0	0	0	1	0
Concord	7	1	1	2	1	1	1	1	0
Delaware	1	3	1	1	0	1	0	0	0
Genoa	7	5	1	6	2	1	5	3	0
Harlem	2	1	0	0	0	0	0	0	0
Kingston	1					2	1	1	1
Liberty		7	4	0	3	0	0	0	0
Marlboro	A	A	A	A	A	A	A	1	0
Orange	12	14	9	19	6	13	4	14	8
Oxford	2	1	0	0	1	0	1	0	0
Porter	A	A	A	A	A	1	0	0	0
Radnor	A	2	0	0	0	0	0	0	0
Scioto			2	0	0	0	1	0	0
Thompson	A	A	A	2	0	0	0	0	0
Trenton	A	1	0	0	0	0	2	2	0
Troy	A	1	1	1	1	3	0	0	0
Commercial Total	**40**	**43**	**27**	**36**	**19**	**24**	**20**	**26**	**20**

Notes:

[1] A = Data not available

[2] Municipal Permits are Excluded

The development status of Delaware County's unincorporated area at the end of 2014 is as follows:

Single Family Lots:

- Non-Platted Zoned Lots:
  - Approved by Townships: 1,636 Lots
  - Pending in Townships: 78 Lots
- Sketch Reviewed Lots: 220 Lots
- Preliminary Approved Lots: 2,454 Lots
- Final Approved Lots: 19 Lots
- Non-Built Recorded Lots: 849 Lots

Multi Family Units:

- Housing Units with Building Permits: 2,492 Units

Total:

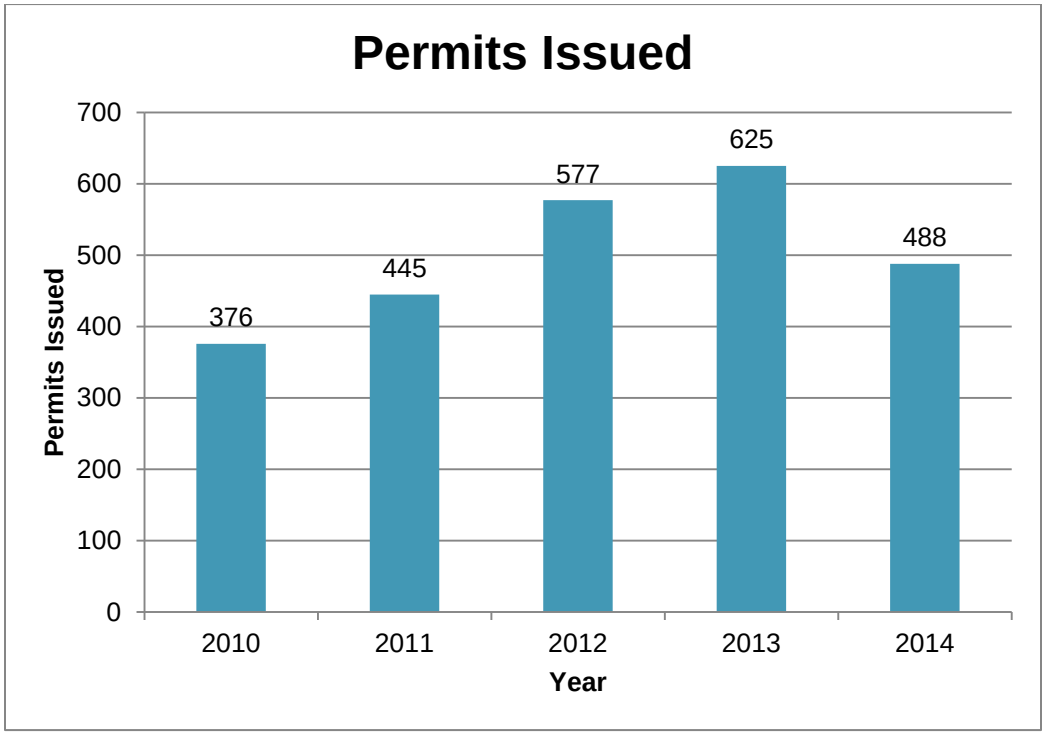
- Single Family Lots: 5,256 Lots
- Multi Family Units: 2,492 Units

This reserve of lots equates to approximately 14.8 Years of Supply in Delaware County based on the trends of the last 5 years (525 Building Permits/year). If the rate of construction were to increase, this supply backlog would go down without a commensurate increase in platting. This indicates that there is still long term interest in new construction in Delaware County as there are still a number of approved lots where Building Permits have not been issued.

3.3.3 Sewer Permits

Delaware County sewer permit records were reviewed, including, property addresses, permit numbers, date the permit was issued and the date of inspection. Records contain the entire year beginning in 1980 through May 2015. Chart 3-2 shows the number of sewer permits issued from 2010 – 2014. This correlates approximately to 85% of the Building Permits issued for the same year, generally matching the population distribution in the Townships that are served by the District.

Chart 3-1: Delaware County Sewer Permits Issued 2010-2014.



3.4 Zoning and Land Use Planning

Delaware County has a number of comprehensive regional planning and zoning resources in addition to the planning documents compiled by individual communities and State or regional organizations. The Delaware County Regional Planning Commission develops and maintains a number of Township level planning documents and ensures they are completed in a coherent way. Individual cities such as Columbus, Dublin, Westerville, Delaware, Powell, Sunbury, and Galena also maintain various planning reports and studies charting their projected growth with long and near term goals.

Most Townships within Delaware County have Comprehensive Master Plans compiled with the Delaware County Regional Planning Commission (DCRPC). These plans vary in their outlooks and timeframe, but are all composed in similar ways and have similar formats. Some of the Township plans are more than a decade out of date, while others have been completed within the last few years. Depending on the changes in population and development over that time, these plans could be out of date. Regardless of the time they were developed, however, they represent a coherent and thorough assessment of the Township at some point in the last 10-15 years and detail each jurisdiction's roadmap for the future. We have grouped these plans into 4 categories to better assess the different types of development they anticipate.

Table 3-4
Township Planning

Planning and Development Type		Township
1	Townships that have completed Comprehensive Plans and have Suburban type development.	Liberty, Orange & Genoa Townships
2	Townships that have completed Comprehensive Plans and have moderate levels of development	Berlin, Berkshire, Concord, Harlem Townships
3	Townships with Comprehensive Plans and predominantly rural use	Thompson, Radnor, Delaware, Marlboro Townships
4	Townships with no DCRPC Plan	Scioto, Brown, Porter, Kingston, Trenton, Oxford, Troy Townships

3.4.1 Townships with Comprehensive Plans and Suburban Development: Liberty, Orange, Genoa Township

These three Townships have already undergone significant development (although there is still a large amount of land open), particularly in Liberty Township. These Townships are more suburban in nature than the others, although there are areas which are significantly less developed, particularly northern Liberty Township and Genoa Township east of the Hoover Reservoir. With the exception of these more rural pockets,

these Townships are characterized by smaller lots (less than 1 acre) in subdivisions. There are also some residual larger lots that were common before the area began to suburbanize. In addition to the higher density of residential property, there is also a large quantity of commercial development, predominantly in the Polaris area but also along Sawmill Parkway and US 23. Parts of these Townships (particularly Liberty), have been subject to annexation in the past as both Powell and the City of Delaware have expanded. All of Powell has sanitary sewer service and wastewater treatment provided by the Delaware County Regional Sewer District.

Liberty, Orange, and Genoa Townships are primarily served by sanitary sewer which runs though collector lines to either the Olentangy Environmental Control Center or the Alum Creek Water Reclamation Facility. Table 3-5 Illustrates remaining open lands which warrant further evaluation. Identifying features that make land developable (access to roads, utilities, and other amenities as well as topography) will further refine these areas to what is developable within the Townships.

Table 3-5
Farmland by Township (2012)

Township	Acreage	% of Total
Berkshire	6,234	42%
Berlin	3,756	25%
Brown	4,685	29%
Concord	3,570	26%
Delaware	2,205	39%
Genoa	783	6%
Harlem	9,742	59%
Kingston	4,972	34%
Liberty	3,759	22%
Marlboro	4,265	57%
Orange	1,715	13%
Oxford	9,647	79%
Porter	8,062	50%
Scioto	14,143	65%
Thompson	9,854	77%
Trenton	11,451	69%
Troy	7,220	48%
Township Total:	**106,063**	**37%**

3.4.2 Townships with Comprehensive Plans and Moderate Development: Berlin, Berkshire, Concord, Harlem Townships

These four Townships are occupied by both typical rural development as well as suburban style development. There are pockets of suburban style neighborhoods typified by lot sizes below an acre with either HSTS or sanitary sewer service. These Townships also include large areas where very low density residential or agricultural land uses predominate.

Concord Township has experienced the most growth along its southern and eastern edges as it abuts Dublin, Shawnee Hills, and Powell. While the density in southern Concord Township is similar to that seen in the communities to its south, areas farther north exhibit more rural characteristics such as agriculture and larger lot sizes. The Scioto Reserve and Tartan Fields developments on the south west and south east corners of Concord Township have sanitary service provided by gravity sewers flowing to a Zero Discharge facility within the development.

Harlem Township anticipates future growth driven by expansion of the area around New Albany, per its Comprehensive plan. At this time however, the township remains almost entirely agriculture and low density residential housing. This area will likely have future sewer service provided by the City of Columbus per their plans and agreements that have been made between the City and DCRSD.

Berkshire and Berlin Townships have growth driven by internal factors such as access to major thoroughfares and proximity to the City of Delaware and Villages of Sunbury and Galena. Commercial expansion along the 36/37 Corridor as well as the I71-36/37 Interchange has led to increased residential growth in the area. Planned improvements to the entrance and exit ramps off I71 as well as the annexation of township land by Sunbury is likely to lead to more development in Berkshire and Berlin Townships similar to Liberty, Orange, and Genoa Townships. As both Berkshire and Berlin Townships have had areas annexed from surrounding communities, the sanitary collection systems of the annexing communities have followed to serve them. While stretches of both Townships near Delaware, Galena, and Sunbury have developed with the highest densities, other areas within the Townships have included more varying types of development and these township areas have sanitary service provided by DCRSD. In addition to the pre-development residential units, new subdivisions have been established in Berlin and Berkshire Townships utilizing sanitary sewers pumped to ACWRF, a Zero Discharge system (Bent Tree), and HSTS. These subdivisions have higher densities than the rest of the Townships but are often still lower in density that the developments encountered in Liberty, Orange, and Genoa Townships. Large areas of

both Berkshire and Berlin Townships are still zoned for Agricultural or Farm Residential development although this is expected to change as access to transportation and increased commercial development continues.

3.4.3 Townships with Comprehensive Plans and in predominantly rural Townships: Scioto, Brown, Porter, Kingston, Trenton, Oxford, Troy Townships

These Townships have limited development and are characterized primarily by a rural atmosphere. The roads are predominantly the historical farm to market two lane roads with few structures. The homes and businesses that do exist are built on larger lots (2-5 acres in most cases) and are served by private Home Sewage Treatment Systems. These Townships have no connections to the sanitary sewer system connected to the three major Delaware County Regional Sewer District facilities. Kingston Township has limited sewer service as part of Zero Discharge systems established around the Northstar development.

The comprehensive plans for these Townships list their predominantly rural characteristics such as open spaces, light traffic, low crime and pollution as major benefits to the community. These comprehensive plans, though diverse in their communities, all describe a desire to keep out higher density growth to maintain their current residential or agricultural character. This can be seen in the proposed densities for new residential development, which are in the range of less than 1 unit per acre.

3.4.4 Townships with no DCRPC Plan: Thompson, Radnor, Delaware, Marlboro Townships

These Townships are primarily rural in nature and did not have Comprehensive Plans filed with the Planning Commission. The Townships are on the north and western edges of the county and are characterized by large amounts of agricultural land as well as some pockets of woods. The homes in these areas are all served by on site Home Sewage Treatment System as there are no sewers available and the current density does not make them likely. There is also not likely to be any changes in this zoning or density in the immediate future due to the distance from all three major Delaware County plants as well as the Wastewater Treatment facilities in Ashley, Sunbury, and the City of Delaware. Connections to any of these systems would require extensive improvements to the collection system.

3.4.5 City of Columbus

The City of Columbus has extended water and sewer service into Delaware County over the last two decades. These extensions have primarily been around the Polaris Shopping

Center complex with the sewage from this area primarily treated by Delaware County through agreement. The 1,200 acre shopping, business, and residential complex is a significant source of wastewater within the county system and is tributary to the Alum Creek Water Reclamation Center via pump station. This area has been built up significantly since it opened in the early part of the 1990s with additional growth expected to continue over the next ten years as areas north and east of the mall area develop. This infill development is projected to be of similar style and density as the rest of the Polaris area, namely commercial and office space with some higher density residential as well.

3.4.6 City of Delaware

The City of Delaware maintains and operates a wastewater collection system and a treatment facility, the Upper Olentangy Water Reclamation Center. This facility has an average design flow of 10-MGD which is discharged to the Olentangy River after treatment. The City has annexed more rural areas of Delaware, Berlin, and Liberty Township and provides sanitary service to those areas in addition to the city core. Agreements for the conveyance or treatment of sewage between different political entities are detailed in Attachment 1. The City of Delaware also maintains its own Comprehensive Plan and Collection System Master Plan which is currently undergoing revision.

3.4.7 Village of Sunbury

The Village of Sunbury maintains its own collection system and the Sunbury Wastewater Treatment Plant with an average design flow of 1.125 mgd off Middleview Drive. This facility discharges to Prairie Run, a tributary of Big Walnut Creek. This system is currently capable of handling all flow from Sunbury as well as some outlying areas which have been annexed over the recent years. Sunbury's historic growth has focused north and west of the village along US 36/ SR 37.

3.4.8 Village of Galena

The Village of Galena owns and operates its own wastewater collection system and treatment plant with an average design flow of 0.50 mgd. This facility discharges to the Big Walnut Creek.

3.4.9 Village of Ashley

The Village of Ashley maintains their own 0.20 mgd WWTP southeast of town. It serves the village as well as some homes and businesses in Oxford Township in the vicinity of the plant. It discharges to an unnamed tributary of Alum Creek.

3.4.10 Village of Ostrander

The Village of Ostrander owns and operates its own 0.10 mgd wastewater treatment facility which discharges to the Mill Creek.

3.4.11 City of Westerville

Westerville owns and maintains its own wastewater collection system, but contracts for treatment. The bulk of Westerville's service area flows south to City of Columbus facilities, some areas on the northwest side of Westerville are directed to Alum Creek WRF. Not all of Westerville is developed, though there are currently plans to infill most of the undeveloped area, some of which will have sewage flows directed to DCRSD. The existing flow is transferred to Delaware County's Sewer system by pump station according to an agreement, which is detailed further in the Agreements section.

3.4.12 City of Dublin

The City of Dublin owns and maintains a sanitary sewer collection system but not a treatment facility. It sends approximately 6 million gallons per day of sewage to the City of Columbus for treatment. The collection system in Dublin also conveys flow for Shawnee Hills and other areas near the Columbus Zoo, south for treatment. Dublin has constructed or paid for large parts of conveyance systems that will continue to direct flow to the City of Columbus for treatment for the foreseeable future.

3.4.13 City of Powell

The City of Powell maintains neither their own sanitary sewers nor a sewage treatment facility and the Delaware County Regional Sewer District is in charge of conveying and treating the wastewater generated. All flow from Powell is either treated at Zero Discharge facilities, HSTS, or conveyed to the Olentangy Environmental Control Center. Growth in Powell has been heavy since 2000 and has included the annexation of parts of Liberty Township. Growth in Powell has followed the developing Sawmill Parkway corridor north and has included single family neighborhoods as well as pockets of higher density and commercial development. Growth in Powell is anticipated to continue in a similar fashion as areas east and west of Sawmill Parkway develop over time.

LEGEND

- Township Boundary
- Municipalities

Zoning

- Agricultural District
- Agricultural Residential District
- Alum Creek State Park
- Farm Residential District
- Community Business District
- General Business
- Floodplain Regulatory District
- General Industrial
- Recreational District
- Highway Service District
- Industrial District
- Light Industrial District
- Limited Industrial District
- Low Density Residential District
- Medium Density Residential District
- Multi-Family Residential
- Multi-Type Residential District
- Neighborhood Business
- Neighborhood Commercial District
- Neighborhood Office District
- Non-Conforming Use
- Outside Storage/Warehouse
- Planned Commercial & Office District
- Planned Community Facilities District
- Planned Elderly Residential District
- Planned Institutional District
- Planned Office District
- Planned Residential District
- Quary District
- Residential
- Rural Residential District
- Single-Family Planned Residence District
- Suburban Residential District
- Transitional Planned Unit Development
- US Land

DATA SOURCE: Delaware County, Ohio

0 Miles 3

MARLBORO
ASHLEY
THOMPSON
RADNOR
OXFORD
TROY
BROWN
KINGSTON
PORTER
DELAWARE
SCIOTO
OSTRANDER
BERKSHIRE
TRENTON
CONCORD
LIBERTY
BERLIN
SUNBURY
GALENA
ORANGE
GENOA
HARLEM
SHAWNEE HILLS
DUBLIN
POWELL
COLUMBUS
WESTERVILLE

DELAWARE COUNTY ZONING MAP

DELAWARE CO., OHIO

PATH: J:\OH\DELAWARECO\DELAWARECO_WWMP\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\ZONING_MAP_150825.MXD - USER: MMILLER - DATE: 8/27/2015

3.5 County GIS

Geographic Information System (GIS) shapefiles are maintained by various departments within the County and compiled by the County Auditor. These files represent the general infrastructure of the county such as roads, schools, parks, land use, and other public buildings as well as aerial maps and topographic information. In addition to the information maintained by the Auditor, individual departments are tasked with maintaining their own data files to better maintain their assets. The Regional Sewer District maintains a number of shapefiles updated to maintain their accuracy. Key information is included within the shapefiles detailing the location, depth, size, material, and other crucial information related to the condition and orientation of assets. The list below includes a list of the various shapefiles maintained by both the County Auditor and other regional organizations and reviewed for this Master Plan:

- Elevations and Topography
- Parcels
- Roads and Railways
- Park Land
- Zoning
- Comprehensive Plan Density
- Water Resources
- Floodplains
- Wetlands
- Soil Types
- Political Boundaries
- Right of Way
- Proposed Roads
- Proposed Subdivisions
- Rezoning Cases
- County Engineer Projects
- Proposed and Existing Bike/Walking Paths
- DelCo Water Pipes
- DelCo Water Tanks, Booster Stations, and Treatment Works

3.6 Development Trends

Delaware County was one of the fastest growing counties prior to the 2008 Recession. While growth and development certainly slowed between 2007 and 2013, it did not completely cease. Population growth and residential and commercial development in the county reached its lowest point in 2009 (based on building permit data), but has increased since that time. The long term trends of population expansion have historically been strongest in the Liberty, Orange, and Genoa Townships that neighbor Franklin County. In recent years, however, growth has moved into Berkshire and Berlin Townships particularly near the Village of Sunbury and along major transportation corridors and interchanges. Commercial development has focused in the Polaris area as well as the US 23, Sawmill Parkway, and SR 36/37 corridors with residential developments expanding around them.

As development moves farther north away from existing sanitary facilities, the capacity to handle additional flow has been stretched. This has impacted the size, density, and location of new development and has spurred the use of more localized treatment technology. The availability of open farmland and changes to zoning in the areas contiguous to existing developed areas has led to extensive development, and those features have not changed. **The trend towards suburbanization north of existing developed areas and future commercial development around Polaris and major transportation corridors looks set to continue. In the absence of available sanitary capacity, development will struggle to build higher density infill, but the ability to use alternative means of treatment will continue.**

Section 4 – Delaware County Sanitary Service

4.1 District Service and Agreements

The current District service area, illustrated on Figure 4-1, includes both land currently served by District Facilities as well as land currently planned to be served at build out conditions – and represents the boundaries that will be evaluated for sewer contribution under this Master Plan. Service area mapping was developed in its most recent form in the 2004 Master Plan and the 2005 and 2008 updates identify build-out conditions based on Township land use and zoning.

Within the County Sewer Service Area, the District has entered into almost 30 separate arraignments, resolutions and/or memoranda that detail the County and/or other local communities' agreements for managing the sanitary flow, sanitary sewer collection systems and sewage treatment systems of Delaware County. Each agreement has unique parameters and/or limits. **For example, the Polaris area agreements with Columbus (No. 1) have sewer limits equivalent to 16.5 persons per acre at 100 gal/person/day; additional area is available for development within this area.** The agreement with Westerville (No. 4) for the Polaris area stipulates that flow be directed to Columbus for treatment.

A comprehensive list of service agreements, resolutions and/or memoranda that detail managing the sanitary flow, sanitary sewer collection systems and sewage treatment systems are provided in Appendix 1. This list includes a summary of each service agreement including service area; basic agreed upon services; flow parameters; fees; begin date of the agreement; end date of the agreement; and any attachments that were included with the agreement.

LEGEND

- Alum Creek
- Alum Creek - B
- Alum Creek - C
- Bent Tree
- Central Big Walnut
- Columbus Service Agreement Area No. 1
- Columbus Service Agreement Area No. 4
- Delaware City-County Service Area
- Hoover Woods
- Lower Big Walnut
- Lower Scioto
- Lower Scioto or OECC
- Municipal Service Areas
- Northstar
- OECC
- Central Olentangy
- Scioto Hills
- Scioto Reserve
- Tartan Fields
- Westerville Service Agreement Area No. 1
- Westerville Service Agreement Area No. 2
- Westerville Service Agreement Area No. 3
- Westerville Service Agreement Area No. 4
- Westerville Service Agreement Area No. 5
- Westerville Service Agreement Area No. 6

DATA SOURCE: Delaware County Regional Sewer District

0 Miles 2

CENTRAL OLENTANGY

CENTRAL OLENTANGY

CITY OF DELAWARE

DELAWARE CITY-COUNTY SERVICE AREA

ALUM CREEK B

ALUM CREEK - C

NORTHSTAR

NORTHSTAR

BENT TREE

CENTRAL BIG WALNUT

SUNBURY

GALENA

LOWER SCIOTO

SCIOTO RESERVE

LS or OECC

OECC

SCIOTO HILLS

OECC

DUBLIN

TARTAN FIELDS

ALUM CREEK

LOWER BIG WALNUT

HOOVER WOODS

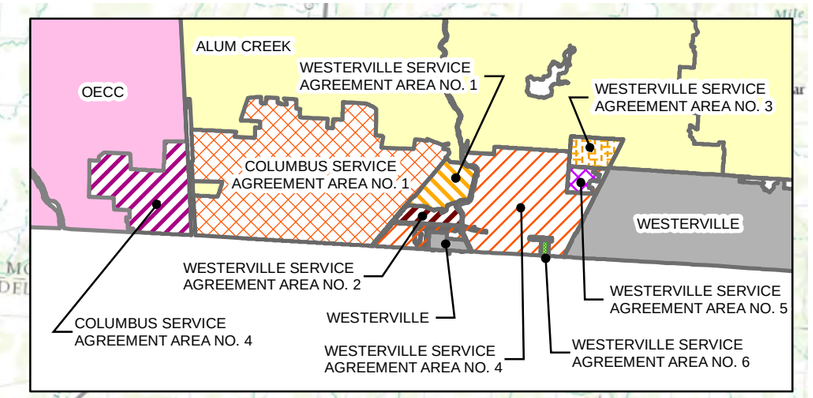
LOWER BIG WALNUT

ALUM CREEK (Columbus)

ALUM CREEK (Westerville)

WESTERVILLE

Inset Map (Above)



WWTP SERVICE AREAS

DELAWARE CO., OHIO

4.2 Home Sewage Treatment Systems

The Delaware County Health Department was contacted to determine both the number of systems currently installed and the annual rate of new system installation. **As illustrated in Figure 4-2, according to DCHD records approximately 13,000 HSTS permits have been issued - this represents 3.75-MGD of wastewater (290 g/d/house). Department staff has observed an average of 150 new systems being installed per year for the past several years – approximately 45,000 g/d/y.** HSTS have historically been used as an alternative to tapping into sewers where there is available land to discharge the leachate and where sewer connection is either unavailable or not considered financially viable. The Department regulates the installation of these systems and requires site-specific soil testing to ensure they are appropriate for the site. Discussions with the Health Department specific to their data, their rules, and procedures have yielded both measurable and anecdotal data of use to the Sanitary Sewer Master Plan. **The most recent report published by the Ohio Department of Health indicated that approximately One-Third (33%) of all HSTS are considered to be in a failure condition. Nearly half (50%) of these failures are directly attributable to system age.** In addition to Health Department records, TMDL reports issued by OEPA generally document HSTS's that contribute to water quality impairment.

Although proper care and maintenance can prolong the life of HSTS, these systems do have an anticipated lifespan like any built infrastructure, beyond which they no longer operate effectively. As the systems deteriorate, they begin to operate in a fashion that does not adequately treat the sewage being produced, leading to discharges to groundwater, nearby drainage systems, and local waterways.

Sampling completed by the Health Department for the 2005 Sanitary Sewer Master Plan indicated that a large number of HSTS in the county were releasing some level of pollutant that could be measured downstream. According to recent discussions with Health Department staff, very few of these areas have been connected to gravity sewers since 2005. In addition, the Health Department has continued to approve new installations at a rate between 100 and 200 a year. While some of these systems are being installed in areas far from existing sewers, a large number of them are being installed in areas relatively close to existing sanitary sewers.

LEGEND

- Home Sewage Treatment Systems
- Townships
- County
- Parcels

DATA SOURCE: Delaware Co., Ohio

0 Miles 3

MARLBORO
ASHLEY
THOMPSON
RADNOR
OXFORD
TROY
BROWN
KINGSTON
PORTER
SCIOTO
DELAWARE
CONCORD
BERLIN
SUNBURY
TRENTON
BERKSHIRE
LIBERTY
ORANGE
GENOA
HARLEM
SHAWNEE HILLS
WASHINGTON
COLUMBUS
WESTERVILLE

HOME SEWAGE TREATMENT SYSTEMS

DELAWARE CO., OHIO

Section 5 – Conveyance

Almost 10 million gallons of sewage is conveyed and treated by the District on average, each day. The District's conveyance infrastructure is made up in large part of privately constructed sewers and pump stations at the neighborhood-level connected to larger trunk sewers that convey flow to one of nine Water Reclamation Facilities. Figure 5-1 illustrates the Service Areas of each of the 8 on-line facilities. **As presented in Table 5-1, Olentangy Environmental Control Center and Alum Creek Water Reclamation Facility currently treat 95% of the sanitary flow within the District.** ACWRF was constructed as a state-of-the-art facility during the 1990's housing construction boom and was commissioned in 2002. OECC was constructed in the 1970s but was substantially expanded with the south plant coming on line in 1996. After reviewing data and documents provided by DCRSD as well as conducting a number staff interviews, District needs can be classified in one of the three following categories:

Planning: Providing cost effective infrastructure that maintains the District's desired Level of Service. New infrastructure is provided when necessary and in a manner that supports desired growth in a financially sustainable and balanced manner.

Operations: Conveyance and treatment of sanitary flow in an efficient manner that consistently exceeds regulatory requirements and prepares the District for anticipated regulatory changes.

Maintenance: Proactive repair and/or replacement of infrastructure to ensure reliability and redundancy in support of successful Operations.

Table 5-1
Water Reclamation Capacity[1]

Facility	ADF Design (MGD)	ADF Actual (MGD)	% Remaining of ADF
ACWRF	10	5.1	49%
OECC – South	4.5	4.32	4%
OECC – North[2]	1.5	-	100%
LSWRF	1.4	0.1	100%
Bent Tree	0.01	0.005	50%
Hoover Woods	0.025	0.011	56%
Northstar	0.5	0.057	89%
Scioto Hills	0.084	0.08	5%
Scioto Reserve	0.4233	0.286	32%
Tartan Fields	0.25	0.134	46%
Total	**18.7**	**9.9**	**47%**

[1] PTI Applications DCRSD website
[2] North plant not currently in service

5.1 District Workshops

Several discussions were undertaken to gain an understanding of specific challenges facing the District. Meetings were conducted with Engineering, Collections, Treatment (OECC, ACWRF & Package Plants) and Maintenance Staff. The comments from those discussions are presented below:

5.1.1 Engineering Department Meeting

Planning

- Big picture goal is to make sure that department makes sustainable decisions
- District had developed a budget forecast and corresponding fee increase that would cover 'big-picture, all-in' development. That planning and fee increase was placed on hold pending consideration of the Master Plan
- Desire more accurate representation of user charges vs. how District costs are applied to expenses
- Ensure District policy is sound regarding investments related to development
- Powell is the most active in terms of sewer need and development
  Within the county there are several community authorities, and we would like to better explore how relationships can be mutually beneficial.

Maintenance

- Near term objectives are to 'take stock' of current condition of infrastructure to ensure long term sustainability of District.
- Desire a clearer picture of remaining infrastructure useful-life.

5.1.2 Collection System Staff Meeting

Planning

- Improved software and training will allow department leadership to focus more on planning and coordinating staff than data management.
- Better collaboration between construction and collections will improve the integrity of the finished sewer systems, particularly the service laterals.
- Collection system challenge reducing I/I – integrity of installed pipes and manholes (specifically brought over from developments)

Operations

- Department currently lacks a facility that will house all equipment and staff. This results in expensive equipment being parked outside – most Collections Department

equipment holds water or has a tank. Centralized facilities and/or facilities than can house all staff will permit a more cohesive approach to collection systems operations, problem response and cleaning activities.

- Desire infrastructure to support meeting sewer inspection goals as dictated by OEPA. (Equipment, facilities & staff – though a couple new employees have hired on recently).
- Desire a facility to dump and dewater material from sewer cleaning work – reduces odors, cuts down on drive time and improves work flow efficiency.
- Grease is an issue at some pump stations
    - Stations need to be pumped down multiple times by hand to break up grease
    - Polaris Parkway area is tributary to Delaware County facilities but there is no ability to enforce
    - Grease needs to be broken up every 3-4 weeks
- Cost for chemical feed to sewers to reduce odors and hydrogen sulfide corrosion has increased to $700k/year
    - Currently treated with trioxen
    - Numerous sewer segments and manholes have been damaged and replaced
    - Would like to investigate using add mixtures for concrete or other ways to reduce Hydrogen Sulfide formation and corrosion

Maintenance

- Due to equipment age, the risk of pump station failure has increased. Equipment failures can lead to backups and overflows. As many pump stations are located in areas tributary to reservoirs, any overflow could potential release raw sewage to drinking water supply reservoirs.
- Would like materials implemented in new construction that inhibit corrosion to avoid repairs and risk of failure in manholes and other concrete structures.

5.1.3 Treatment Facilities - General

Planning

- Evaluation of plant cyber security is desired to ensure this insurance is in place.
- Staff requested an overall review of ‘redundancy’ to ensure all critical pieces of equipment or processes are in place to mitigate the risks from failure.

Operations

- Operations staff would like to investigate ways to reduce power consumption and suggested high speed turbo blowers (HSTB).

5.1.4 OECC Treatment Facility

Planning

- Filter repairs and UV replacement are currently being implemented.

Operations

- Operators have indicated that the raw sewage pump station operating level occasionally rises above the sewer invert. No overflows have been reported, but staff desires to better control rise in the wet well levels.
- The current phosphorus limit is successfully met with the current plant. Due to anticipated tighter phosphorus limits and possibly nutrient limits in future NPDES permit revisions, the plant will need to enhance the nutrient removal capability in the aeration tanks by ensuring the proper zones are in place. [Segmenting aeration tanks into anoxic (mixing with no oxygen transfer) and aerobic zones (oxygen transfer) promote bacteria that consume nutrients in the wastewater]. Plastic baffle walls were previously installed but became damaged and then were removed. Mixers frequently bind with rags and debris and fail.
- Solids processing throughput time through the single centrifuge is extended across several shifts which creates staffing challenges. A second centrifuge would allow trucks to be filled in a more reasonable amount of time.
- Current filter technology has not been reliable and creates excessive backwash recycle that must be treated a second time. This filter technology is prone to plugging which leads to excessive backwash and potential for flow to bypass around filters.

Maintenance

- Maintenance and operations time is used dealing with debris that comes into the plant, including rags plugging equipment (raw sewage pumps, aeration mixers, RAS pumps and clarifier sludge system) and frequent cleaning of grit from the aeration tanks. Removal of this material before it enters the plant would reduce downtime and maintenance of equipment.
- The South plant normally operates 3 of the 4 aeration trains which provide flexibility to buffer storm flow and help ensure steady treatment. Influent flows are currently approaching 75% of design average capacity at which point the 4^{th} aeration tank will be needed for treatment. This will limit the plant's ability to buffer flow until the North Plant is in service. A step feed configuration [introducing raw sewage to multiple points of aeration in order to balance solids distribution during wet weather

events] would help offset this lack in flexibility. The aeration diffusers are due to be replaced.

- There is a specific yard valve on the sludge feed system that is broken, resulting in reduced flexibility in solids transfer during wet weather events. Due to the surrounding utilities and foundations it will be difficult/expensive to excavate and replace.
- Concern regarding refurbishment of the North Plant was expressed; the timing of bringing it online soon enough in relation to EPA and development pressure. Additionally it must now treat to tighter standards that what it was originally designed for, or it may have to operate at a lower capacity than what is anticipated in order to meet the same 2015 limits as the South plant.

5.1.5 ACWRF Treatment Facility

Planning

- Ongoing projects: aeration diffuser replacement, flocculation system mixer replacement, filter work.

Operations

- Desired to optimize the biological system to reduce solids loading to the filters [more efficient biological process will result in more consistent and lower secondary clarifier effluent solids] and this may require modification to the clarifier sludge return system.
- More efficient blower operation is desired, current blower style has no turndown
- Reducing water content of solids hauled offsite is desired. The County is paying for too much water to be hauled to the landfill. Concern is that a thicker sludge would require odor control and other modifications.

Maintenance

- Maintenance and operations time is used dealing with debris that comes into the plant, including rags plugging equipment (raw sewage pumps, aeration mixers, RAS pumps and clarifier sludge system) and frequent cleaning of grit from the aeration tanks. Removal of this material before it enters the plant would reduce downtime and maintenance of equipment.
- 4 years ago major PLC failure (at both facilities) caused valves to shut. Quick action by Staff mitigated the impact of this event. PLC Control boards are believed to be older with increasing risk of failure.

5.1.6 Package Plant Treatment Facilities

Planning

- Would like to identify a long term plan to convert package plants, including Scioto Hills and Bent Tree, into pump stations that pump to larger facilities reducing the number of major facilities.
- Bent Tree to eventually pump to North Star to consolidate package plants and reduce maintenance at sites

Operations

- EQ and new generator will increase reliability and flexibility at Tartan Fields.
- Several package plants, including Tartan Fields, operate close to permitted levels. Several plants have had permits tightened beyond what they were designed to meet.

Maintenance

Age of equipment at package plants is a concern.

5.1.7 Maintenance Staff

Planning

- A systematic review of useful life should be completed that would permit more accurate projections for budgeting for the replacement of major components; pumps, grinders, blowers, etc.

Operations

- Current garage does not have space to house all emergency equipment and trucks
- Since several plants use aeration mixers, the current technology should be evaluated to identify if more efficient equipment could prove cost effective, have consistency across plants and invest in something that will alleviate what has been a maintenance intensive piece of equipment.

Maintenance

- VFDs and many other larger components are reaching the end of their expected life; concern is that these will begin to unexpectedly fail.
- Grinders at each pump station could reduce maintenance costs related to clogged pumps.

5.2 Collection System GIS

The Districts Collection System GIS data will be incorporated into the Master Plan through software to model the hydraulics of the system; each sewer layer was reviewed for completeness and source. This geodatabase containing the sewer GIS data was provided by the District and represents the system as of May 29, 2015. Figure 3-2 illustrates the District's Sewer GIS linework overlaid on the County GIS map. The Collection System GIS information includes the following layers:

- Manholes
- Gravity Mains
- Force Mains
- Sewer Network Junctions
- Air Releases
- Pump Stations

All six layers, specifically the Manholes and Gravity Mains, were found to be relatively complete and suitable for importation into the modeling software with only minimal data filling. A detailed assessment of each sewer GIS layer is provided in the following sections.

5.2.1 Manholes

This table contains a total of 10,096 individual features, representing the total number of sewer manholes across the service area. For the development of the master plan, the most critical information is to support the model development and to evaluate critical locations in the system. In addition to the northing and easting location, the manhole ID (DCRSD_ID), and the top of casting (TOC) fields are most critical to the model construction. Table 5-2 represents that 86% of manholes had TOC elevation information included.

Table 5-2
Manhole Top of Casting Statistics

Total Number of Manholes	10,096
Manholes with TOC	8673 (86%)
Manholes without TOC	1423 (14%)

5.2.2 Gravity Mains

GIS contains a total of 10,066 individual features, representing the gravity sewers across the system. The most critical information to support the model and master plan development include the sewer main ID (DCRSD_ID), the sewer diameter (GMainSize), material (Type), sewer length (Shape_Length), and inverts (AsBuilt_Upstream_Invert, AsBuilt_Downstream_Invert, Plan_Upstream_Invert, Plan_Downstream_Invert). Table 5-3 represents that 60% of mains had all elevation information, 20% had at least some, and 13% were required to be filled in prior to importing into the model.

Table 5-3
Gravity Sewer Invert Elevation Completeness

Both As-Built Up & Down	One As-Built Up & Down	Both Plan Up & Down	One Plan Up or Down	No Up or Down
7557	992	1871	17	1517

5.2.3 Forcemain

Sewer GIS data contains a total of 34 features, representing the force mains across the system and was found to be complete. The most critical information to support the model and master plan development include the DCSE_ID, force main diameter (FMainSize), material (Material), and length (Shape_Length).

5.2.4 Sewer Network Junction

Sewer GIS data contains a total of 23 features that represent points within the sewer network that do not fall under the category of manholes. Based on a visual observation, these would consist of blind connects, changes in pipe slope or material, bulkheads, stubs, etc. They are necessary to complete connectivity within the system but they do not have a DCRSD_ID that would enable their easy identification. Further discussion with the District will be undertaken to gain an understanding of the Junction points.

5.2.5 Air Release

Sewer GIS data contains a total of 70 features that include the air release valves along system force mains. The data is not complete for most attributes, but includes some information regarding the ID (DCSE_ID), the WWTP (WWTP) and the plan name and number (Plan_Name and Plan_No) and the current status (Enabled).

5.2.6 Pump Station

Sewer GIS data contains information on 27 pump stations through the County system. The data is also not complete for most attributes but includes the station name (PumpStation) and WWTP as well the plan name (Plan_Name) and the current status (Enabled, Owner).

5.3 Collection System Information

The District provided several sources of information that help to characterize the existing collection system and future planning areas. These included previous master planning reports and their updates as well as the following documents:

- Collection System Studies
    - Berkshire
    - Central Alum Creek
    - Crownover Farms
- SSO Annual Reports
- CCTV Observations (PACP Data)
- Flow Monitoring Data
- Pump Stations

5.3.1 Central Alum Creek Sewer Study – Alum Creek B

Completed in 2010, this study identified a recommended route for providing sanitary service to Area B (as Identified by the 2008 Delaware County Sewer Master Plan Update on next page) of the Central Alum Creek Wastewater Service Area. This area includes the 36/37 corridor between the City of Delaware and Alum Creek Lake. With the potential for considerable development, providing sewer service to 3,800 acres, 850 of which has been identified for commercial/industrial use (Brown and Berlin Township Comprehensive Land Use Plans as of 2010) with potential of 3.75-MGD sewer flow at an estimated construction cost of $40M. The recommended route, shown in Figure 5-1 was Option 4-1, which consists of two pump stations system. As illustrated in Figure 4-2, there are a large number of HSTS systems in the area immediately south of 36/37 and West of the Big Run branch of Alum Creek Lake. While this option is still viable should a pumped alternative be desired, the revised agreement (July 12, 2012) with the City of Columbus allows for a new Central Alum Creek Wastewater Treatment Facility to be constructed with a flow of 800,000 Gallons/Day. This facility would be able to discharge to the Alum Creek Reservoir and could eliminate the need to pump or otherwise convey the flow from the Central Alum Creek Study Area to the existing Alum Creek Water Reclamation Facility. At the time of this Technical Memorandum, no sewers, pump stations, or treatment facilities have been constructed to serve this area with sanitary sewers.

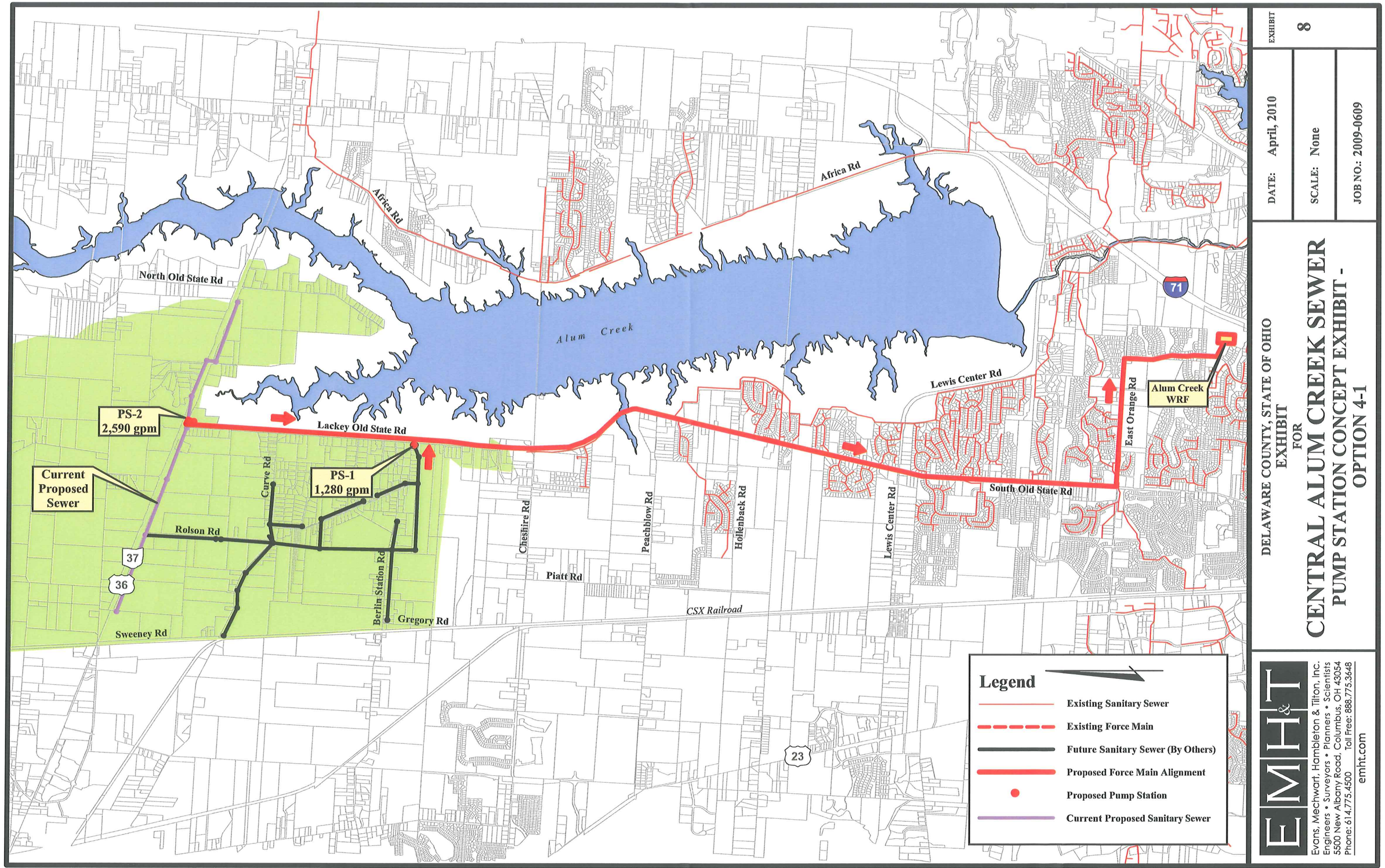


EXHIBIT 8

DATE: April, 2010

SCALE: None

JOB NO.: 2009-0609

DELAWARE COUNTY, STATE OF OHIO
EXHIBIT
FOR

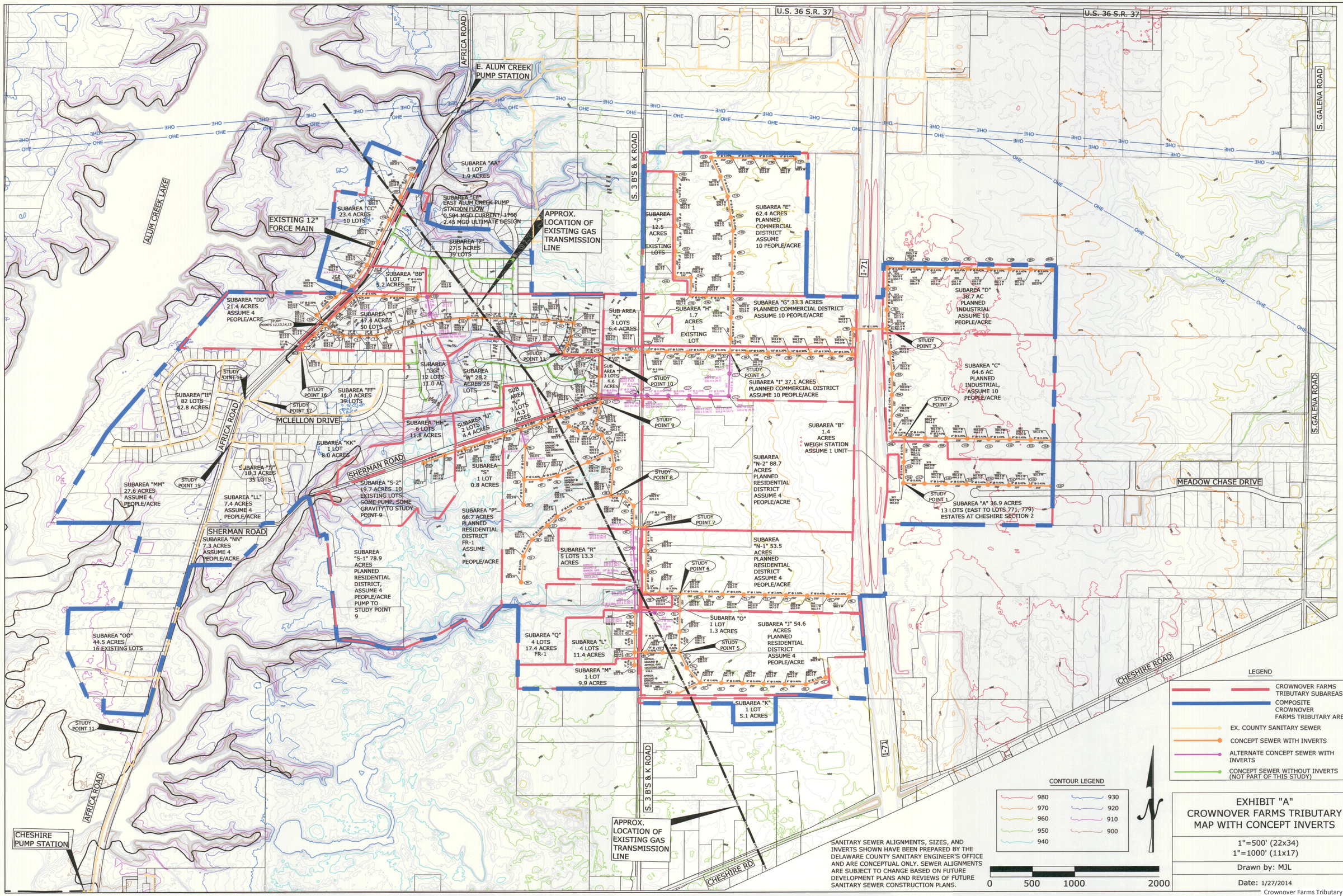
CENTRAL ALUM CREEK SEWER
PUMP STATION CONCEPT EXHIBIT - OPTION 4-1

EMH&T
Evans, Mechwart, Hambleton & Tilton, Inc.
Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Toll Free: 888.775.3648
emht.com

\\CMHDATA01\PROJECT01\20090609\Dwg\Exhibits\CAD Tech Working Folders\mbodine\11-04-09 Overall Organization\4 - Pump Station Concept Exhibits\PS_Concept.dwg<8 Pump Station Concept Exhibit - Option 4-1> - 2 Xrefs: [\\CMHDATA0 PARCELS.DWG] - No Images - SavedBy: MBODINE [4/30/2010 2:31:59 PM] - PlottedBy: MBODINE [4/30/2010 2:32:14 PM]

5.3.2 Crownover Farms Study – Alum Creek C (North)

Completed in 2014, this exhibit illustrates proposed sewer development providing sanitary service to the northern Area C of the Central Alum Creek Wastewater Service Area. **The proposed development is immediately South of 36/37 between Alum Creek Lake and I-71.** Although the documentation did not clearly state the quantity of sewage flows that would be contributed, the development appears to account for **providing sewer service to approximately 1,000 acres with potential for 0.5-MGD sewer flow (3.2-MGD peak).** The proposed sewer would tie into Cheshire Pump Station. As illustrated in Figure 4-2, there are a moderate number of HSTS systems in the area immediately south 36/37 and East of Alum Creek Lake.


U.S. 36 S.R. 37
U.S. 36 S.R. 37
AFRICA ROAD
E. ALUM CREEK PUMP STATION
S. 3 B'S & K ROAD
S. GALENA ROAD
S. GALENA ROAD
ALUM CREEK LAKE
EXISTING 12" FORCE MAIN
APPROX. LOCATION OF EXISTING GAS TRANSMISSION LINE
SUBAREA "AA" 1 LOT 1.9 ACRES
SUBAREA "EE" EAST ALUM CREEK PUMP STATION FLOW 0.594 MGD CURRENT, 1700 2.45 MGD ULTIMATE DESIGN
SUBAREA "CC" 23.4 ACRES 10 LOTS
SUBAREA "DD" 21.4 ACRES ASSUME 4 PEOPLE/ACRE
SUBAREA "BB" 1 LOT 5.2 ACRES
SUBAREA "YY" 47.4 ACRES 50 LOTS
SUBAREA "FF" 41.0 ACRES 39 LOTS
SUBAREA "II" 82 LOTS 42.8 ACRES
SUBAREA "JJ" 18.3 ACRES 35 LOTS
SUBAREA "KK" 1 LOT 8.0 ACRES
SUBAREA "LL" 7.4 ACRES ASSUME 4 PEOPLE/ACRE
SUBAREA "MM" 27.6 ACRES ASSUME 4 PEOPLE/ACRE
SUBAREA "NN" 7.3 ACRES ASSUME 4 PEOPLE/ACRE
SUBAREA "OO" 44.5 ACRES 16 EXISTING LOTS
SUBAREA "GG" 12 LOTS 11.0 AC
SUBAREA "HH" 6 LOTS 11.8 ACRES
SUBAREA "W" 28.2 ACRES 26 LOTS
SUBAREA "U" 2 LOTS 4.4 ACRES
SUBAREA "V" 3 LOTS 4.3 ACRES
SUBAREA "S" 1 LOT 0.8 ACRES
SUBAREA "S-2" 19.7 ACRES 10 EXISTING LOTS SOME PUMP, SOME GRAVITY TO STUDY POINT 9
SUBAREA "P" 66.7 ACRES PLANNED RESIDENTIAL DISTRICT FR-1 ASSUME 4 PEOPLE/ACRE
SUBAREA "S-1" 78.9 ACRES PLANNED RESIDENTIAL DISTRICT, ASSUME 4 PEOPLE/ACRE PUMP TO STUDY POINT 9
SUBAREA "R" 5 LOTS 13.3 ACRES
SUBAREA "Q" 4 LOTS 17.4 ACRES FR-1
SUBAREA "L" 4 LOTS 11.4 ACRES
SUBAREA "M" 1 LOT 9.9 ACRES
SUB AREA "X" 3 LOTS 6.4 ACRES
SUB AREA "T" 3 LOTS 6.6 ACRES
SUBAREA "F" 12.5 ACRES 7 EXISTING LOTS
SUBAREA "E" 62.4 ACRES PLANNED COMMERCIAL DISTRICT ASSUME 10 PEOPLE/ACRE
SUBAREA "H" 1.7 ACRES 1 EXISTING LOT
SUBAREA "G" 33.3 ACRES PLANNED COMMERCIAL DISTRICT ASSUME 10 PEOPLE/ACRE
SUBAREA "I" 37.1 ACRES PLANNED COMMERCIAL DISTRICT ASSUME 10 PEOPLE/ACRE
SUBAREA "B" 1.4 ACRES WEIGH STATION ASSUME 1 UNIT
SUBAREA "N-2" 88.7 ACRES PLANNED RESIDENTIAL DISTRICT ASSUME 4 PEOPLE/ACRE
SUBAREA "N-1" 53.5 ACRES PLANNED RESIDENTIAL DISTRICT ASSUME 4 PEOPLE/ACRE
SUBAREA "O" 1 LOT 1.3 ACRES
SUBAREA "J" 54.6 ACRES PLANNED RESIDENTIAL DISTRICT ASSUME 4 PEOPLE/ACRE
SUBAREA "K" 1 LOT 5.1 ACRES
SUBAREA "D" 38.7 AC PLANNED INDUSTRIAL ASSUME 10 PEOPLE/ACRE
SUBAREA "C" 64.6 AC PLANNED INDUSTRIAL, ASSUME 10 PEOPLE/ACRE
SUBAREA "A" 36.9 ACRES 13 LOTS (EAST TO LOTS 771, 779) ESTATES AT CHESHIRE SECTION 2
STUDY POINT 1
STUDY POINT 2
STUDY POINT 3
STUDY POINT 4
STUDY POINT 5
STUDY POINT 6
STUDY POINT 7
STUDY POINT 8
STUDY POINT 9
STUDY POINT 10
STUDY POINT 11
STUDY POINT 16
STUDY POINT 17
STUDY POINT 18
STUDY POINT 19
STUDY POINT 11
MCLELLON DRIVE
SHERMAN ROAD
SHERMAN ROAD
MEADOW CHASE DRIVE
CHESHIRE ROAD
CHESHIRE ROAD
AFRICA ROAD
AFRICA ROAD
I-71
I-71
S. 3 B'S & K ROAD
CHESHIRE PUMP STATION
APPROX. LOCATION OF EXISTING GAS TRANSMISSION LINE
LEGEND
CROWNOVER FARMS TRIBUTARY SUBAREAS
COMPOSITE CROWNOVER FARMS TRIBUTARY AREA
EX. COUNTY SANITARY SEWER
CONCEPT SEWER WITH INVERTS
ALTERNATE CONCEPT SEWER WITH INVERTS
CONCEPT SEWER WITHOUT INVERTS (NOT PART OF THIS STUDY)
CONTOUR LEGEND
980
970
960
950
940
930
920
910
900
0
500
1000
2000
SANITARY SEWER ALIGNMENTS, SIZES, AND INVERTS SHOWN HAVE BEEN PREPARED BY THE DELAWARE COUNTY SANITARY ENGINEER'S OFFICE AND ARE CONCEPTUAL ONLY. SEWER ALIGNMENTS ARE SUBJECT TO CHANGE BASED ON FUTURE DEVELOPMENT PLANS AND REVIEWS OF FUTURE SANITARY SEWER CONSTRUCTION PLANS.
EXHIBIT "A"
CROWNOVER FARMS TRIBUTARY MAP WITH CONCEPT INVERTS
1"=500' (22x34)
1"=1000' (11x17)
Drawn by: MJL
Date: 1/27/2014

5.4 SSO Annual Reports

SSO reports were provided for years 2011-2014 for the treatment plant basins within the collection systems. As illustrated in Table 5-4 the District has very few overflows, mostly attributable to debris blocking the pipes. This standard of expecting zero overflows will be carried forward into the Master Plan as a Level of Service category. It will assist in prioritizing design criteria for evaluation of existing and new sewer infrastructure.

Table 5-4
SSO Annual Report Summary

Treatment Plant	# SSO Occurrences				WIB Occurrences			
	2011	2012	2013	2014	2011	2012	2013	2014
Alum Creek	1	0	0	1	8	0	0	2
OECC	0	1	2	0	0	3	1	0
Bent Tree	0	0	0	0	0	0	0	0
Hoover Woods	0	0	0	0	0	0	0	0
LSWRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scioto Hills	0	0	0	0	0	0	0	0
Scioto Reserve	N/A	N/A	1	0	N/A	N/A	0	1

Based on the review of the individual annual data sheets, each of the WIB occurrences was associated with a main line blockage that was identified as contributing to the occurrence. For the SSO occurrence, most were identified as a maintenance (blockage, pump failure) or operational issue (construction accident). Only the Orange Road pump station SSO occurrence in 2012 was not identified as a result of an O&M issue.

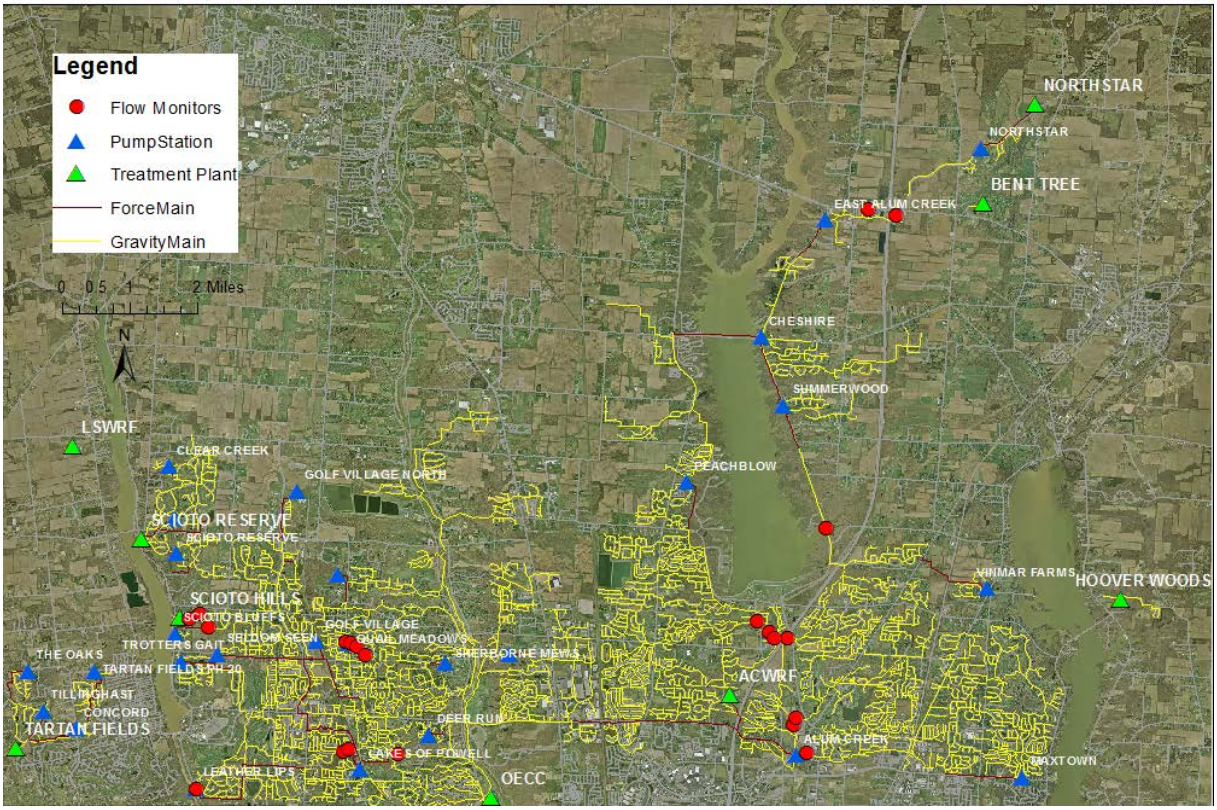
5.5 CCTV Observations

The District's GIS shapefile contains links to all of the coded observations from CCTV work through March 17, 2015. The CCTV data is developed during video recording of the sewer lines by Collection System Staff. **This data records the location and severity of defects in the collection system that will be included in the condition assessment and capital improvement plan prioritization aspects of the master plan.** Review of the CCTV data for 1,212 individual pipes (approximately 12% of the overall gravity sewer system by count). There are a total of 9,523 observations for the 1,212 sewer lines. The majority of these observations do not indicate defects, and include locations of taps (3,356) and manholes (2,358) and designate start and stop points (2,361) for the inspections. Another large data set within this information (1,201) indicates high water levels (1,201) in the pipes. Approximately 200 observations were included for structural or O&M defects, including roots, cracks, deposits, broken pipes, and obstacles.

5.6 Flow Monitoring Data

The GIS data included files for previous collection system monitoring using portable flow meters performed by the District, along with links to the data collected. Figure 5-3 Illustrates locations that these meters have been installed. This data will be used to calibrate the collection system model to observations of real world conditions. **Sufficient data exists to perform calibration for ACWRF; it would be advantageous but not essential, to have additional data for the trunk sewers leading to OECC.** In addition to those 21 flow monitoring locations, 3 additional excel files were provided that contained some flow data.

Figure 5-3 Flow Monitoring Locations



5.7 Pump Stations

The District operates and maintains 24 raw sewage pump stations throughout the system, illustrated in Table 5-5 that collect flow and convey it to an adjacent trunk sewer, pump station or treatment facility. Multiple types of pump station information were reviewed, including contract drawings, previous testing, and manufacturers' information including pump curves and run time data. This information will be analyzed during the condition and capacity assessment, however as illustrated in Table 5-5, preliminary review indicates that based on daily run time many of the smaller pump stations may have additional capacity – this must be carefully checked during subsequent phases of the Master Plan against cycle times, force main velocities and other design parameters to ensure a consistent Level of Service is being maintained.

Table 5-5
Pump Station Summary Information

Pump Station	As-Builts	Pump Information		
		No. of Pumps	Capacity (MGD)	2014 Average Total Daily Run Time (hrs)
Alum Creek	X	4	30.0	22.6
Cheshire	X	2	0.9	8.5
Concord		2	0.3	8.1
Deer Run		2	0.3	1.6
East Alum Creek	X	2	0.5	5.6
Golf Village	X	3	1.6	3.2
Golf Village North		2	0.6	0.3
Lakes Of Powell		2	1.0	5.4
Leather Lips	X	3	1.7	10.0
Maxtown	X	3	1.7	12.3
Northstar		3	1.3	0.2
Peachblow	X	2	0.7	6.7
Quail Meadows		2	0.3	4.0
Scioto Bluffs		2	0.1	6.5
Scioto Reserve	X	2	0.2	3.3
Scioto Reserve North		2	0.2	2.1
Seldom Seen		2	0.3	3.3
Sherborne Mews		2	0.1	4.6
Summerwood		2	0.3	3.1
Tartan Phase 20		2	0.3	3.7
The Oaks		2	0.2	4.1
Tillinghast		2	0.3	5.3
Trotters Gait		2	0.2	7.0
Vinmar Farms	X	2	0.4	2.1

Section 6 –Treatment Facilities

6.1 Operating Data & Reports

Process control data and OEPA reporting forms were provided for Alum Creek and OECC. Preliminary review of operating data illustrates several key points at both plants:

6.1.1 Alum Creek WRF

- Influent waste strength for CBOD5 and TSS, are moderately stronger than the original design criteria. **Upon further evaluation in the condition and capacity assessment phase of the master plan, this increase may have the effect of reducing the hydraulic rating of the facility in relation to the biological load.**

Table 6-1
Alum Creek WRF Operating Data Summary

Description	Influent		Effluent		Units
	Design Criteria	Current Conditions	NPDES Limit (monthly)	Current Conditions	
Average Flow	10	5.3[5]	10	4.8[1,2]	MGD
Peak Flow	30		-	10.8[1] 8.8[2]	MGD
$CBOD_5$	167[3] 134[4]	208[2]	10	1.8[2]	mg/l
TSS	167[4]	224[2]	12	4.0[1,2]	mg/l
Nitrogen-Ammonia (NH3)	22[4]		3.0 - Winter 1.0 - Summer	0.22[2]	mg/l
Phosphorus	-	-	-	3.2[2]	mg/l
Filter Bypass					
Events	N/A	N/A		22% (143 of 640 days)	
Flow, Average per Event	N/A	N/A		0.8	MGD
TSS	N/A	N/A		11.8	mg/l
$CBOD_5$	N/A	N/A		4.9	mg/l

[1] ACWRF OPS LAB SHEETS 9/14/12 – 5/29/15
[2] OEPA 4500 Forms 4/1/13 – 12/31/14
[3] ACWRF O&M Manual – 6/27/03
[4] ACWRF Background Information – 6/25/02
[5] Assumes 10% recycle for non potable uses

- Alum Creek phosphorus discharge concentration is comparable to other major Central Ohio dischargers, all in the Scioto Watershed. Several pieces of legislation have been introduced at the State level recently limiting phosphorus discharge to 1.0 mg/l (max) for all dischargers and this serves as evidence that nutrient management in Ohio and for Gulf of Mexico dischargers will be an increasingly discussed topic.
- Secondary Clarifier Effluent bypassed the filters and flowed directly to the Post Treatment Facility on 22% of the days reviewed. On these days an average of 16% of the effluent flow had bypassed the filters.

6.1.2 OECC

- Influent waste strength, CBOD5 and TSS, are significantly weaker than the original design criteria.
- Flow rates are within 70% of average and 75% peak capacity for the North Plant
- The most recent TMDL recommended 0.5 mg/l seasonal limit for Phosphorus

Table 6-2
OECC Operating Data Summary

	Influent		Effluent		Units
	Design Criteria	**Current Conditions**	**NPDES Limit (monthly)**	**Current Conditions**	
Average Flow	1.5 (NP) 4.5 (SP)	3.2[1]	-	-	MGD
Peak Flow	3.3 (SP) 10 (NP)	7.4[1]	-	-	MGD
$CBOD_5$	200 (SP) TBD (NP)	68[1]	8.5	1.1[1]	mg/l
TSS	200 (SP) TBD (NP)	102[1]	12	0.8[1]	mg/l
Nitrogen-Ammonia (NH3)	15 (SP)		1.28 – Winter 0.78 – Summer	0.3[1]	mg/l
Nitrite Plus Nitrate			4.58	4.1[1]	mg/l
Phosphorus			1.0	0.7[1]	mg/l

[1] OEPA 4500 Forms 4/1/13 – 3/31/15
SP = South Plant
NP = North Plant (not in service)

6.2 Operations and Maintenance Documents

A summary of operations and maintenance documents reviewed for incorporation into the ACWRF and OECC Condition and Capacity evaluations is provided in Table 6-3. Further discussion on maintenance summary is provided in Section 6.3.

Table 6-3
ACWRF & OECC Operations & Maintenance Document Summary

Document	OECC	ACWRF
Equipment: Descriptions & Runtime	A summary description of equipment in service on an average basis was provided for OECC.	Equipment service will be obtained through follow up interviews with ACWRF Staff. Equipment descriptions will be extracted from O&M manual
Operations & Maintenance Manuals	OECC Plant O&M Manual – 1979, 1.5 MGD North Plant Only. OECC Centrifuge Equipment O&M Manual – 2008	ACWRF O&M Manual – 2003
Chemical Consumption	Costs for hauling solids, disposal, ferric chloride and polymer, 2010-2014.	Costs for polymer, 2010-2014.
Solids Production	Daily flow of WAS generated	Weekly volumes of solids disposed (OPS LAB Sheet)
Maintenance Documentation (In addition to Plant O&M Manuals)	Inventory of Large Machinery and Preventative Maintenance Guidelines – 1/2008. Motor & bearing lubrication, select troubleshooting & seal adjustment cut sheets.	
	2 Year History (6/4/13 - 5/26/15) of DCRSD Maintenance at all Pump Stations and Treatment Plants. See Table 6-4	
	2 Year Forecast of DCRSD Maintenance at all Pump Stations and Treatment Plants. See Table 6-4	

6.3 Maintenance History and Forecast

Combining the separate data sets for number of task orders completed and budgeted days of maintenance over similar time periods permits a direct correlation to be drawn between operations reliability, equipment life cycle and maintenance staff/budget. As illustrated in Table 6-4, the District spreadsheets summarize work tasks for preventative and reactive maintenance and alarm responses along with budgeted days of maintenance.

Table 6-4
Facility & Pump Station Maintenance Overview

Category	Completed Task Orders 6/4/13 – 5/21/15	Budgeted Maintenance Days (2016-2017)
Total (Pump Stations & Facilities)	847 (Task Orders)	180 (Days of Maintenance)
Facility Subtotal	516	130
OECC	130	52
ACWRF	209	50
LSWRF	-	
Bent Tree	21	
Hoover Woods	11	
Scioto Reserve	69	16
Scioto Hills	29	
Tartan Fields	47	12
Pump Stations SubTotal	185	44
AC PS	40	2
Cheshire	5	2
Clear Creek	3	2
Central Maintenance Facility	4	2
Concord Road, Deer Run	3	2
Deer Run	5	2
East Alum Creek	6	2
Golf Village	5	2
Lakes of Powell	3	2
Leather Lipps	21	2
Maxtown	24	2
NorthStar PS & Facility	9	2
Oaks	4	2
Peachblow	3	2
Quail Meadows	14	2
Scioto Reserve PS	4	2
Seldom Seen	5	2
Sherbourne Mews	3	2
Summerwood	10	2
Tillinghast	2	2
Trotters Gait	4	2
Vinmar	8	2
Unassigned Subtotal	146	

6.4 Staffing

Staffing input from District Administration was solicited to understand of specific challenges of operating and maintaining sewer service. Highlights of those challenges and desired outcomes include:

- Desire to attract and retain the best and most talented operations and maintenance staff.
- Ability to benchmark staffing levels based on miles of sewer, gallons of flow, population, or other measurable criteria to identify future triggers that will making hiring decisions happen at the right time – keeping in mind that often new hires require learning time.
- Identifying staffing requirements and timing of increases is always concern. Ideally a planning system could be used that would identify staff expansion triggers based on projected growth, required man hours, budgets, equipment requirements, etc.
- Desire ability to further ensure current/future staff have skills necessary to do their jobs and provide professional enhancements including:
    - Industry trainings, resources, or other requirements that could assist
    - Are wages competitive enough to attract and keep employees that can maintain the current system and assets?
- Asset Management program has been discussed but never implemented. This would help on several fronts for manpower planning, maintenance planning and budgeting.

DCRSD maintains staffing organization charts that are updated annually. Charts for 2012-2014 were reviewed and the actual and needed staffing levels are summarized in Table 6-5.

Table 6-5
District Staffing Levels

Department / Year:	10/12	12/12	11/13	8/14
Administration	6	6	6	6
Engineering	2	2	4	6
Package Plants	5	5	6	5
OECC	7	7	9	9
AWRF	8	9	10	10
Maintenance	9	12	12	12
Collections	9	9	11	14
Construction	3	3	3	4
Lab	4	4	-	-
Actual Staff, Subtotal	53	57	61	66
Unfilled (New & Vacant)	13	11	9	2
Needed Staff, Subtotal	66	68	70	68
Future (6-7 @ LSWRF)	7	7	9	11
Total	**73**	**75**	**79**	**79**

Section 7 – Regulatory and Permitting

7.1 Section 208 Planning

Ohio EPA's Division of Surface Water issued the current State Water Quality Management Plan in September 2006, a requirement of Section 303 of the Clean Water Act. This Plan identifies the condition of the overall water quality within the State and outlines actions needed to preserve clean water throughout Ohio. The State WQM Plan is delineated into 6 geographic areas for planning purposes as required by Section 208 of the Clean Water Act. Delaware County's 208 Plan was prepared by the State of Ohio and issued in September 2006.

OEPA's Section 208 Planning for Delaware County strongly encouraged sewer utilities to develop agreements amongst themselves that provide the most cost effective sewer service for development of unincorporated areas. The County currently reviews sewer service requests in unincorporated areas (and not immediately inside the District's service area) to be potentially served by either the District or adjacent service providers on a case by case basis.

The State WQMP assessment of waterways within the Counties ranges in condition from very good to fair-poor and that the majority of waters do not meet their assigned water quality protections standards. The OEPA concluded that a regional plan is needed to address sewage collection and treatment needs in the southern half of the county based on projected population growth to 156,000 by 2030.

7.2 Total Maximum Daily Load of Receiving Streams

As required under the Clean Water Act Section 303(d), Ohio EPA develops Total Maximum Daily Load (TMDL) assessments to identify both the water quality problems in specific waterbodies and the contributing sources of pollution. When a waterbody is impaired, the TMDL report will identify the cause, means of reduction and responsibility of improvement. When the pollutant causing impairment is contributed by point-source dischargers, the report will allocate reduction amongst permitted dischargers within that waterbody. Of the various causes of waterbody impairment, the three attributable to point source dischargers are typically Total Suspended Solids, Total Phosphorus and Fecal Coliform.

All of Delaware County falls within the Scioto River Watershed; as illustrated in Figure 7-1 ACWRF is included in the Big Walnut Basin (Alum Creek Watershed); OECC falls within the Olentangy River Basin (Olentangy River Watershed). A summary of the TMDL for ACWRF and OECC are shown below in Table 7-1.

Table 7-1
ACWRF & OECC TMDL Summary

Facility	Watershed TMDL	Sub Basin	River Mile	Major Basin Impairments	Facility Implication
ACWRF	Big Walnut Creek, 8/19/05	Lower Alum Creek	22	• Siltation and habitat alteration	• Additional load to POTW from elimination of HSTS's
OECC	Olentangy River, 8/27/07 (an update is in progress) Aquatic life and recreation is impaired	Lower Olentangy	13.39	• Pathogen Loading from HSTS • Habitat Degradation • High nutrient and sediment load • Rapid land development	• Recommended TP limits of 1.0 mg/l Winter • 0.5 mg/l Summer • Additional load to POTW from elimination of HSTS's

7.2.1 Big Walnut Creek TMDL Summary (2005):

The Big Walnut Creek watershed contains several sub-watersheds across Morrow, Delaware, Franklin and Pickaway Counties. Nutrient enrichment and habitat alteration have been identified as impairments to many portions of this watershed along with organic enrichment/dissolved oxygen and the excessive loading of pathogens. An implementation plan is not included in this report, but implementation planning and watershed action plans are being developed or implemented in various parts of this

watershed. Alum Creek in the area of ACWRF is impaired from habitat alteration which is an environmental condition rather than a contributed pollutant load. The segment of Alum Creek that ACWRF discharges to was not impaired in a manner that would have direct impact to ACWRF's permit limits. It is possible that, similar to OECC, because other portions of Alum Creek are impaired due to HSTS's, ACWRF may see additional minor contributions as these areas are sewered.

7.2.2 Olentangy River Watershed TMDL Summary (2007):

The Olentangy River Watershed is divided into four sub basins for upper Olentangy, middle Olentangy, lower Olentangy, and Whetstone watersheds. OECC is in the lower Olentangy sub-basin. The major concern for this watershed in general is total phosphorus (TP), total suspended solids (TSS), and fecal coliform (FC) with all having a TMDL calculated for each watershed. The Olentangy River Watershed has diverse sources of impairment related to major characteristics: 1) floodplain connectivity; 2) stable stream morphology; and 3) watershed hydrology that approximate natural conditions are applicable to the agricultural, developing, and urban areas of the watershed.

The concern for this lower Olentangy sub-watershed includes nutrient enrichment, siltation, habitat and flow alteration, and bacterial contamination. The TMDL states that "City of Delaware WWTP and OECC do not appear to currently be negatively impacting water quality in the Olentangy River beyond what is reasonably expected. Both are major facilities discharging large waste loads but are provide adequate treatment. Rapid development in southern Delaware County emphasizes the need to maintain the existing and acceptable waste load contribution." Olentangy River in the area of OECC is impaired from nutrient loading and pathogens. The pathogen impairment is attributed to failing HSTS in Southern Delaware County. OECC may see slight increase to flow and load as HSTS in this watershed are sewered. The Olentangy River TMDL recommended lower phosphorus limits for the NPDES dischargers as a means of reducing impairment on the water course. This would include a 0.50 mg/l seasonal Phosphorus discharge for OECC.

LEGEND

- ALUM CREEK
- BATTLE RUN
- BIG RUN
- BIG WALNUT CREEK
- BLACKLICK CREEK
- BLUES CREEK
- BOKES CREEK
- BRANDIGE RUN
- CULVER CREEK
- DELAWARE LAKE
- DELAWARE RUN
- DUNCAN RUN
- EVERSOLE RUN
- FULTON CREEK
- HORSESHOE RUN
- KEBLER RUN
- LITTLE WALNUT CREEK
- MILL CREEK
- NORTH FORK RATTLESNAKE CREEK
- OLENTANGY RIVER
- RATTLESNAKE CREEK
- ROCKY FORK CREEK
- SCIOTO RIVER
- SOUTH FORK RATTLESNAKE CREEK
- TURKEY RUN
- WEST BRANCH
- WHETSTONE CREEK

DATA SOURCE: Delaware County Regional Sewer District

0 Miles 3

BATTLE RUN
BRANDIGE RUN
DELAWARE LAKE
KEBLER RUN
WHETSTONE CREEK
WEST BRANCH
TURKEY RUN
FULTON CREEK
HORSESHOE RUN
BOKES CREEK
SCIOTO RIVER
DELAWARE RUN
BIG RUN
LITTLE WALNUT CREEK
CULVER CREEK
BLUES CREEK
MILL CREEK
OLENTANGY RIVER
ALUM CREEK
NORTH FORK RATTLESNAKE CREEK
RATTLESNAKE CREEK
SOUTH FORK RATTLESNAKE CREEK
BIG WALNUT CREEK
EVERSOLE RUN
DUNCAN RUN
ROCKY FORK CREEK
BLACKLICK CREEK

Richwood
Fulton
Marengo
Sparta
Centerburg
Croton
Johnstown
Plain City
Dublin
Worthington
Westerville
Sharon Woods Metro Park
Hoover Recreation Area
Glacier Ridge Metro Park
Avery Park
York Golf Club
New Albany Links Golf
Delaware State Park
MORROW
FRANKLIN
UNION

7.3 NPDES Permits

Current NPDES permit limits for OECC and ACWRF are included in Section 6 and will be used as the basis for determining current treatment performance and efficiency. Preliminary discussions with OEPA did not indicate that substanial reductions in pollutant loads were imminent – these disussions however do remain ongoing and will be formalized during the condition and capacity assessment phase of the master plan. **Comparison of current effluent performance (Table 6-1&2), effluent limits (Table 7-2) and known operational limitations indicate that ACWRF (Table 6-1) and OECC are cabable of meeting permits under all current conditions.**

Table 7-2
ACWRF AND OECC NPDES PERMIT SUMMARY

Facility	$CBOD_5$	TSS	Ammonia-Nitrogen	Nitrate + Nitrite	Phos.	Fecal Coliform (#/100ml)	E.Coli (#/100 ml)
	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)		
	w / m	w / m	w / m	w / m	w / m	w / m	w / m
ACWRF	15 / 10 1/Day	18 / 12 1/Day	4.5 / 3 (w) 1.5 / 1.0 (s) 1/Day	-	-	2,000 (w) / 1,000 (s) 1/Day	-
OECC	12.8 / 8.5 3/Week	18 / 12 3/Week	1.93 / 1.28 (w) 1.18 / 0.78 (s) 3/Week	- /4.58 1/Month	- / 1.0 1/Week	-	284 / 126 3/Week

(s) = Summer limit
(w) = Winter limit
w / m = weekly / monthly limits

Section 8 – Financial

The County provided several sources of data related to the financial condition and need of the Sewer District, including: historical budget and actual operating costs, historical customer accounts, comprehensive annual financial reports, system asset lists, bond trust agreements, and historical user charges and revenue. This data has been catalogued and analyzed with the following objectives

1. Perform an evaluation of the existing financial condition of the District
2. Form the basis of the financial planning model that will be developed to analyze future financial performance based on the master planning results.

The comprehensive annual financial reports are developed annually by the County and submitted to the State Auditor's office. These reports document the County's formal financial position based upon standard accounting regulations. HDR teaming partner on the Master Plan, Raftelis Financial Consultants, maintains a database of several hundred utilities for which we perform similar work and the following graphics present a comparison of the District to select financial metrics taken from this database. Additionally, the rating agency Fitch annually publishes the median metrics for utilities they assign bond ratings to each year. This information is presented as well. These metrics were presented and discussed with District staff at the Financial Kick-off Workshop on August 12, 2015.

Chart 8-1: Total Outstanding Debt to Net Plant Assets

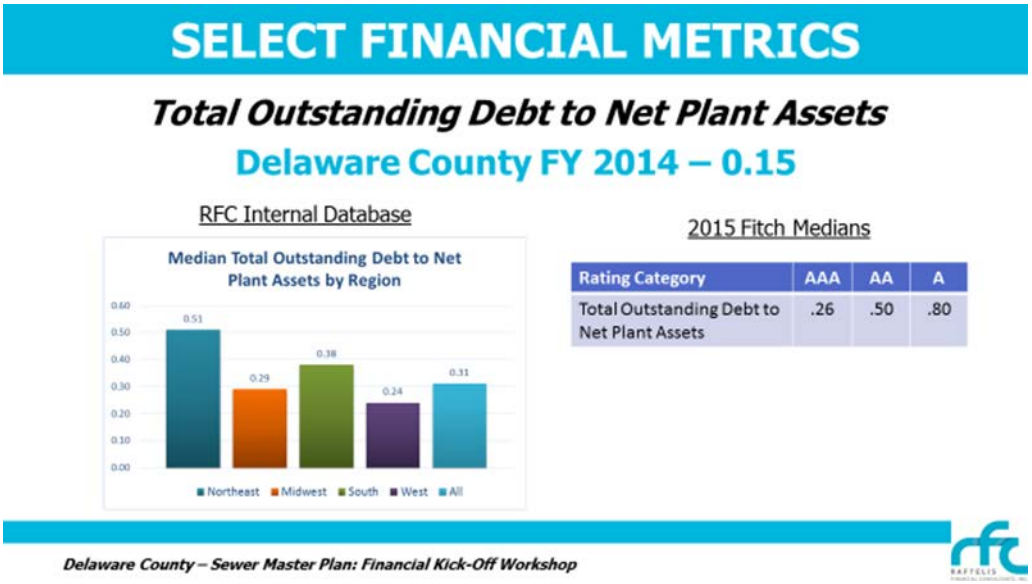


Chart 8-2: Total Outstanding Debt per Customer

SELECT FINANCIAL METRICS

Total Outstanding Debt per Customer

Delaware County FY 2014 – $1,054

RFC Internal Database

2015 Fitch Medians

Rating Category	AAA	AA	A
Total Outstanding Debt Per Customer	$1,259	$1,934	$2,218

Delaware County – Sewer Master Plan: Financial Kick-Off Workshop

Chart 8-3: All-in Debt Service as a Percent of Total Revenue

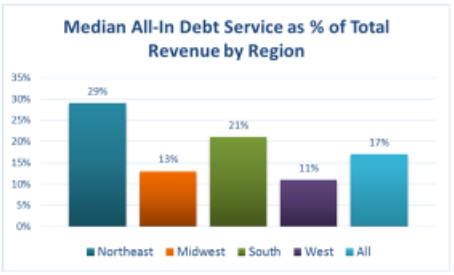
SELECT FINANCIAL METRICS

All-in Debt Service as a Percent of Total Revenue

Delaware County FY 2014 – 19.3% (w/ capacity fees)

24.4% (w/out capacity fees)

RFC Internal Database



2015 Fitch Medians

Rating Category	AAA	AA	A
All-In Debt Service as % of Total Revenue	16%	23%	26%

Delaware County – Sewer Master Plan: Financial Kick-Off Workshop

Chart 8-4: All-in Debt Service Coverage

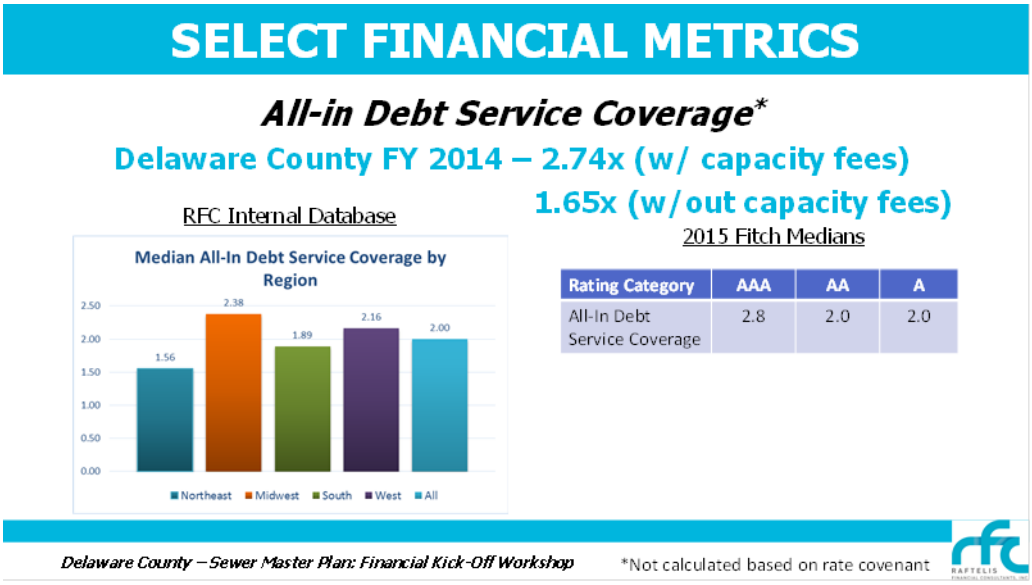
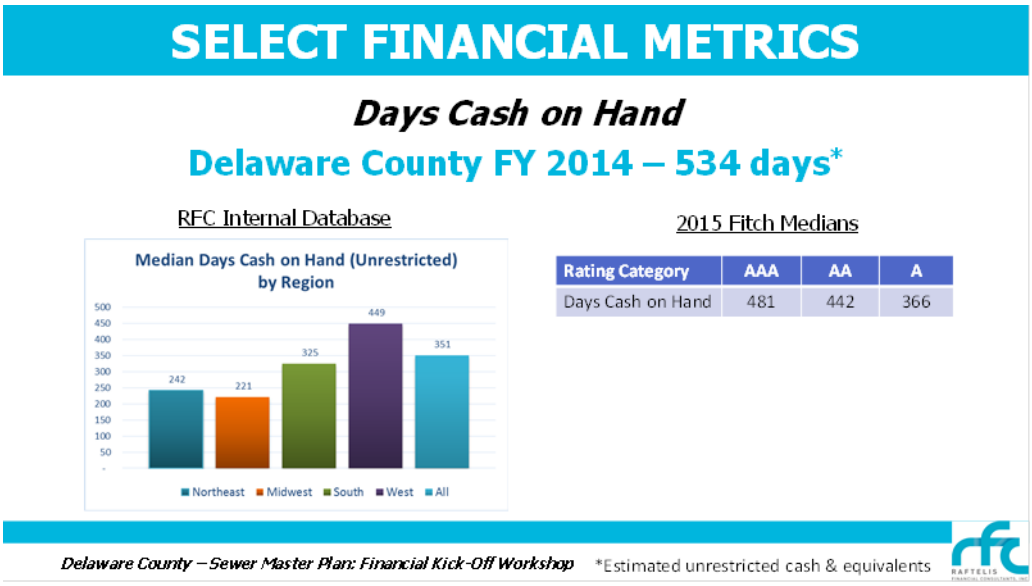


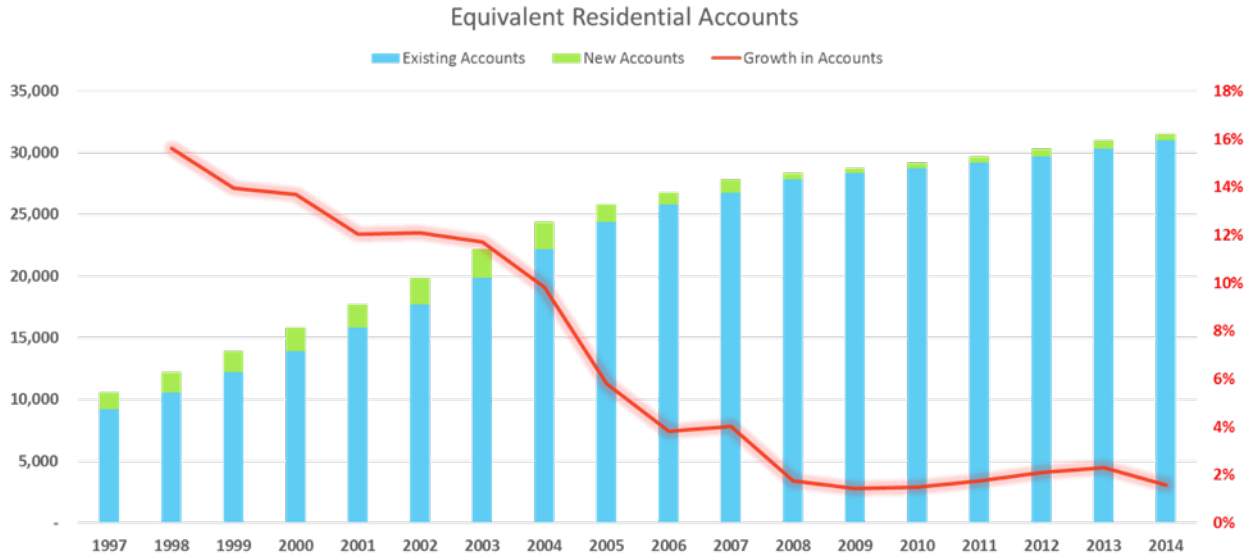
Chart 8-5: Days Cash on Hand



Developing a financial plan involves the projection of revenues and expenditures over a planning horizon to ensure that future revenues will be sufficient to meet the operating and capital needs of a system. The District receives most of its annual revenue from user rates and charges which are dependent on the number of customers on the system and the annual growth rate. The following graph presents the total number of customers and annual growth rate for the system over the past 18 years. Growth has slowed dramatically from the levels seen in the late 1990's and early 2000's, however an annual customer growth rate of 1.5% to 2.0%

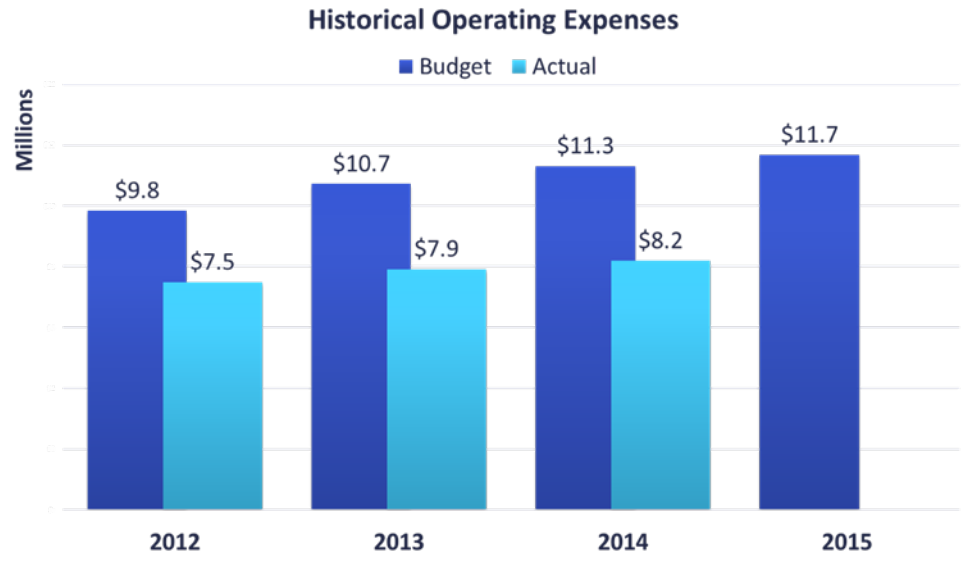
continues to account for significant revenue from capacity charges and future projected user charges.

Chart 8-6: Equivalent Residential Accounts



The District provided historical operating expense budgets and actual expenditures for 2012 through 2014, along with the budget for 2015. Historically, the District has spent less than its budget, as can be seen in the following graph.

Chart 8-7: Historical Operating Expenses



In addition to discussing these data and analyses related to the data, RFC discussed several items with District staff at the Financial Kick-off Workshop. One of these items relates to financial policies of the District. The District does not have formal policies related to operating targets, debt service coverage, reserve funds, or other similar items. RFC will identify some potential policies for the District to consider for future development. Structure and functionality of the financial planning model was also discussed. Maintaining maximum flexibility for modeling future capital and operating requirements was one of the key objectives. Additionally, the District has directed RFC to develop a dashboard of critical system information based on our experience which can be tweaked and adjusted based on feedback following County review. As previously mentioned, the documents and discussion provided by the District will be incorporated into the financial planning model to be built and delivered to the District following completion of the Study.

Attachment 1

Service Agreement Summary

Attachment 1
Service Agreement Summary

Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Delaware County - Creation of Sewer District	19690602 Original Sewer District	Unincorporated area of Delaware County, OH and such additional territory within the boundaries of incorporated municipalities, when so authorized by the legislative authority of said municipalities and when so accepted by resolution of this board, shall be hereby established as the Delaware County Sewer District (DCSD).				6/2/1969		Map: Assumed Design Population Densities
City of Columbus & Delaware County	19911112 City of Columbus Agreement	City of Columbus, in Delaware County Area #1: Area of the county bounded on the west by the Conrail Railroad, on the east by Alum creek, and on the north by Powell Road. Area #2: West of Scioto River bounded on the west by Union County, on the south by the corporate limits of the City of Dublin and on the north by US 42. Inclusion to be determined. Area #3: East of Hoover Reservoir and the Little Walnut Creek bounded on the east by the Licking County line, on the south by the Franklin County line, and on the north by SR 37. Inclusion to be determined. Area #4: North of Lazelle Road bounded on the north by the Catholic Cemetery, on the east by the Conrail Railroad, and on the west by the Highbanks Metro Park.	Discharge of sewage, industrial waste, water or other liquid wastes into the sewerage system and the sewerage treatment works of DCSD and to provide for the discharge of sewerage, industrial waster, water or other liquid wastes from the sewer of the county into, and the transportation, pumping and treatment of the same by the sewerage system and sewerage treatment works of the City.	Area #1: 12 persons per acre. Area #2 and #3: To be determined, but will not exceed 4 persons per acre. Area #4: 8 persons per acre. 1 person = 100 gallons per day. Densities in portions of each area may exceed the maximum density per acre as set forth above, however, the gross density per area shall not be exceeded, and such density shall be reserved for the entire tributary area of each sanitary sewer.	Usage charged every 3 months, based on current rate at time of discharge plus 50% surcharge.	11/12/1991	11/12/2041	Map: Areas #1 through #4
City of Dublin & Delaware County	19940822 City of Dublin Agreement	Service Area No. 1: North of Summit View Road situated in Franklin County Service Area No. 2: Village of Shawnee Hills situated north of the City and west of Scioto River	Service Area No. 1: All sewage and wastewater will be collected and discharged into the sanitary sewer system of the County for treatment at and discharge from the sewage and wastewater treatment facilities of the County. Service Area No. 2: After the completion of the West Branch Interceptor Sewer and the Village of Shawnee Hills or the County have constructed a sewage and wastewater collection system within Service Area No. 2 to be collected and discharged into the sanitary sewer system of the City for treatment at and discharge from the sewage and wastewater treatment facilities of Columbus. Master meters were to be installed at each of the service areas connection points between the City and County's collection systems.	Service Area No. 1: No residential development shall exceed gross density of 1.25 residential units per acre or a maximum total of 300 dwelling units. Assumed residential discharge rate = 290 gal/day/residential unit. Service Area No. 2: County agrees the City is not obligated to accept into its sanitary sewer sewage and wastewater from more than the equivalent of 300 residential units (based on occupancy of 2.9 person per residential unit and 100 gall/person/day). Assumed residential discharge rate = 290 gal/day/residential unit.	Service Area No. 1: Capacity fees will be equal to County's current capacity fees for its Regional 1A District plus surcharge. A chart from Oct 1992 to Oct 2006 is included in the agreement. City to pay County usage fees based on actual usage recorded by master meter and current residential rate plus a 50% surcharge. Service Area No. 2: Capacity fee paid to the City will be sent to City of Columbus. County will pay City quarterly usage fees based on usage recorded by master meter and at the County's rate plus a 50% surcharge.	8/22/1994		Map: Service Area No. 1

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Service Agreement Summary

Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Union County & Delaware County	19980128 Union County Agreement	Tartan Fields Subdivision and Village of Jerome.	Delaware County will treat sanitary sewage originating within Union County portion of Tartan Fields Subdivision and within the service area around Village of Jerome. Delaware County agrees to operate and maintain the sanitary sewer and related facilities located in the Union County portion of the Tartan Fields Subdivision.	Sewage generated within the Village of Jerome service area will not exceed 25,000 gpd (average). Union County installed two master meters where the sanitary sewer collections between Union and Delaware Counties connect. Assumed residential discharge rate = 290 gal/day/residential unit.	Except for Lots 565-571 and Lots 509-589 in the Tartan Field Subdivision and all lots in the Village of Jerome service area, customers in Union County will be billed monthly by Union Co based on current sanitary sewer charges. Union Co will pay Delaware Co quarterly based off of actual usage as recorded by the master meters and at Delaware County's residential rate.	1/28/1998		Map: Service Area
City of Dublin & Village of Shawnee Hills	20000424 Dublin Shawnee Hills Agreement	Current and future boundaries of the Village of Shawnee Hills	Transportation of sewage, industrial wastes, water or other liquid wastes from the Village of Shawnee Hills and its Sewerage System to the City of Columbus for ultimate treatment and disposal utilizing the sewerage system of the City of Dublin.	Shanee Hills will limit inflow and infiltration to its sewer system to the design characteristics in the engineering plans for the sewer system approved by the City of Columbus.	Shawnee Hills compensate City with a one time LS payment of $115,000. The amount Shawnee Hills is compensating the City is based upon daily generated wastewater flows of 120,000 gpd. If that flow is exceeded the City will receive compensation based on the actual flows in excess of 120,000 gpd.	4/24/2000	40 years from date of connection of Shawnee Hills collector sewer system to the Dublin sewer system.	Map: Shawnee Hills existing corporation limits and proposed expansion area.
City of Westerville & Delaware County	20020422 City of Westerville Agreement	Service Area No. 1: An area of the City of Westerville (254 ± acres) is situated in Delaware County Service Area No. 2: An area of the City of Westerville (974 acres). Service Area No. 3: An area of the County (63 ± acres)	As of Sept 30, 1999, all sewage and wastewater from Service Area No. 1 will be collected and discharged by the sewage and wastewater treatment facilities of the County. Service Area No. 2: sewage and wastewater will be treated by the City under the City's contract with City of Columbus. Service Area No. 3: sewage and wastewater will be treated by the city under the City's contract with City of Columbus.	(Area 3) Rosselot Tract: 376 units at 290 gpd/unit (Area 1) Zumstein Tract: 640 units at 290 gpd/unit	The City will pay the County capacity fees based upon the diameter of the water tap and usage fees based upon the amount of drinking water usage for each individual building. Those fees will be based upon a percent of the current county single-family residential capacity fee and user fee shown in the agreement. No deduct meters will be allowed in the service area.	4/22/2002	7/17/2014 (new agreement takes effect)	Map: Service Area No. 1, 2 & 3; delineated effluent line for wastewater.
Village of Galena	20031124 Galena Meeting Minutes	On Nov. 24, 2003 a resolution accepting the wastewater treatment plan and separating from the County Sewer District passed. The Village has tried unsuccessfully to work with the County to get additional sewer capacity to meet the Village's needs. Sewer capacity is imperative to meet the Village's land use planning goals.				11/24/2003	11/24/2003	
Village of Galena & Delaware County	20050307 Galena Settlement Agreement	Approving settlement agreement and mutual release between the Village of Galena and the Delaware County Commissioners for the sale of the Galena Sewer Treatment Plant with associated fixtures, equipment and machinery.				3/7/2005	3/7/2005	
Delaware County - Leatherlips Sub-District	20060925 Leatherlips Surcharge				Amending the capacity fee surcharge for the Leatherlips Sub-District of the Regional 1A Sewer District. Capacity fee surcharge revised to $0	9/11/2006		
Delaware County - Regional 1A	20060925 Modification to Service Area 1A	Will include the proposed Berlin Township Fire Department located at the corner of Old State Road and Cheshire Road.				9/25/2006		

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Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Delaware County - Perry Taggart Sub-District	20070108 Perry Taggart Surcharge (and other Modifications)	Sawmill Parkway area North of Home Road	Village Communities agreed to abandon the temporary pump station and extend a gravity sewer to a gravity sewer outlet when available.		Amending the capacity fee surcharge for the Perry Taggart Sub-District of the Regional 1A Sewer District. Waive the Perry Taggart Surcharge ($4000) for 300 single family units and the Olentangy Local School District Hyatts Middle School tributary to the temporary pump station.	7/8/2007		Letter: Sewer Project Surcharge Map: Perry Taggart Sanitary Sewer Tributary Area Email: Woodland Hall Section 2 and Perry Taggart Surcharge
City of Delaware & Delaware County	20070129 City of Delaware Agreement	General vicinity of SR 42, Section Line Rd, Freshwater Rd and Bunty Station Rd - Refer to Map. The City will serve the area designated County - City Agreement Area. The City and County may both serve the area on the map designated City County Service Area 2007 as it extends north to SR 36 (Marysville Rd) and, if served by the City, annexation would not be required to obtain City sanitary sewer Service. The County will serve the area designated Lower Scioto WRF Service Area				1/29/2007		Map: Sewer Service Areas
City of Delaware & Delaware County	20080922 City of Delaware Agreement	General area of on the West from Ford Rd on the South by Bunty Station Rd, the Olentangy River, the Southern City Water Service Area and Peachblow Rd; on the East by the Conrail Railroad from Peachblow Rd to Baker Rd. - Refer to Map The City will provide sanitary sewer service to the area on the map designated City Sanitary Service Area. The County will provide sanitary sewer service to the area on the map designated as County Sanitary Service Area.	County understands and agrees that annexation to the City is a prerequisite to the City's provision of sanitary sewer service, subject to the following exceptions: single family residences in this area existing as of this agreement are not required to annex, unless and until the existing single family residence in this area existing as of the date of this agreement transfers ownership and becomes contiguous to the City. Available sewer capacity for sanitary sewer service within the County Sanitary Sewer Service Area shall be determined by the County.			9/22/2008		Map: City/County Sewer Service Area. Ordinance No. 08-58: City Manager Authorization to enter agreement with Delaware County.
City of Delaware & Delaware County	20090401 City of Delaware Agreement					4/2009		Map: City/County Sanitary Sewer Service Agreement Areas
City of Columbus & Delaware County	20090604 Lower Big Walnut Service Area	Lower Big Walnut Service Area	Sanitary Sewer Service will be provided by the City of Columbus as determined in the 1991 agreement between the City and County.			6/4/2009		Map: Columbus' plan for extending their Big Walnut Sanitary Trunk Sewer
Delaware County - Cheshire Elementary School Sub-District	20110713 Cheshire Elementary School Surcharge	Berlin Township - S. Old State Rd to the Cheshire Elementary School property on Gregory Rd. Properties along and north of Cheshire Rd (shown on attached surcharge map) Berlin Township Fire Station Two properties at the northeast corner of the intersection of Cheshire Rd and Lackey Old State Rd that currently are tributary to existing County sewer along Lackey Old State Rd.	Gravity sanitary sewer service to the elementary school. Gravity service for existing properties in the general vicinity.		Regional Sewer District paid for project. Surcharge of $3,050 was levied for all residential units or equivalent residential units. One single family home connection $9,025.	7/13/2011		Map: Cheshire Elementary School. Resolution No. 11-752: Capacity fees for Cheshire Elementary School Sanitary Sewer Sub-District. Calculations: Cheshire Elementary School Sanitary Sewer Improvements Surcharge calculations.

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Service Agreement Summary

Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Delaware County - Cheshire Pump Station Sub-District	20110718 Cheshire Pump Station Surcharge	Cheshire Pump Station Sub-District includes all wastewater discharges tributary to and that pass through the Cheshire Pump Station			The standard capacity fee will equal the current capacity charge approved by resolution for the Regional 1A Sewer District at the time the fee is paid. Capacity fee surcharge shall be equal to $2,600 for all new connections on a residential equivalent basis. Total capacity fee shall be the standard capacity fee plus the surcharge equal to $2,600 for all new connections on a residential equivalent basis.	7/18/2011		
Delaware County - Regional 1A Sewer District	20110718 Modifications to Service Area 1A	Regional 1A Sewer District is the existing sanitary sewer area that includes all wastewater discharges tributary to and treated by either Olentangy Environmental Control Center (OECC) or the Alum Creek Wastewater Reclamation Facility (Alum Creek WRF). Service area will be amended to include the map titled Cheshire Elementary School Sanitary Sewer Improvements - Service Area Amendment Map dated 7/13/11.				7/18/2011		Map: Cheshire Elementary School Sanitary Sewer Improvements
Village of Shawnee Hills & Delaware County	20111212 Shawnee Hills Sewers	Sanitary House Service Connection Specifications						Document: Land Use Plan Map: Sewer Lines
City of Columbus & Delaware County	20120712 Modification to City of Columbus Agreement	Area #1	DCRSD may build a new WW Treatment Plant with a discharge directly to Alum Creek Reservoir. The new plant, which will be designed to serve the Central Alum Creek service area as defined in the Delaware County 2005 Sewer Master Plan (will be designed to treat an avg flow of 800,000 gpd.	modify the density standard for the tributary area of Area #1 WW flows from the tributary areas shall be based on: 1 person = 100 gpd Area #1 - 16.5 persons per acre Area #2 & Area #3 the conditions on service to be determined in accordance with the provisions of I(B), but in any event not to exceed 4 person per acre. Area #4 - 8 persons per acre		7/12/2012		
Delaware County - Regional 1A Sewer District	20120820 Modification to Service Area 1A	Existing sanitary service area that includes all wastewater discharges tributary to and treated by either the Olentangy Environmental Control Center (OECC) or the Alum Creek Wastewater Reclamation Facility (ACWRF). Area is being modified to include where the current boundary for Regional 1A Sewer District bisects the property currently owned by Vinmar Investment Limited and identified with Parcel ID #3172400303700 (Vinmar North Parcel).				8/20/2012		Untitled Map - assumed to be the Vinmar North Parcel

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Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Delaware County - Regional 1A Sewer District	20130321 Modification to Service Area 1A	Existing sanitary service area that includes all wastewater discharges tributary to and treated by either the Olentangy Environmental Control Center (OECC) or the Alum Creek Wastewater Reclamation Facility (ACWRF). Area is being modified to include where the current boundary for Regional 1A Sewer District bisects the properties currently owned by Katherine Benalcazar and identified with Parcel ID #31713001029000; 31713001036000; 31713001036001; 3171300103602; 31713001036003; 31713001036004; 31713001036005; 31713001038000 (Benalcazar Parcels)				3/21/2013		
Concord/Scioto Community Authority & Delaware County	20130930 Scioto Reserve IGA		Financing and construction of the Lower Scioto Water Reclamation Facility (LSWRF). The Community Authority dedicated the LSWRF to the County and the County acquired all remaining tap credits granted to the Community Authority. The established trust for financing of the LSWRF was terminated. An amended and restated Intergovernmental Cooperation Agreement was approved.		Voucher to the Community Authority for $14,062,374.65	9/30/2013		Asset Purchase and Bond Modification and Redemption Agreement. Amended and Restated Intergovernmental Cooperation Agreement.
Delaware County - Donald R Kenney	20131001 Scioto Reserve Subdividers Agreement	Scioto Reserve Golf Club Community Subdivision. Area to be modified to include 195 single-family homes bordering the eastern edge of the existing subdivision boundaries shown in the exhibit as Subdivision Addition. Area to be modified to include the boundary shown in the exhibit as Upstream Tributary Area.	D. Kenney (Subdivider) installed public infrastructure improvements consisting of a wastewater reclamation and reuse system and treatment facility (plant), service lines, and other sewer system improvements necessary to serve the subdivision. The County will own and operate the improvements, plant and sewer system. Subdivider has been approved for 1,678 sanitary sewer connections for single family residences, golf course facilities, and schools. He was also approved for 195 single family taps for the Subdivision Addition.	Maximum capacity of the plant as is exists at 423,400 gpd	Subdivider can charge third parties for Taps within the Subdivision and Subdivision Addition and to retain all fees charged by Subdivider to third parties for Taps within the Subdivision and Subdivision Addition. The County can charge third parties for capacity fees and surcharges within the Upstream Tributary Area and to retain all fees charged by the County to third parties within the Upstream Tributary Area. After County acceptance of the improvements, the County shall retain usage fees and any inspection fees charged to third parties.	10/1/2013		Map of Subdivision Addition, Pump Station and Sewer Line Upgrades
Concord/Scioto Community Authority & Delaware County	20131003 Lower Scioto Service Area	Original Agreement (11/1/2007) - Was not included. The Lower Scioto Service Area (see attachment) that will be serviced by the improvements. The service area will cover any areas east of Steitz Road and within the Original Service Area at the election of any property owner owning property outside of the service area but within the original service area that desires to develop property and receive sewer services from the LSWRF.	LSWRF will be the sole and exclusive wastewater treatment facility for the service area.	Lower Scioto Water Reclamation Facility (LSWRF) = 1.4 million gpd sanitary wastewater treatment facility. Capacity based on 100 gallons per person per day.				Map of Lower Scioto Service Area; Services Areas

Attachment 1
Service Agreement Summary

Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
Delaware County - Liberty Park Pump Station Sub-District	20140602 Liberty Park Pump Station Surcharge	All wastewater discharge tributary to and/or that pass through the proposed Liberty Park Pump Station.			Total capacity fee = current capacity charge approved by Region 1A Sewer District; existing $4,000 Perry Taggart surcharge per Equivalent Residential Unit; $1,000 Liberty Park Pump Station surcharge per Equivalent Residential Unit; any future surcharge established by Board	6/2/2014		Map: Anticipated Tributary Area for Liberty Park Pump Station
Delaware County - Liberty Township	20140602 Liberty Sawmill Sewer Extension	10/28/13: Sewer from Nelson Farms subdivision and other current service lines to the area of Sawmill Parkway and other properties where growth is imminent in Liberty Township. 3/20/14: sewer from Nelson Farms subdivision to Sawmill Parkway north of Home Road. 6/2/14: All wastewater discharge tributary to and/or that pass through the proposed Liberty Park Pump Station.	10/28/13: Establishing a funding formula; the project would initially be funded by the sanitary sewer enterprise fund and reimbursed by a combination of developer surcharges, general fund transfers and/or credits and by new revenues from an increase in user fees. 1/9/14: Sewage collection and sewage treatment service in Delaware County. 3/20/14: Approves Liberty Park Pump Station Improvements.	1/9/14: 1 residential unit is assumed to be 290 gpd of ordinary domestic sewage.	1/9/14: Amend user charges for the Delaware County Sewer District. A table of user charges are included in Section II. 6/2/14: Liberty Park Pump Station Sub-District Total capacity fee = current capacity charge of Region 1A Sewer District; ex. $4,000 Perry Taggart surcharge per Equivalent Residential Unit (ERU); $1,000 Liberty Park Pump Station surcharge per ERU; any future surcharge established by Board. Liberty Sawmill Sanitary Sewer Extension Sub-District total capacity fee = current capacity charge approved by Region 1A Sewer District; ex. $4,000 Perry Taggart surcharge per ERU; $1,350 Liberty Sawmill Sanitary Sewer Extension surcharge per ERU; any future surcharge established by Board.	6/2/2014		Map: Surcharge Map for Liberty Sawmill Sanitary Sewer Extension Improvements Resolutions: 13-1126 14-19 14-326 14-327 14-634 14-638 14-635

Attachment 1
Service Agreement Summary

Service Agreement Communities	Document	Service Area	Agreed Upon Services	Flow Parameters	Fees	Begin Date	End Date	Attachments
City of Westerville & Delaware County	20140717 New Westerville Agreement	Area #1 (Zumstein Tract); Area #2; Area #3: (Rosselot Tract); Area #4; Area #5; Area #6: See Attachment	Area #1: City discharges all wastewater(ww) from sanitary sewers if the City located in Delaware County to the sanitary sewer system of the County for treatment at a County ww treatment facility. Area #2: County discharges all ww from sanitary sewers of the County located adjacent to Area #1 of the City to the sanitary sewer system of the City for treatment at & discharge from facilities of City of Columbus. Area #3: City discharges ww from sanitary sewers of the City located within Delaware County to the sanitary sewer system of the County for treatment at a County ww treatment facility. Area #4: City may cause all ww (893 ac.) to be collected and discharged into the system of the City for treatment at & discharge from City of Columbus. Area #5: County may cause all ww (49 ac. developed for residential use) to be collected & discharged into the sanitary system of the City for treatment at & discharge from facilities of City of Columbus. Area #6: County may cause all ww (13 ac. developed for residential use) to be collected & discharged into sanitary system of the City for treatment at and discharge from facilities of City of Columbus.	Area #1 (Zumstein Tract): 16.5 persons per acre; flows measured by flume metering device Area #2: per City's agreement with the City of Columbus Area #3: (Rosselot Tract): 376 units total at 290 gpd/unit; flows based on water usage for City water customers Area #4 - 6: per City's agreement with the City of Columbus 1 person equals 100 gpd. Densities in portions of each area may exceed the maximum density per acre but the gross density per acre for each area shall not be exceeded and density will be reserved for the entire tributary area of each sanitary sewer within each party's respective governmental boundaries.	Billing user charge every three months. User charge of County for accepting City discharges are based upon the County's current rate at time of discharge plus 50% surcharge. User charge of the City for accepting discharge from users within Areas #2, #4, #5 and #6 are set by City's Codified Ordinances.	7/17/2014		Map: Service Areas 1 through 6 Map: Effluent Line Resolution 14-800