Delaware County Regional Sewer District

Sanitary Sewer Master Plan

Technical Memorandum #2

February 19, 2016

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Section 1 - Introduction

Delaware County Regional Sewer District (DCRSD) has commissioned a Sanitary Sewer Master Plan intended to reflect the current planning efforts of the County and Township government as well as incorporate input from stakeholders. The purpose of Technical Memorandum No. 2 is to identify key, fundamental technical assumptions, planning and modeling criteria that will be used to evaluate the condition and capacity of the current system, and identifies improvements needed to support planned growth. The planning criteria presented within this memorandum incorporate historical trends and development criteria presented in Technical Memorandum No. 1, as well as industry best planning practices. The planning criteria that are presented within this memorandum include:

- **Population Growth**
- **Land Use & Density**
- **Wastewater Flow**
- **Collection System Capacity Evaluation**
- **Target Level of Service**

Section 2 - Population Growth

Population and development growth forecasts for the DCRSD planning area are the single largest element of wastewater flow projections, forecasting the need for new and larger capacity infrastructure. An accurate estimate of future population size and distribution will help determine conveyance pipe sizes, as well as the capacities of the pump stations and treatment facilities. In order to make accurate wastewater flow projections, we must characterize both the quantity and location of the planned residential and commercial developments and the total number of new occupants. This information is generally established by considering past development, and incorporating planning documents provided by various sanitary sewer stakeholders including the Delaware County Regional Planning Commission (DCRPC). These documents have been identified and summarized in Technical Memorandum 1 (TM1). The estimated growth rates for the DCRSD area have been based on the individual rates of growth for each Township and City within the service area and have been compiled by the DCRPC. Each sub-area within the County has a different growth rate based on:

- Existing development,
- Outstanding building permits,
- The availability of developable land, and
- Proximity to existing or planned thoroughfare corridors.

The ultimate build-out population for each township reflects estimates performed by the DCRPC that utilizes both historical growth rates and the existing Comprehensive Plans. The yearly population estimates are compiled through a combination of the use of two methods; the “Step-Down Method” which uses known population numbers and growth rates at a local and regional level and the “Housing Unit Method” which incorporates data from building permits. The combination of applying these two techniques has yielded accuracy within 3% of Census determined counts since the previous iteration of the Sanitary Sewer Master Plan.

Table 1 illustrates a projection of the future population of Delaware County compiled in part by the DCRPC. The base year of 2010 was the last time a national census was conducted; therefore the 2015 projections are themselves estimates. These estimates for population will be used to model the dry weather flow being conveyed to the pump stations and wastewater treatment facilities. As these estimates are on a township level, they will be somewhat less valuable when considering the impact on smaller sewers and pump stations. **Based on the table shown below, it is estimated that DCRSD will have approximately 15,000 additional persons living within the overall service area by 2020 compared to 2015.**

Table 1 Selected Delaware County Township Populations and Projected Build Out (as of 2015)*						
	2010	**2015**	**2020**	**2025**	**2030**	**Ultimate**
Berkshire Township	1,428	2,853	3,421	3,943	4,455	17,113
Berlin Township	6,496	7,175	7,910	8,578	9,234	23,537
Concord Township	9,294	10,301	12,281	13,691	15,074	31,298
Genoa Township	23,090	25,242	27,761	28,454	28,454	28,454
Liberty Township	14,581	16,308	17,734	19,138	20,515	29,900
Orange Township	23,762	27,104	30,666	33,916	37,038	37,038
Columbus **	7,245	9,667	12,387	12,974	12,974	12,974
Powell**	11,500	12,975	13,500	13,500	13,500	13,500
Westerville **	7,792	8,444	9,500	9,633	9,633	9,633
Estimated Total	**105,188**	**120,069**	**135,160**	**143,827**	**150,877**	**203,447**

*Per "Demographic Information – Delaware County, Ohio. October, 2013" Prepared by DCRPC and based on current Comprehensive Plans

**Population of areas of municipality within Delaware County only; does not account for potential future annexation

Section 3 - Land Use & Density

A thorough understanding of the future land use and density of development is required in order to quantify infrastructure capacity and location to accommodate growth. Factors for consideration include:

- The existing density of recent development within Delaware County,
- Development trends and Township Comprehensive Plans,
- Planned zoning restrictions, and
- The extent of remaining undeveloped land.

For the purposes of the Sanitary Sewer Master Plan, developable land within Delaware County is characterized as privately held land not already utilized at a density typical for the more sub-urbanized areas of Delaware County (1.5-2 units per acre). This would include vacant land or land that is currently utilized for either agriculture or low density residential/commercial space. Though the actual development of this land and the densities seen therein will be determined by the owners and townships themselves, this Master Plan will consider the higher densities reflected in nearby development and the existing Comprehensive Plans as a means of conservatively sizing the proposed assets.

Table 2 shows the existing breakdown of land use within the townships representing the bulk of the undeveloped land within the DCRSD service area, as well as the acreage of remaining undeveloped land. This information presented does not account for future lot splits within existing residential areas which potentially increase development density, but does indicate the amount of remaining total acreage as well as the type of residential development that is typical for the area. The data presented in the Table does not include the small amount of infill area available within the existing Powell borders or within areas of Columbus or Westerville that are tributary to DCRSD by agreement. All of these areas have the potential to develop in the near term, however they are either:

- Covered by an existing agreement that limits the quantity of flow permitted to be conveyed, or
- Would be small additions in comparison to the potential new development within the townships farther north.

Although the existing land use is not a perfect indication of potential future development, it does provide a good representation of an overall estimation as individual projects and their densities are subject to the desires of the property owners and developers within the bounds of zoning requirements. As future development trends are difficult to predict with certainty, recent development and Comprehensive Plans will continue to be the guide for the determination of future development densities on a macro scale. Within individual townships and cities, more historical trends point to increased residential and commercial density along specific corridors.

Table 2 Existing Housing Mix and Land Use per DCRPC (2014/2015) and assumed for Future Growth					
Township	**Single Family**	**Multi Family**	**Percent of Commercial Land Use**	**Percent Industrial Land Use**	**Remaining Vacant or Agricultural Land - Acres and Percent of Total Township**
	As a percentage of Total Residential Land Use				
Berkshire	97%	3%	1%*	0%	6,644 Acres (59%)
Berlin	89%	11%	2%	<1%	6,193 Acres (42%)
Concord	89%	11%	1%	1%	5,880 Acres (43%)
Genoa	88%	12%	1%	<1%	2,098 Acres (17%)
Harlem	82%	18%	<1%	<1%	11,170 Acres (67%)
Kingston	99%	1%	4%	0%	10,318 Acres (70%)
Liberty	80%	20%	4%	<1%	5,787 Acres (35%)
Orange	78%	22%	7%	3%	3,102 Acres (25%)
Total:					51,192 Acres

*Does not include Outlet Mall currently under construction.

Table 3 (see page 9) illustrates the current zoning requirements as well as the zoning for undeveloped land in the townships that DCRSD currently serves. The zoning requirements for minimum lot size, together with the quantity of remaining undeveloped land are based on the Zoning Codes and Comprehensive Plans specific to each township as well as historical information compiled by the DCRPC. These documents provide the foundation for assumptions regarding the density of future development and the overall number of additional units that may be constructed on a township-by-township basis. Estimates for additional individual residential units serve as the basis for the allocation of sanitary flow, which will be used to determine the requirements for conveyance, pumping and treatment.

Observed development within the DCRSD service area has historically been over 75% residential with lot sizes between ¼ and 1 acre for single family residences. These densities are mirrored in the current zoning requirements throughout the more suburban sections of Delaware County which DCRSD largely serves. Based on the most recent development plans as well as discussions with the Building Industry Association, these sizes are likely to continue. In addition to the single family residential developments, between 10 and 20 percent of the total residential development constitute higher density multi-family units with between 6 and 8 units per acre. There has been an increase over the last five years in the percentage of multi-family units constructed; however these numbers are still within the range of the existing land use ratios shown in Table 2. The multi-family units are primarily constructed closer to major thoroughfares or commercial development. It is anticipated that this trend will continue with the potential for higher density development along Sawmill Parkway, Liberty Road, Home Road, Old State Road, Dublin Road, US-23, US-42, and US 36/SR37.

In addition to multi-family units, new commercial construction is also expected along the major thoroughfares. Currently, commercial and industrial space represents the remaining 2 to 10 percent of developable land within the Sewer District's service area. Most of the remaining developable land use is defined as institutional. Commercial development is likely to continue to represent between 2 and 5 percent of developable land in order to serve the growing residential population. This development will generally be distributed across the county but is expected to develop in concert with new residential occupancy and will most likely follow major arterial roads. Within the DCRSD service area those routes include Sawmill Parkway, Liberty, Home, and Orange Roads as well as US-23 and US 36/SR37. The new outlet mall near the intersection of US36/SR37and I-71 is an example of this commercial development along a major transportation corridor.

Moving forward, the more developed townships of Orange, Liberty, and Genoa are anticipated to maintain their existing low density residential/high density residential/commercial development ratio shown in Table 2. Harlem, Berkshire, Berlin, Kingston, and Concord Townships have less of a commercial base and could over the long term, develop more high density residential and commercial construction around the major corridors relative to their existing acreage. It is anticipated that the eventual distribution would be on par with existing commercial to residential ratios seen in the more developed Townships. While a trend towards more mixed use and combined residential commercial space have been proposed in a few recent development plans, they have not been seen in large amounts within the DCRSD service area.

Timing is another component of Land Use critical to understanding future infrastructure needs. While development densities and zoning are controlled to some extent by the Comprehensive Plans of each township, the timing of new growth is determined by developers and their response to market demand. As such, the precise timing of new development will not be known until designs are submitted and ground is broken. The DCRSD ultimately approves permits for new sanitary flow to be accepted and can therefore impact the timing of developments contributing new sanitary flow. The general population estimates discussed in Section 1 have defined approximate numbers of new citizens anticipated to be located within the DCRSD service area, but the exact locations are harder to determine with respect to time. Development plans can be postponed at many points during the process and the timing is therefore difficult to discern more than a year or two in advance of potential sewage taps coming on line. Within Delaware County, there have historically been three broad trends or conditions that have impacted the general order of development:

- Proximity to existing development. While this is not always the case, Delaware County has historically developed near existing established areas. This has led to new development generally moving from south to north from the edge of Franklin County continuing north through Orange, Liberty, Genoa, and Concord Townships. The areas most likely to develop in the near term (less than 5 years) are within this band of land adjacent to existing development.

- Development along major thoroughfares. Access to sufficient ingress and egress and proximity to jobs and businesses has led to increased development along major road corridors. As road projects are completed to ease congestion or add access to major roads and highways, development has often followed soon after.
- The Olentangy Local School District has been attracting residential development. Areas within this school district are developing at a far higher rate due to higher demand according to the discussions with multiple developers.

One additional trend to note was described by multiple developers: Access to sanitary capacity. Areas that fell into the above mentioned categories were typically considered good candidates for development sooner. Access to adequate sanitary sewer capacity allowed for sites to be developed sooner than they would if an alternative sanitary solution was required.

Based on these trends, it is expected that the growth within Delaware County will continue to move north along Sawmill Parkway, US-23, SR 315, Old State Road, Dublin Road, as well as east and west along the US36/SR37 corridor. Open land within Westerville, the Polaris area, and southern Orange Township are also likely to develop in the near term and will provide additional sanitary flow through agreement to supplement the existing flow from township areas.

Table 3
Land Use Density (Maximum Permitted in Current Zoning)[*]

Township	Agricultural and Farm Residential Districts[**]	Acres Zoned as Farm Residential or similar[**]	Light Residential and R-2 Districts	Medium Residential (R-3 and R-4) Districts
Berkshire	0.2 Units/Acre	8,656 Ac	0.5 Units/Acre	1.5 Units/Acre
Berlin	1 Unit/Acre	9,042 Ac	1.5 Units/Acre	2.2 Units/Acre
Concord	0.66 Units/Acre	10,766 Ac	1.5 Units/Acre	1.5 Units/Acre
Genoa	0.5 Units/Acre	5,763 Ac	N/A	1.8 Units/Acre
Harlem	0.5 Units/Acre	16,816 Ac	N/A	N/A
Kingston	0.5 Units/Acre	13,733 Ac	N/A	N/A
Liberty (including Powell)	1 Unit/Acre	4,325 Ac	2.2 Units/Acre	2 Units/Acre Single Family 6 Units/Acre Multifamily
Orange	0.5 Units/Acre	-	3 Units/Acre	2 Units/Acre Single Family 8 Units/ Acre Multifamily (4 Units/Acre average across multifamily development)

[*] Based on the approximate minimum lot size for the zoning district in each township

[**] Potential to be re-zoned to a higher density. Historically, these areas have been re-zoned to a higher density when property is subdivided as part of a new housing development.

Section 4 - Wastewater Flow

Wastewater flow from individual dwellings and businesses are used to develop the sewer model and estimate flows at treatment facilities and pump stations. The total wastewater flow that is developed for planning purposes is based on three distinct components:

- Sanitary base flow
- Dry weather infiltration
- Rainfall-derived inflow/infiltration

The sanitary flow component is the flow generated by residential and commercial users on a daily basis and that is tributary to the collection system through approved sanitary connections. Dry weather infiltration includes water that infiltrates from the ground into the sanitary collection system. While the magnitude of this value may vary depending on the time of year and the level of the groundwater, it is a component that is present in some form on a continuous basis. On a typical dry day with no rainfall, the flow to the wastewater plant is made up of the sanitary base flow and the dry weather infiltration.

During rain events, additional water may enter the sanitary system through both direct (connected downspouts) and indirect (cracks in joints) methods. This additional flow is considered rainfall-derived inflow/infiltration (RDII) and is present only following rainfall events. This inflow/infiltration will peak during and immediately following rainfall events and will gradually subside until the sources are no longer contributing. When planning for potential collection system improvements, all of these sources must be considered.

Sewer contribution estimates are based upon comparison of the District's historical sewer flow data and conventional values used for the planning of new developments. The combination of flow data specific to Delaware County and the formulas and standards typical to many local sewer systems allows for the development of dry weather flow values that are anticipated from a new development. The amount of flow per unit sewered includes an allowance for dry weather infiltration from both residential and commercial population. Daily flow patterns accounting for the time of day and peak flow per unit contributions are further applied to determine the extent of sewer flows anticipated under more realistic and varied conditions. With the assistance of sewer modeling software, this range of resulting flow rates is then used to allocate flow across the sanitary sewer system on a per unit basis as well as to develop peak flow estimates for the volume and rate anticipated in trunk sewers, pump stations and the treatment facilities. The criteria developed for use within the modeling simulations will not necessarily match existing design criteria developed by the county as the model is attempting to simulate flow that correlates with observed flow measurements collected from monitoring devices. These criteria are not developed to be as conservative as design guidelines would be, but rather they attempt to accurately represent conditions encountered within the system. Table 4 lists the key criteria that have been developed for use within the Delaware County Sewer Model.

Table 4 Sewer Model Contribution Design Criteria		
Criteria	**Value**	**Description**
Total dry weather flow per residential unit	290	Gallons per day (gpd)/unit (210 gpd sanitary flow, 80 gpd dry weather ground infiltration)
Dry weather peaking factor	2.0	Ratio of peak dry weather flow to average dry weather flow
Wet weather peaking factor	3.0	Ratio of peak wet weather flow to average dry weather flow in commonly occurring events (6 month event)
RDII volume factor	1.0% of rainfall as RDII	Flow data from recent development; to be confirmed with evaluation of recent flow monitoring data

A more detailed description of each item is included below:

Total unit flow: This value is based on a typical residential unit and is the current planning number in use to describe the contribution from new residential units in the district. The value of 290 gpd/unit includes both sanitary flow and dry weather infiltration. This value is consistent with other utilities and commonly accepted values. Typical sanitary usage rates are between 60-75 gallons/person/day, meaning that the sanitary component for a typical 3 person residential unit is between 180-225 gpd. Dry weather infiltration as well as commercial contributions account for the remaining average daily flow. Most utilities use a value between 200-400 gpd/unit to account for both sanitary and dry weather infiltration. The use of 290 gpd provides a reasonable representation of the dry weather flow volume from a newly developed residential unit.

Dry weather peaking factor: A value of 2.0 represents the peak dry weather flow on a typical dry weather day from a residential unit. This means that on average, the peak dry weather flow from a new residential unit will be 2x the average dry weather flow. While the total volume for the day from the unit will be 290 gallons, the peak rate that will be accommodated will be approximately 580 gpd. This accounts for the variation in daily usage, with peak rates of usage occurring in the morning and in the evening, with lower rates during daytime working hours and overnight.

Wet weather peaking factor: A value of 3.0 represents the peak wet weather flow observed during rainfall events relative to the average dry weather flow. This allows for the inclusion of RDII in the planning process. The value of 3.0 is based on a commonly occurring storm event for Central Ohio. Different size storm events generate varying degrees of RDII and subsequently, varying magnitudes of peaking factors. A 0.5-inch rainfall event is significantly different than a 5.0-inch rainfall event and will generate a different response. For purposes of planning, this 3.0 peaking factor will be assumed to occur during a 6-month recurrence event, which is approximately 1.30 inches over a 6-hour period or 1.75 inches in a 24-hour period. For reference, the rainfall on December 26-27, 2015 was approximately 1.60 inches over a 24-hour period and generated peak flow ratios of approximately 3.0 based on available flow monitoring data. This storm occurred during a wetter period with rainfall having occurred earlier in the week and leaving the ground partially saturated. Larger rain events will be assumed to generate higher peaking factors which will be based on the additional rainfall; the model will be used to estimate the peaking factors in larger storm events.

RDII volume factor: Wet weather response due to inflow/infiltration is defined not only by a peaking factor (defining the maximum flow), but also by the total volume of water expected to enter the collection system as a result of the rainfall. Typically, this volume factor is expressed as a percentage of rainfall occurring over a certain area. For example, for every 1-inch of rainfall, an RDII percentage of 1% would mean that 0.01 inches of that rainfall would be entering the sanitary system. Previous studies of other similar utilities have indicated that recent developments (those occurring in the past 20 years) have shown a range of contributions from 0.0% to 1.5%. Depending on the time of year, new developments may not produce any RDII, while during the winter and spring wet seasons, new developments may generate RDII values closer to 1.5%. In addition, the observed rate varies from developments that were recently built compared to those that were built 20-25 years ago. For this study, 1% is proposed to be used because it allows for some aging of sewers and laterals and accounts for RDII from new development moving forward.

The application of the above factors will be based on the number of units planned to occur over a specific acreage. Future land uses and proposed densities will be used to develop an estimated number of units over the designated acreage. The number of units will be used to specify the dry weather flow, dry weather peaking factor, and wet weather peaking factor while the acreage will be used to estimate the RDII volume factor.

The use of residential units and acreages as noted in Table 3 will help to guide the application of these future flows to the model based on the rate of development and location within the collection system.

Section 5 - Collection System Capacity Evaluation

Software models will be utilized in the master planning process to determine the remaining capacity of the existing infrastructure and forecast the sewer capacity needed to accommodate growth. Within the sewer model representing future conditions, dry weather flow contributions will be based on projections of future population and land use and verified by historical flow records. Wet weather sewer flow responses, the indication of how quickly rain or groundwater results in a sewer rate increase, will be applied to the entire modeled area based on data collected downstream of recently constructed residential development.

To simulate the impacts of wet weather sewer contributions to the current infrastructure and possible future improvements, a range of design storms will be simulated; 1-year, 2-year, 5-year, 10-year, and 25-year design storms. These simulations will evaluate the sewer system behavior and infrastructure capacity under various conditions. The intent of this analysis is to evaluate the cost-benefit of providing higher levels of service. Table 5 summarizes the capacity evaluation factors that will be used either as inputs or indicators of potential performance issues in the sewer model.

Table 5
Collection System Capacity Evaluation Factors

Category	Assumption	Comment
Design Storm	1-year, 2-year, 5-year, 10-year, and 25-year, 6 hour events per NOAA - Bulletin 71 distributions and Atlas 14 volumes	Range of design storms to evaluate potential scenarios for new facilities and infrastructure
Pipe Roughness	n = 0.013	Coefficient of friction for all sewers; this value will be used to assist in identifying any existing capacity issues.
Minimum Velocity	2.0 feet per second (fps)	Any sewer with an existing velocity below 2.0 fps will be flagged as these sewers are not operating at best practice; only those low-velocity sewers that correlate to maintenance issues regarding sediment will likely be recommended for any improvements.
Design Capacity (as % of full)	50% full at peak dry weather flow; 100% full during peak wet weather	All sewers that are 50% full during peak dry weather flow will be flagged to evaluate the possibility of potential capacity issues; in addition, any sewers flowing 100% full during wet weather will be flagged for further investigation to determine if any surcharge is allowable based on depth to grade and/or the potential for basement backups during rain events.

Section 6 - Target Level of Service

One of the key decisions for master plans to address is the performance benchmarks that sanitary sewer infrastructure must achieve, also known as the Level of Service. The Level of Service is determined by the requirements of the served community as well as the capacity of the existing infrastructure. The target Level of Service describes the system condition and maximum fullness of pipes and manholes considered to be acceptable during various modeled storm conditions. It is applied to the model output during the capacity evaluation as a hydraulic benchmark to determine if a sewer pipe's performance is either acceptable or not within the prescribed constraints. This determination of this acceptance is based in part on whether it meets the Level of Service requirement in addition to other engineering requirements and Best Practices. Under the defined Level of Service, the sewers will be determined to either have remaining capacity or to be full.

Establishing a target Level of Service applies not only to determining the remaining hydraulic capacity but Operations and Maintenance planning as well. Various Level of Service criteria have been developed based on observation of historical District planning and industry best practices. The initial Level of Service criteria will determine when assets are under performing; require modification to increase capacity or present unacceptable risk of performance failure. Level of Service criteria also examine the context of the future model scenarios and costs for improvements; multiple criteria may be examined depending on future cost implications (i.e. a higher or lower level of service may be more appropriate based on financial analysis).

To address this issue, the model will be calibrated to confirm performance in both dry weather and wet weather. For dry weather conditions, typical dry weather days will be simulated to verify that the system meets the required level of service metrics based on dry weather. For wet weather, there are a range of potential storm events that can be used to define wet weather performance. As the storm rainfall volume increases, the cost to ensure the prescribed Level of Service across the district will also increase. To make sure that all pump stations and sewers in the system meet all of the performance metrics for wet weather in a 1-year event will require less improvement than confirming that those pump stations and sewers will meet the performance metrics in a 25-year event. The 25-year event is much larger but also occurs much less frequently; evaluating the cost and benefit of meeting the metrics in different rainfall events will help to identify the preferred Level of Service, one that meets the goals of the County ratepayers and is financially sustainable.

Table 6
Recommended Modeling Level of Service

Sanitary Sewer Capacity	Sewer surcharge within 8' (Typical Basement Depth) of ground surface during selected storm wet weather event	A range of design events will be used to help define when exceedance of this criterion is allowable. Some utilities, such as Columbus, have selected a 10-year event, while others have used smaller (2-year, 5-year) and larger (25-year) events. System analysis will identify a reasonable storm event to use that provides significant benefit while maintaining a reasonable cost.

Table 6 Recommended Modeling Level of Service		
Collection System Pump Station Capacity	1. **Velocity range:** 2.0 – 8.0 feet per second is recommended in 10 States Standards. 2. **Pump Cycles:** maximum 10 starts per hour represent ideal pump conditions. 3. **Operating Conditions**: Pump operating point falls within the actual operating range (AOR) defined by Hydraulic Institute Standards. 4. **Motor Load**: Non-overloading	1. Velocity Range: Maintaining appropriate minimum velocity reduces sewer blockages by allowing solid material to stay in suspension. Establishing maximum velocity limits reduces corrosion due to scour and maintains an acceptable amount of pressure restriction on the pump. 2. Pump cycle evaluations are performed based on standard industry practice and are dependent upon individual motor size and pump type. While 10 is suggested as guidance for a reasonable number of starts per hours, pumps will be evaluated on an individual basis if they exceed this amount to see if they are able to handle the proposed conditions. 3. Operating Conditions: Range of pumping output is evaluated against the pumps Preferred Operating Range (POR) and Actual Operating Range (AOR) to verify efficient operation. 4. Pumps operate in non-overloading conditions at all points in POR.
Pump and Equipment Redundancy	Peak hourly flow rate able to be conveyed with the single largest component out of service.	This criteria may be adjusted for specific pump stations depending on age and characteristics of infrastructure within the tributary area.
Wastewater Treatment Hydraulic Capacity	1. **Freeboard:** 24-inches at walls and 6-inches at hydraulic controls is typical. 2. **Hydraulic Loading**: velocity, detention time and gallons/day application rate of individual unit processes.	1. Check that hydraulic elevations maintain appropriate freeboard and hydraulic control with largest units out of service 2. Check that hydraulic loading rates fall within regulatory stipulated values for wet stream process
Wastewater Treatment Organic Capacity	1. **Organic Loading and Process Efficiency:** permit compliant performance to meet NPDES limits (summarized in TM1)	1. Evaluate organic loading and process efficiency at design, current, and anticipated future loads. Check performance to verify regulatory compliance of conditions.