Infrastructure Capacity Constraints

Onondaga County Department of Water Environment Protection

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Save the Rain

ONONDAGA COUNTY DEPARTMENT OF WATER ENVIRONMENT PROTECTION

VISION

To be a respected leader in wastewater treatment, storm water management, and the protection of our environment using state-of-the-art, innovative technologies and sound scientific principles as our guide.

MISSION

To protect and improve the water environment of Onondaga County in a cost-effective manner ensuring the health and sustainability of our community and economy.

CORE VALUES

E*xcellence*

T*eamwork*

H*onesty*

I*nnovation*

C*ost-Effectiveness*

S*afety*

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Background

Within the Onondaga County Consolidated Sanitary District, the Department of Water Environment Protection owns, operates, or maintains an extensive network of sewers, pump stations, and wastewater treatment facilities. The more than 2,000 miles of sewer pipe owned or maintained by the department could stretch from Syracuse, New York to Yellowstone National Park. The department's six wastewater treatment plants annually treat about 29 billion gallons of wastewater. The sanitary system serves approximately 410,000 residents, and its services are fundamental to local economic activity and the growth and redevelopment of every urban and suburban section of the district's thirteen towns, seven villages, and the City of Syracuse. A primary factor in attracting new business is the community's ability to provide adequate wastewater treatment facilities with available capacity. Additionally, wastewater treatment is absolutely fundamental to maintain high quality local water bodies which contribute to the community's property values and quality of life.

In April 2013, the American Society of Civil Engineers (ASCE) released its annual report card on the status of America's infrastructure. Our nation's sewer infrastructure, as judged by the ASCE, is just above failing. It is not surprising then to recognize that consolidated sanitary district assets, those owned by the County and those owned by its municipal partners, also have considerable condition and age-related problems which impact service and capacity. Consider for a moment that a fifteen year old car is a classic, and a twenty-five year old car is an antique. Under that scenario, five of the six wastewater treatment plants in the Onondaga County Sanitary District would be considered antique, and it is easy to understand that, now in their fortieth year, the mechanical systems, electrical systems, instrumentation, and controls have been replaced or are in need of replacement. One should expect these infrastructure components to have reached or extended beyond the end of their useful life. Many of the major pump stations in the system are now going through a comprehensive overhaul as they too are at least forty or more years old. Maintaining these "vertical" assets is a tremendous challenge for most wastewater utilities across the nation. The linear, or "horizontal" components of wastewater infrastructure are the pipes and conveyance elements of the sewer system. Here in the Onondaga County sanitary district, that network of sewers can range in age from one year in the newest subdivision to well over one hundred years. As these linear assets age, they become prone to leaking joints, cracked or broken manhole structures, crushed pipes, or broken lateral connections which allow groundwater to gradually contribute to even larger

> ***"The wastewater systems of the United States earned a grade D."***

portions of the flow in the sewer lines. In the wettest years, when spring groundwater tables are very high, parts of the system experience peak flows over fifteen times the typical dry weather flow. The effects of this inflow and infiltration dramatically erodes the capacity of the system and reduces the ability to treat waste most effectively.

"Extraneous flow uses capacity within the sewer system that should be used for economic growth."

This infrastructure system has a definitive capacity, established during design and set by the State Pollutant Discharge Elimination System (SPDES) permitting processes. System capacity limitations include flow constraints (volume) as well as a treatment facility's ability to treat biochemical oxygen demand (BOD) and total suspended solids (TSS) components of wastewater (load). New York State Regulations 6 NYCRR Part 750-2.9(c), http://www.dec.ny.gov/regs/4584.html) require exceeded capacity to be addressed through additional planning for flow management, management of future flow sources, mitigation of extraneous flows, or intensive capital investment to manage the additional flow or load. In extreme cases, exceeded capacity results in regulatory consent orders that carry significant capital cost plus penalties. In areas where sewer demand exceeds capacity, the regulators are also able to place total moratoriums on all new sewer connections, halting growth as well as redevelopment. Capacity related issues are not a new problem, but as the infrastructure ages, when maintenance is deferred and as operating costs increase, capacity constraints snowball; left unattended, capacity issues grow even larger.

Current Capacity Analysis

With the exception of the recently reconstructed and re-permitted Wetzel Road wastewater treatment facility, all of the satellite treatment facilities in the system were designed and constructed in the 1970s or early 1980s (www.ongov.net/wep/we19.html). As planned in the 1970s, these service areas have seen considerable suburban development and even the addition of decentralized industry. Today the remaining capacity in those service areas is analyzed by using spreadsheets to evaluate current impacts and system constraints. In this way, the available capacity of the sewer conveyances and treatment facility can be verified before additional new development is progressed. An example of this process is shown in Figure 1 -- *Baldwinsville–Seneca Knolls WWTP – Remaining Capacity Evaluation (2010-2012).* As shown below, with the potential addition of new high-strength wastewater from Agrana Fruit US, Inc., the Baldwinsville treatment facility capacity is projected to be utilized at approximately 91 percent of the BOD capacity, 58 percent of the TSS capacity and 51 percent of the flow capacity in the average year. This information indicates the treatment facility has adequate capacity to accept the Agrana Fruit US, Inc.'s wastewater, and it also indicates that with the addition of this large industrial user considerable treatment capacity in this service area will be consumed. With only 95 percent of permitted treatment capacity utilization allowed under the above-cited New York State regulation, the analysis indicates future growth in the this service area will soon be limited unless new BOD capacity is developed or new or existing loads are reduced by pretreatment.

Figure 1.

Baldwinsville-Seneca Knolls WWTP - Remaining Capacity Evaluation (2010 - 2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	9.0
BOD5 (lbs/day)	13,400
TSS (lbs/day)	13,400

BSK WWTP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	4.31	4.17	3.35	3.95
CBOD5 (mg/l)[1]	135	154	175	155
Calculated Equivalent BOD5 (mg/l)[2]	190	217	246	218
TSS (mg/l)	185	227	248	220

Influent Loadings (2010-2012)	Average	3-Year Peak[3]
Average Daily Flow (MGD)	3.95	4.31
CBOD5 (lbs/day)	5,089	6,296
BOD5 (lbs/day) - CBOD/BOD 71%	7,167	8,868
TSS (lbs/day)	7,243	8,937

Future Impact From Agrana Fruit Us, Inc	Reserved Capacity[5]
Average Daily Flow (MGD)	0.22
CBOD5 (lbs/day)	NA
BOD5 (lbs/day)	5,000
TSS (lbs/day)	500

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[3]	Average	3-Year Peak[3]	Average	3-Year Peak[3]
Average Daily Flow (MGD)[4]	4.39	4.02	48.7%	44.6%	51.3%	55.4%
BOD5 (lbs/day) - CBOD/BOD 71%	1,233	-468	9.2%	-3.5%	90.8%	103.5%
TSS (lbs/day)	5,657	3,963	42.2%	29.6%	57.8%	70.4%

[1] CBOD5 monitoring is required by permit and analyzed more frequently than BOD5, however, design treatment is based on BOD5. As a result, a ratio of CBOD to BOD has been developed to evaluate remaining capacity based on the equivalent BOD5 loadings.

[2] The CBOD/BOD ratio of 71% is based on the average of all corresponding/matching data collected from 2010 through 2012, the ratio is then applied to the individual annual CBOD5 average to calculate the equivalent annual BOD5.

[3] Utilizes 2010 flow, and 2012 BOD5 and TSS concentrations.

[4] Based on 95% of Design - Trigger for Flow Management Plan.

[5] Per the February 22, 2013, letter - Intent to Serve: Radison Business Park

Another example, shown in Figure 2 -- *Oak Orchard WWTP–Remaining Capacity Evaluation (2010-2012)*, indicates the BOD capacity of that facility has now been exceeded. Consistent with this desktop analysis, the 2012 Plant Operations Annual Report indicated that in eight of twelve months in 2012 the Oak Orchard Wastewater Treatment Plant received influent BOD loads in excess of the permitted capacity. This resulted in the temporary suspension of new sewer connections within the Oak Orchard service area. (http://static.ongov.net/WEP/OakOrchardWWTP/NoticeOakOrchardServiceArea04042013.pdf)

With the Notice of Temporary Suspension, WEP initiated a study to deeply evaluate the existing loads throughout the service area, to consider the potential costs and benefits of pretreatment for high strength industrial wastes, to consider any potential over conservatism inherent in the initial facility permitting, to reevaluate the potential to redirect a pump station service in this service area to another treatment facility with available capacity, and to evaluate the potential for new treatment processes or enlargement of facilities focused on reduction and treatment of BOD loads.

Figure 2.

Oak Orchard WWTP - Remaining Capacity Evaluation (2010 - 2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	10
BOD5 (lbs/day)	14,200
TSS (lbs/day)	16,700

OO WWTP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	5.54	6.06	5.59	5.73
CBOD5 (mg/l)[1]	231	240	284	252
Calculated Equivalent BOD5 (mg/l)[2]	285	297	350	311
TSS (mg/l)	146	160	177	161

Influent Loadings (2010-2012)	Average	3-Year Peak[3]
Average Daily Flow (MGD)	5.73	6.06
CBOD5 (lbs/day)	12,019	14,328
BOD5 (lbs/day) - CBOD/BOD 81%	14,838	17,689
TSS (lbs/day)	7,693	8,944

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design	
	Average	3-Year Peak[3]	Average	3-Year Peak[3]
Average Daily Flow (MGD)[4]	3.77	3.44	37.7%	34.4%
BOD5 (lbs/day) - CBOD/BOD 81%	-638	-3,489	-4.5%	-24.6%
TSS (lbs/day)	9,007	7,756	53.9%	46.4%

[1] CBOD5 monitoring is required by permit and analyzed more frequently than BOD5, however, design trea CBOD to BOD has been developed to evaluate remaining capacity based on the equivalent BOD5 loading

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[3] Utilizes 2011 flow, and 2012 BOD5 and TSS concentrations.

[4] Based on 95% of Design - Trigger for Flow Management Plan.

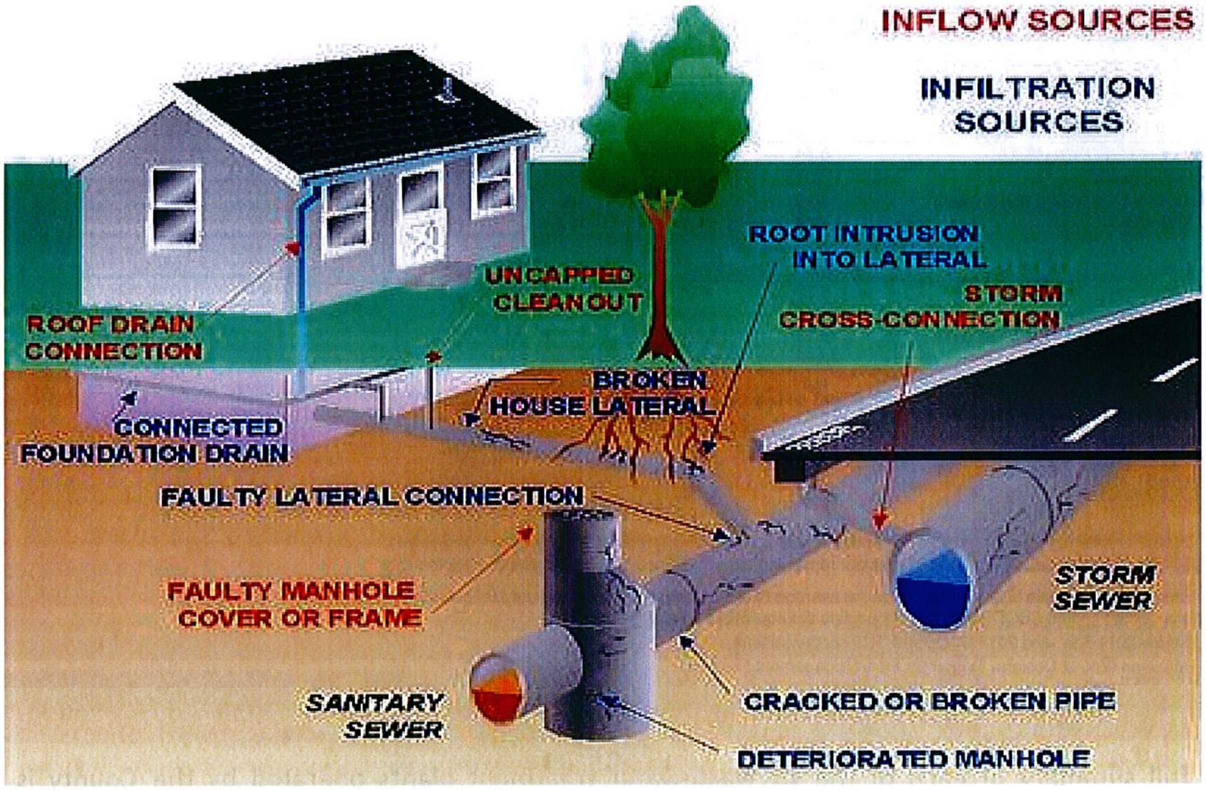
"...eight of twelve months in 2012 the Oak Orchard Wastewater Treatment Plant received influent BOD loads in excess of the permitted capacity."

A full summary of each of the six wastewater treatment plants operated by the County is provided in Attachment A. Two of the six plants are currently constrained: Oak Orchard by BOD and Meadowbrook Limestone by flow. In addition, Meadowbrook Limestone and Baldwinsville are each expected to experience BOD constraints in the near future, based, respectively, upon recent history and new industrial loads in the service areas. Oak Orchard's constraints also impact upon the utilization of the White Pine Business Park for certain industries. The Metro treatment plant has additional capacity as does Wetzel Road. While the County's Brewerton plant is only approximately 76 percent utilized, it needs to be recognized that its overall capacity is relatively small.

Flow Capacity Constraints in Sewer Conveyance and Treatment Service Areas

The impact of extraneous flow on capacity in a service area is more difficult to pinpoint since the sources are typically buried underground and many factors are involved. The sources of extraneous flow are defined as inflow and infiltration (I & I). Inflow can be characterized as stormwater entering the sewer system through direct connections such as sump pumps, foundation drains, roof drains, leaking manholes, and cross connections with storm sewers.

Infiltration can be characterized as groundwater entering the sewer system through pipe or manhole structure joints, cracks, and damaged pipe sections.



Typical Sources of Extraneous Flow Known as Inflow and Infiltration (I & I)

Extraneous flow is considered "clean" water. If it never entered the sanitary sewers it would not require treatment. Keeping clean rain water and clean groundwater out of the sanitary sewers is the essence of the County's Save the Rain program. Avoiding the costs to convey, pump, and treat this extraneous flow is a highly sustainable solution to mitigate the ever growing consumption of flow capacity by inflow and infiltration (I & I). In addition, the extraneous flows caused by I & I typically vary based on the intensity and duration of rain events and the seasonal variability of the groundwater table. As excessive extraneous flow enters the conveyance system, the volume (flow) capacity of the infrastructure system can be surpassed; wet weather flows may be many times greater than dry weather flows. The treatment of BOD and TSS are also impacted since extraneous flow actually dilutes influent wastewater, thereby decreasing the efficiency of the facility to provide adequate treatment.

In the examples which follow, charts comparing wet and dry weather flows for the Ley Creek, Liverpool, and Westside pump stations are shown. The year 2011 was one of the wetter years on record, and 2012 was comparatively dry. By charting and comparing a month of 'wet' weather flow from April 2011 to 'dry' weather flow from July 2012, the effects of extraneous flow can be readily observed. The information indicates pump station flow volumes are more than five to ten times higher during wet weather compared to baseline dry weather. Again, this increase is attributed to "clean" water which would not require treatment if eliminated from the sanitary sewers. For planning level discussion purposes, the cost to Onondaga County's ratepayers for the system to convey and treat wastewater is determined to be approximately $2 per thousand gallons. Based on this cost metric, the estimated cost to process just the extraneous flow from only these three pump stations during April 2011 was approximately an *additional* $1.3 million in comparison to the month of July 2012. Now consider that county-wide there are over 150 pump stations in the sanitary district. System-wide, the capacity impacts and costs of extraneous flow are very significant. As seen on the following charts, each of these pump stations also have absolute capacity thresholds; under extreme wet weather flow conditions, wastewater flow reaches the bright yellow line on the graphs, indicating the potential for a sanitary sewer overflow (SSO) of untreated sewage into nearby water bodies. Regulatory agencies and the general public rightfully do not accept the release of untreated sewage into water bodies. SSO's are environmentally unacceptable. In addition, sanitary sewer overflows--if left unmitigated--result in severe reputation risk; lack of confidence in county leadership; regulatory penalties; and court orders for compliance.

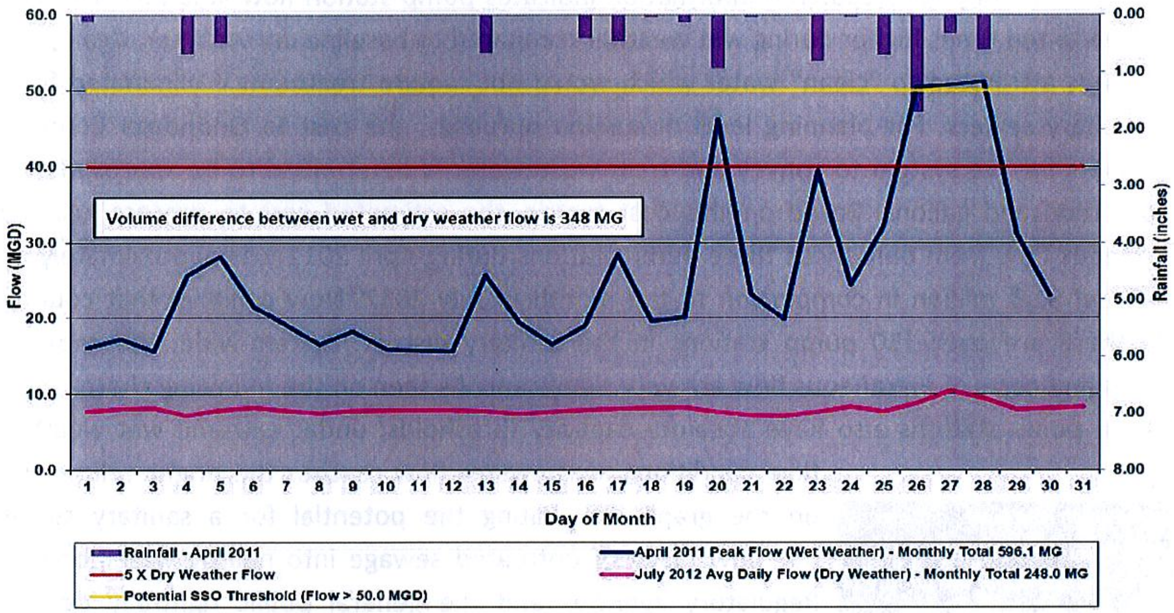
"Keeping clean rain water and clean groundwater out of the sanitary sewers is the essence of the County's Save the Rain program."

Adding to the complex discussion surrounding the erosion of conveyance system capacity and the considerable impacts of extraneous flow is the fact that the consolidated sanitary district is comprised of collection sewers owned by the city, towns, and villages connected to trunk sewers and intercepting conveyance sewers owned by the County. The County ratepayer sees a growing charge for conveyance and treatment due to the costs of deferred maintenance on non county-owned and county-owned sewers. Pressures exist to create new subdivisions and new sewer infrastructure in towns as the existing infrastructure failure slowly erodes capacity and drives up system costs. The combination of disconnected ownerships, eroding capacity due to inflow and infiltration, and sprawling infrastructure serving the same population places more stress on sewer rates.

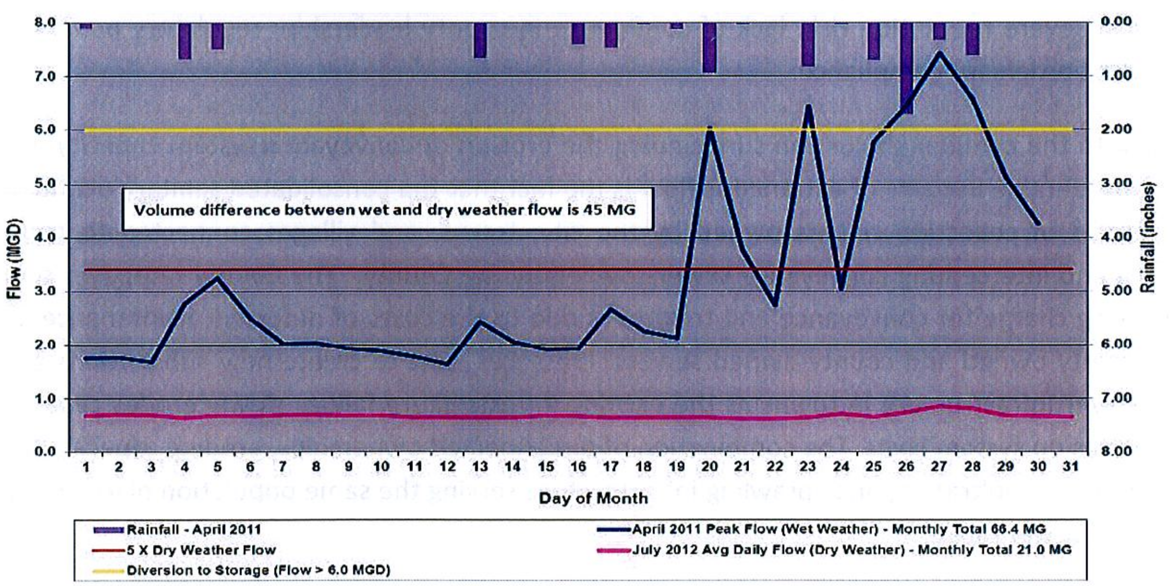
The charts which follow illustrate the impact of extraneous flow at three large pump stations in the system. These charts are real examples; similar extraneous flow issues exist throughout the sanitary district.

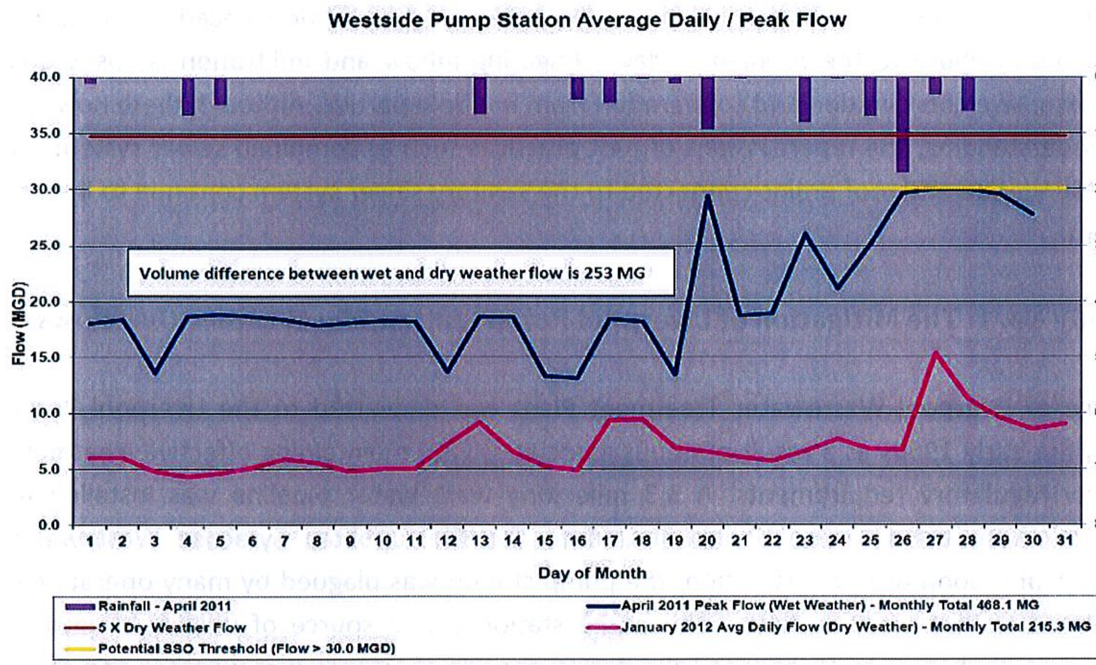
Figure 3.

Ley Creek Pump Station Average Daily / Peak Flow



Liverpool Pump Station Average Daily / Peak Flow





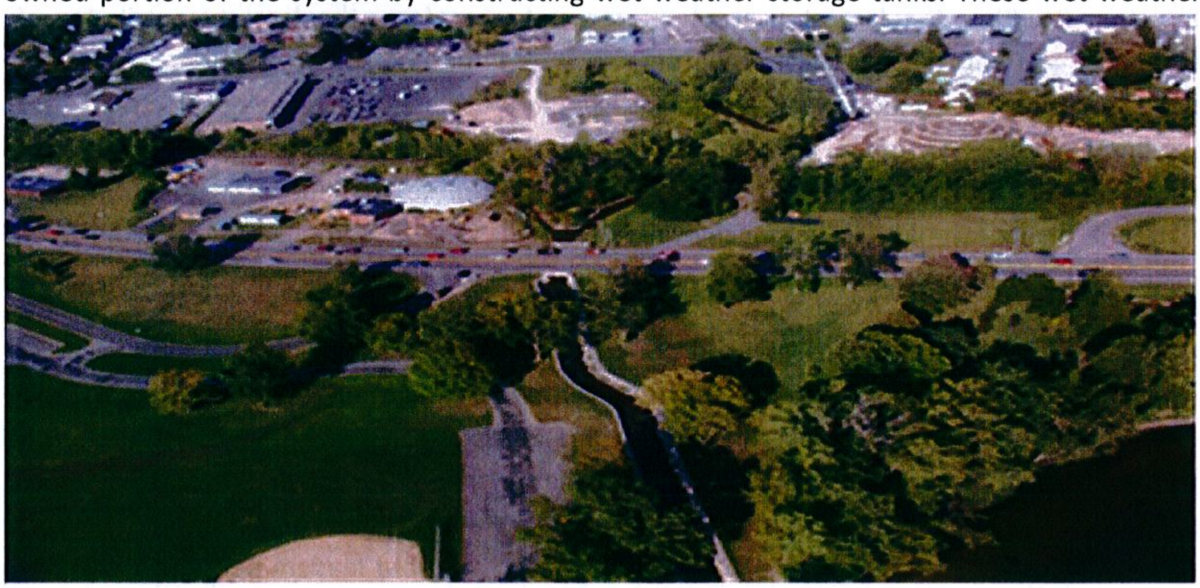
Costs to Convey and Treat Extraneous Flow

The costs to convey and treat extraneous flow are significant. The impact of extraneous flow includes additional energy and process chemical costs as well as increased equipment maintenance and replacement. The April 2012 Onondaga County Climate Action Plan (www.ongov.net) indicates of all County departments, the Department of Water Environment Protection (WEP) is the largest user of energy and, therefore, the largest contributor of greenhouse gas emissions associated with electricity and natural gas use. A primary focus of efforts to reduce greenhouse gas emissions should be aimed at reducing electricity use associated with extraneous wastewater conveyance and processing. The reduction of extraneous flow, which averages over 30 percent of the total influent flow for all WEP treatment plants, would facilitate achieving this goal. This is demonstrated by the WEP Wastewater Transport and Treatment Plant Electrical Energy Summary found in Appendix II.

Extraneous flow typically increases as wastewater infrastructure ages and as more miles of sewer pipe are added to the system. Deferred maintenance is not unusual in sanitary sewers. Unlike potholes in the roadway or leaking roofs on municipal buildings, sewer assets are out of sight and, therefore, too often out of mind even though their costs are gradually taking more resources from the ratepayer. Additional challenges exist due to inflow and infiltration sources on private property. Broken sewer laterals, rain gutters, and roof leaders tied into the sewer system as well as sump pumps and foundation drains connected to the sanitary system all represent legacy problems subsequent to private property construction decades ago which continue to contribute to the problem today. Mitigating inflow and infiltration is costly and requires extensive coordination and cooperation from multiple parties. Although there now is a greater understanding, the repercussions of past practices such as combined sewer systems or building foundation and roof drains connected to the sanitary sewer system continue to impact the system.

Case Study No. 1: The Mitigation of Liverpool Pump Station Wet Weather Overflows

The Village of Liverpool Wastewater Treatment Plant was converted to the Liverpool Pump Station in the early 1960s as a result of issues associated with maintaining effective treatment under new regulatory requirements. A 3.3 mile long wastewater pipeline was installed to convey flow from the Liverpool Pump Station to the Metropolitan Syracuse Wastewater Treatment Plant. Soon after construction, the pump station was plagued by many operational issues related to wet weather flows. The pump station was a source of untreated sewage overflows and discharges to Onondaga Lake during periods of intense wet weather and snow melts. In 1988 Onondaga County invested nearly $1 million to construct a storage tank to capture untreated sewage discharged during wet weather. This project reduced the number of discharge events; however, they still occurred during intense precipitation events. In 2005, Onondaga County invested an additional $5 million to construct a second tank to further mitigate the problem. Despite a combined storage volume of 3 million gallons and millions of dollars in investment, untreated discharges are still a threat with each intense rain event. Onondaga County elected to address the sources of extraneous flow coming into the County-owned portion of the system by constructing wet weather storage tanks. These wet weather



storage tanks also have significant long-term operation and maintenance impacts associated with them. Building these storage assets fixed the immediate problem but did nothing to resolve the ongoing extraneous flows and did not cover the cost for pumping, storing, and treating what is essentially clean water.

Case Study No. 2: Electronics Park Trunk Sewer Order on Consent

The Electronics Park trunk sewer was constructed in 1945 to provide sewer service to the large General Electric industrial complex located in the Town of Salina. The sewer conveyance is approximately 3.8 miles long and consists of 18 and 24-inch diameter pipes. In the mid 1960s the service area was expanded to include residential properties in the Hopkins Road area. In 1968 the Town of Salina installed an 18-inch relief sewer to abate basement flooding in the areas downstream from the General Electric complex and the newly developed areas; however, the problems continued. During periods of heavy rain and significant snow melt events, pumping from wastewater manholes into the storm sewer was required to prevent basement flooding and property damage. In 2007, Onondaga County entered into a legal agreement with the NYSDEC to address basement flooding and sanitary sewer overflows (SSO) from the Electronics Park trunk sewer. A consent order detailed specific activity milestones and deadlines to avoid stipulated penalties. These activities included the following:

- Submission of a work plan that calls for the elimination of SSOs listed in the Order
- Development of operational procedures for exceeding the capacity of the infrastructure
- Development of an engineering evaluation of alternatives for the elimination of SSOs listed in the Order
- Evaluation of historical record of SSOs that occurred from manholes listed in the Order
- Submission of a facilities plan with proposed remedial actions with the selected alternative and implementation schedule
- Submission of final plans and specifications for construction
- Completion of all remedial actions

Based on the overall complexity, the project to address the Order on Consent was separated into two (2) phases. Phase I included manhole rehabilitation and miscellaneous flow routing changes, while Phase II included installation of a new wastewater pumping station to convey a

portion of flow directly to the Ley Creek Pump Station. This project is currently underway with a total authorized budget of $10 million.

Fix It First

The American Society of Civil Engineers (ASCE) – 2013 Report Card for America's Infrastructure gave wastewater condition and capacity a grade of "D" (www.infrastructurereportcard.org/a/#p/wastewater/conditions-and-capacity. They cited the generally poor condition of wastewater infrastructure to be directly correlated to its age. Continued implementation of Save the Rain initiatives to remove clean rainwater and groundwater from the sanitary sewers needs to be further developed and funded at the county and local levels throughout the sanitary district. Essential to this effort will be the development and adoption of a sustainable infrastructure plan embracing a "fix it first" mindset to address capacity limitations and to restore the capacity in constrained areas of the system. In typical development approvals, local roadway intersections are replaced or improved when development adds new traffic flow and electric utilities are enlarged. In similar fashion, new developments will need to offset new flows by eliminating old sources of I & I flow to the system. Discussion and teamwork among local municipalities and the County is necessary to resolve existing problems and capacity constraints in the sanitary system.

Save the Rain

The Save the Rain Program (www.savetherain.us) is an initiative designed to sustainably improve the environment and protect local water bodies, including Onondaga Lake. The program includes construction of traditional "gray" wastewater infrastructure projects and the development of an innovative "green" infrastructure plan to reduce the amount of stormwater runoff that flows directly into the sanitary sewer system. Green infrastructure includes rain barrels, rain gardens, porous pavement, green roofs, cisterns, bio-swales, and other measures which essentially store and later eliminate extraneous wet weather flows by allowing the clean water to naturally return to the environment without the need for conveyance or treatment. This combined approach will use less energy than the traditional wastewater and stormwater treatment measures, which rely on extensive pumping. The Save the Rain Program initially focused on the combined sewer system (sanitary and storm), but it now also sponsors the Suburban Green Infrastructure Program. This program provides financial incentives for suburban municipalities to install green and innovative infrastructure projects within the Onondaga County sanitary sewer district that focus on controlling stormwater runoff and inflow and infiltration into the sanitary sewer system. These projects include green infrastructure as well as innovative non-invasive (trenchless) sewer pipe replacement by pipe bursting, cured-in-place pipe lining, pipe slip lining, spot joint repair, and manhole rehabilitation. In 2012, funding totaling $3 million was allocated to 12 municipalities for 14 projects which, combined, will remove over 38 million gallons of stormwater runoff from the sanitary sewers on an annual basis.

County Local Law No. 1 of 2011

The adoption of Local Law No. 1 of 2011 provided a path to address capacity limitations. It established a Capacity, Maintenance, Operation, and Management (CMOM) Program within the Onondaga County Sanitary District to help assure the capacity of the wastewater infrastructure to convey and treat sanitary waste is preserved by reducing--to the maximum extent practical--excessive extraneous flow (www.ongov.net/wep/uselaws.html). The law authorizes the County to enter into inter-municipal wastewater agreements (IMA) to assure the maintenance and operation of public sewers owned by municipalities within the district conform to the provisions of the law. It also authorizes the County to use an offset plan to establish a program to ensure new flow (such as new development activity) to be offset by the removal of extraneous flow in a matching fixed amount such as one-to-one (1:1). This removal is typically accomplished with infrastructure projects such as those promoted through the Save the Rain Suburban Green Infrastructure Program. The offset plan encourages positive results; that is, improving infrastructure operation consistent with the County's Sustainable Development Action Plan (www.future.ongov.net) compared to alternatives such as consent orders and development moratoriums.

The law enables the following criteria to help determine which separate sanitary sewer areas within the district require offsets:

- Service areas currently under consent order by New York State Department of Environmental Conservation

- Service areas subject to wet weather sanitary sewer overflows (SSOs). (This is inclusive of SSOs that are due to either pumped or gravity overflows.)

- Service areas which significantly exceed their three-year average base flow during wet weather events

As such, the following facilities and portions of the consolidated sanitary district service area require flow offset plans:

- Westside Pump Station Service Area
- Ley Creek Pump Station service area
- Meadowbrook Limestone Wastewater Treatment Plant Service Area
- Davis Road Pump Station Service Area
- Liverpool Pump Station Service Area
- Electronics Park Trunk Sewer Service Area

Inflow and Infiltration Mitigation

Inflow and infiltration mitigation now has a promising return on investment. The nationally recognized issues associated with I & I have created new and innovative solutions to this growing problem. Within WEP's assets found in the service areas listed above, there exists a focused manhole repair program implemented by WEP to mitigate extraneous flow. Table 1 below summarizes the results of the program over the past year.

Table 1.

Action	No. of Manholes	Estimated Extraneous Flow Removed Per Day
Replacement of standard manhole covers in low lying areas with new locking watertight frame and covers	43	247,680 gallons (5,760 gallons per manhole)
Hydrophilic grouting of manholes with active infiltration	10	504,000 gallons (350 GPM total for all)
Lining of manholes with Strong Seal QSR Lining to stop and prevent future infiltration	30	
Total	83	751,680 gallons

The County invested approximately $400,000 in these new and innovative approaches to fixing old cracked and leaking manholes; this activity removed approximately 750,000 gallons per day of clean water from the sanitary sewers. Based on the $2 per thousand gallons it costs Onondaga County to convey and treat wastewater, this equates to a savings of $1,500 per day. The County's investment will be returned in less than one year. In example, with approximately 180,000 unit charges in the district, a $1 per month increase in the unit rate would extract 4,000,000 gallons per day of extraneous flow out of the system, for a savings of $8,000 per day in extraneous flow treatment during periods of wet weather and high groundwater.

Looking to the future, wastewater infrastructure capacity constraints will continue to be a priority. An organized sustainable infrastructure plan, including funding strategies, will be essential for continued success.

Policy Considerations

Funding

As one might expect, these infrastructure issues exist because they are often extremely costly to resolve. In the 1970s and 1980s wastewater projects were typically funded with 87 percent federal funds. Presently, on a national level, 98 percent of wastewater infrastructure work is local dollar funded. The County recently spent well over $25,000,000 to rehabilitate its Wetzel Road Wastewater Treatment Plant; the case study in Appendix IV summarizes the cost to build new capacity as witnessed by the Wetzel project.

> *"Capacity has a price, both in terms of the original capital investment and future enhancement to capacity that is exceeded."*

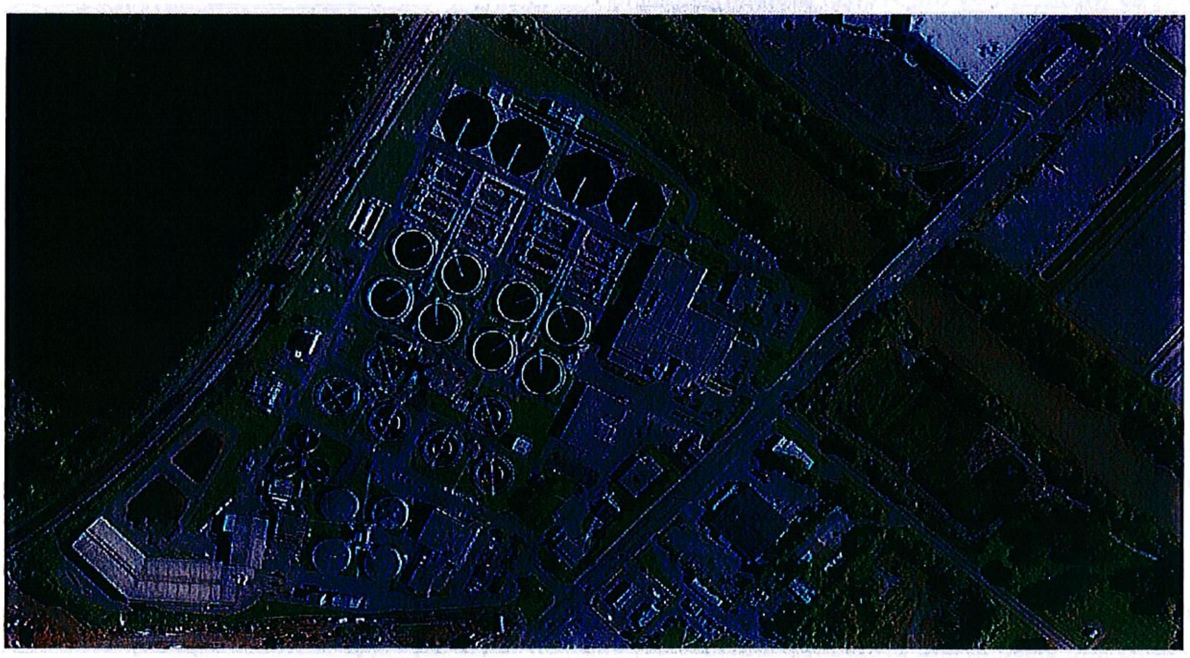
The County's capital and operations costs for the consolidated sanitary district are almost exclusively funded by an annual flat fee rate per household. The County's current annual sewer rate is approximately $360 per year, a rate currently below the national average and below the average in upstate New York. It is projected to rise as a result of the current Consent Order projects described above as well as the considerable additional new debt service which will be coming onto the rate as the current crop of combined system overflow projects are finished, moved to final financing, and their debt service comes on the sanitary district's books. The consolidated sanitary district currently receives no support from the general fund; no real property taxes or sales taxes fund the district. With the exception of several dozen very large industrial flows (based upon strength and volume), the existing rate structure is disconnected from volume, and the ratepayers and municipalities in the district are desensitized to the costs of extraneous flow. From a policy perspective, the resources to fund wastewater infrastructure need to be explored to determine the funds necessary to effectively maintain capacity and, where appropriate, develop new capacity. A comprehensive rate study should be performed to determine the needs and best methods of funding the consolidated sanitary district operations and existing and program-planned debt, and to adequately support future capacity issues and capital maintenance expenditures.

Disaggregated Asset Ownership

The assets in the sanitary district are owned by the County, thirteen towns, seven villages, and the City of Syracuse. Funding capacity issues with such a diverse base of owners is extremely complex. Some of these local municipalities are financially stressed, and the deferred maintenance of their sewers reduces the capacity of the larger County system perhaps without immediately impinging on the municipality. In some, preventive maintenance has suffered in local municipal budgets, and then sewer work is only for emergency repairs to prevent backups or overflows. The larger underlying issues associated with deferred maintenance are not resolved. The costs of sewer maintenance are significant, and the extent of existing liabilities needs to be carefully determined but the efficiencies of continued consolidation should be carefully evaluated.

Comprehensive Planning

In the context of allocation of scarce resources, comprehensive land use planning for new growth and economic activity is critical. Building new assets to maintain and operate, while old assets continue to erode capacity, can be shortsighted and carelessly expensive. Locating industry and development where capacity already exists in the system is tremendously more efficient; the Metro Wastewater Treatment Plant has considerable industrial capacity for new load in its service area. Infill development, which utilizes existing infrastructure, creates life cycle cost efficiencies for long-term maintenance and operations of sewer assets. Smart growth initiatives and comprehensive planning are critical to the best allocation of scarce resources.



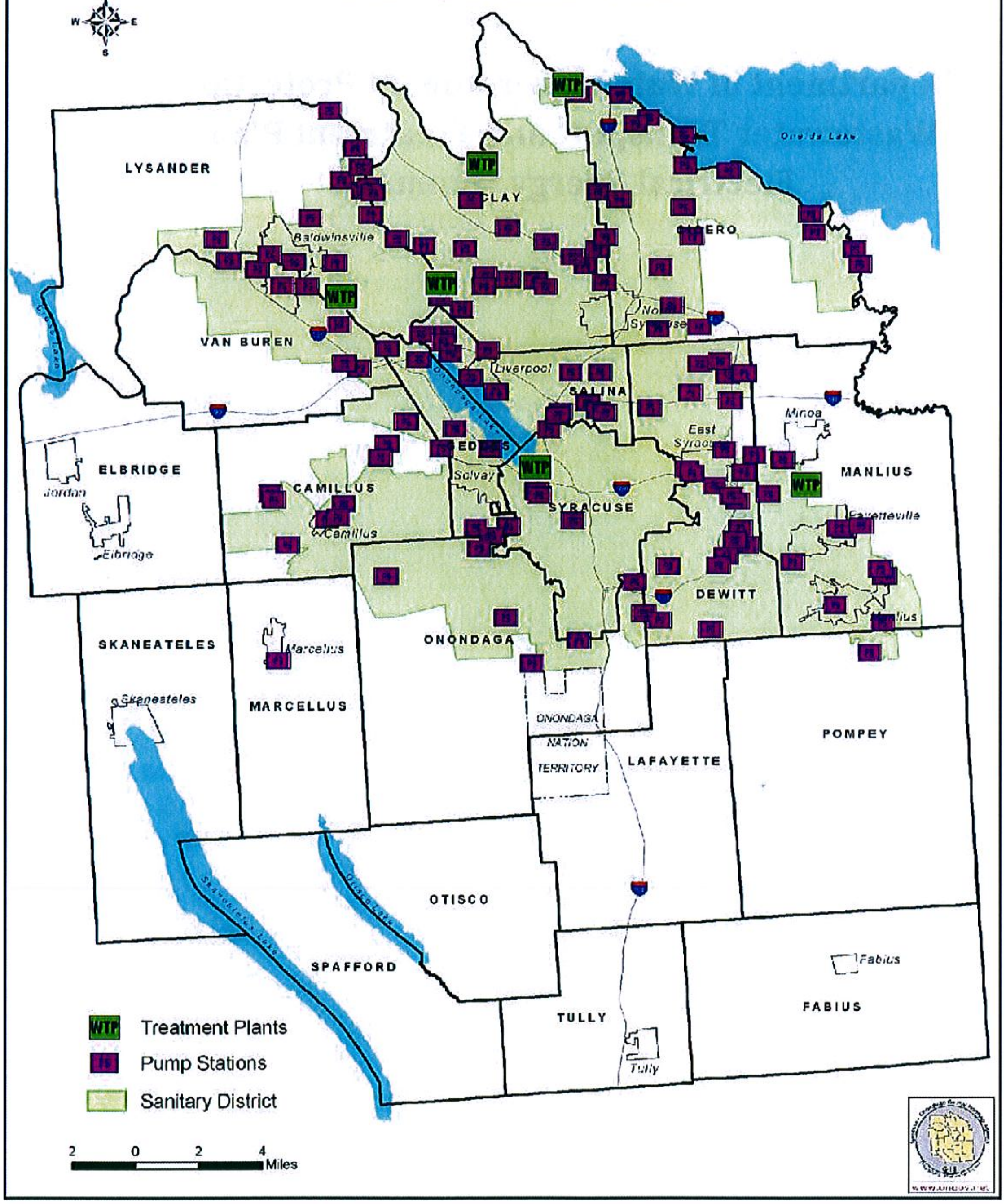
Regulatory Changes Including Stormwater Criteria

Perhaps a "side door" issue associated with capacity constraints is the continuing regulatory burdens on both the treatment plants and the consolidated sanitary district communities. New MS4 stormwater regulations will have a likely impact on community resources throughout the sanitary district. Stiff new nutrient removal conditions are not just a reality at Metro; new nutrient removal conditions likely would limit the capacity of existing treatment plants to accept new load from economic growth. The water quality goals to remove nutrients are important; so are the policy considerations to manage nutrients with source reduction such as more robust green and innovative solutions within the sewershed and watershed, or to address nutrient removal with additional plant upgrades.

Appendix I

Department of Water Environment Protection Mapping of Maintained Pump Stations and Treatment Plants

OCDWEP Sanitary District, Pump Stations and Treatment Plants



Appendix II

Department of Water Environment Protection
Wastewater Transport and Treatment Plant
Electrical Energy Summary

WEP Wastewater Transport and Treatment Plant Metric - Extraneous Electric Use and Cost per Gallon (2010 - 2012)

Item	*2010*	*2011*	*2012*	*Average (2010-2012)*
Total Influent Flow for All WEP WWTPs				
- Daily Average Flow (MGD)	84.8	94.4	75.3	84.8
- Total Annual Volume (MG)	30,952.0	34,445.1	27,541.5	30,979.5
- Extraneous Flow (Percent of Average Daily Flow)	29.8%	43.5%	31.5%	34.9%
Electric Energy Cost	$6,934,671	$6,780,853	$5,224,516	$6,313,347
WEP's Energy Use Allocations by cost				
- Treatment Plants	$5,530,675	$5,374,915	$4,298,498	$5,068,029
- Transport	$1,403,996	$1,405,938	$926,018	$1,245,317
WEP's Energy Use Allocations by percent				
- Treatment Plants	80%	79%	82%	80%
- Transport	20%	21%	18%	20%
Total Electric Energy Cost per MG *1	**$224**	**$197**	**$190**	**$204**
Treatment Plants Electric Energy Cost per MG	**$179**	**$156**	**$156**	**$164**
Transport Electric Costs per MG	**$45**	**$41**	**$34**	**$40**
Electric Energy Use (kWh)	67,633,073	68,492,785	64,398,560	66,841,473
Electric Energy Use (kWh) by quantity				
- Treatment Plants	57,662,518	58,287,137	55,420,407	57,123,354
- Transport	9,970,555	10,205,648	8,978,153	9,718,119
Electric Energy Use by percent				
- Treatment Plants	85%	85%	86%	85%
- Transport	15%	15%	14%	15%
Total Transport and Treatment kWh per MG *2	**2,185**	**1,988**	**2,338**	**2,171**
Total Treatment Plants kWh per MG	**1,863**	**1,692**	**2,012**	**1,856**
Total Transport kWh per MG	**322**	**296**	**326**	**315**
Extraneous Energy Use				
Allocations by cost				
- Treatment Plants *3	$659,256	$935,235	$541,611	712,034
- Transport *4	$397,471	$581,004	$277,111	$418,529
Total	$1,056,728	$1,516,239	$818,722	$1,130,563
Allocations by energy (kWh)				
- Treatment Plants *3	6,873,372	10,141,962	6,982,971	7,999,435
- Transport *4	2,822,664	4,217,484	2,686,712	$3,242,287
Total	9,696,036	14,359,446	9,669,684	$11,241,722

General Notes:
1. The above information is for conceptual discussion purposes.
2. MG: Million Gallons.
3. MGD: Million Gallons per day.
4. Treatment plant values are for all six of WEP's treatment plants.
5. Transport includes all pump stations, CSO facilities and Henry Clay Facility.

Specific Notes:

*1. Above energy cost values include demand charges. Includes all facilities owned and operated by WEP (including Henry Clay Facility).

*2. Above energy usage values do not include demand (kW) use. Includes all facilities owned and operated by WEP (including Henry Clay Facility).

*3: An adjustment factor of 0.40 was used to acknowledge the non-linear relationship with plant flow and electrical energy use. For example, some treatment plants have electric heat, this cost would not change as a function of plant flow.

*4 An adjustment factor of 0.95 was used to acknowledge the non-linear relationship with sewer flow and electrical energy use. For example, many pump stations have HVAC installations, this cost would not change as a function of plant flow.

Expenditures	2009	2010	2011	2012[2]
Total Expenditures[1]	$ 66,055,791	$ 65,946,777	$ 67,753,362	$ 68,311,357
Flow Billing to Towns and Villages	$ 2,561,477	$ 2,204,362	$ 1,875,342	$ 1,516,353
Fleet Billing to Other County Departments	$ 1,143,428	$ 1,068,623	$ 1,130,962	
Sheriff's Department Reimbursement	$ 96,872	$ 296,339	$ 354,296	
Jamesville O&M Charges	$ 19,965	$ 33,349	$ 26,809	$ 1,591,241
Petroleum Bulk Storage	$ 66,561	$ 44,873	$ 59,912	
Net Operational Expenses	$ 62,167,488	$ 62,299,231	$ 64,306,041	$ 65,203,763

Total Influent Flow for All WEP Treatment Plants (MGD)	2009	2010	2011	2012
Metro	63.35	65.19	73.35	57.20
Baldwinsville-Seneca Knolls	4.12	4.32	4.17	3.35
Oak Orchard	6.02	5.56	6.07	5.59
Wetzel Road	2.21	2.25	2.37	2.36
Meadowbrook Limestone	5.15	5.52	6.28	4.89
Brewerton	1.88	1.95	2.13	1.87
Total Flow (MGD)	82.73	84.80	94.37	75.25
Total Annual Volume (MG)	30,196.5	30,952.0	34,445.1	27,541.5

Estimated Extraneous Flow Volume by Facility (MGD)	2009	2010	2011	2012
Metro	20.97	19.70	33.61	18.59
Baldwinsville-Seneca Knolls	1.71	1.65	1.51	1.07
Oak Orchard	1.53	1.20	2.00	1.12
Wetzel Road	0.50	0.61	1.04	0.67
Meadowbrook Limestone	1.55	1.71	2.40	1.83
Brewerton	0.52	0.41	0.52	0.43
Total Flow (MGD)	26.8	25.3	41.1	23.7
Total Annual Volume (MG)	9,777.7	9,224.0	14,988.1	8,674.6

Cost Summary	2009	2010	2011	2012
Annual O&M Cost per MG	$ 2,058.76	$ 2,012.77	$ 1,866.90	$ 2,367.47
Annual O&M Cost per 1,000 gallons	$ 2.06	$ 2.01	$ 1.87	$ 2.37
Estimated Cost to Treat Extraneous Annual Volume	**$ 20,129,938**	**$ 18,565,790**	**$ 27,981,284**	**$ 20,536,855**
Adjusted to 2012 Dollars - 3.0% Annually	**$ 21,996,527**	**$ 19,696,447**	**$ 28,820,723**	**NA**

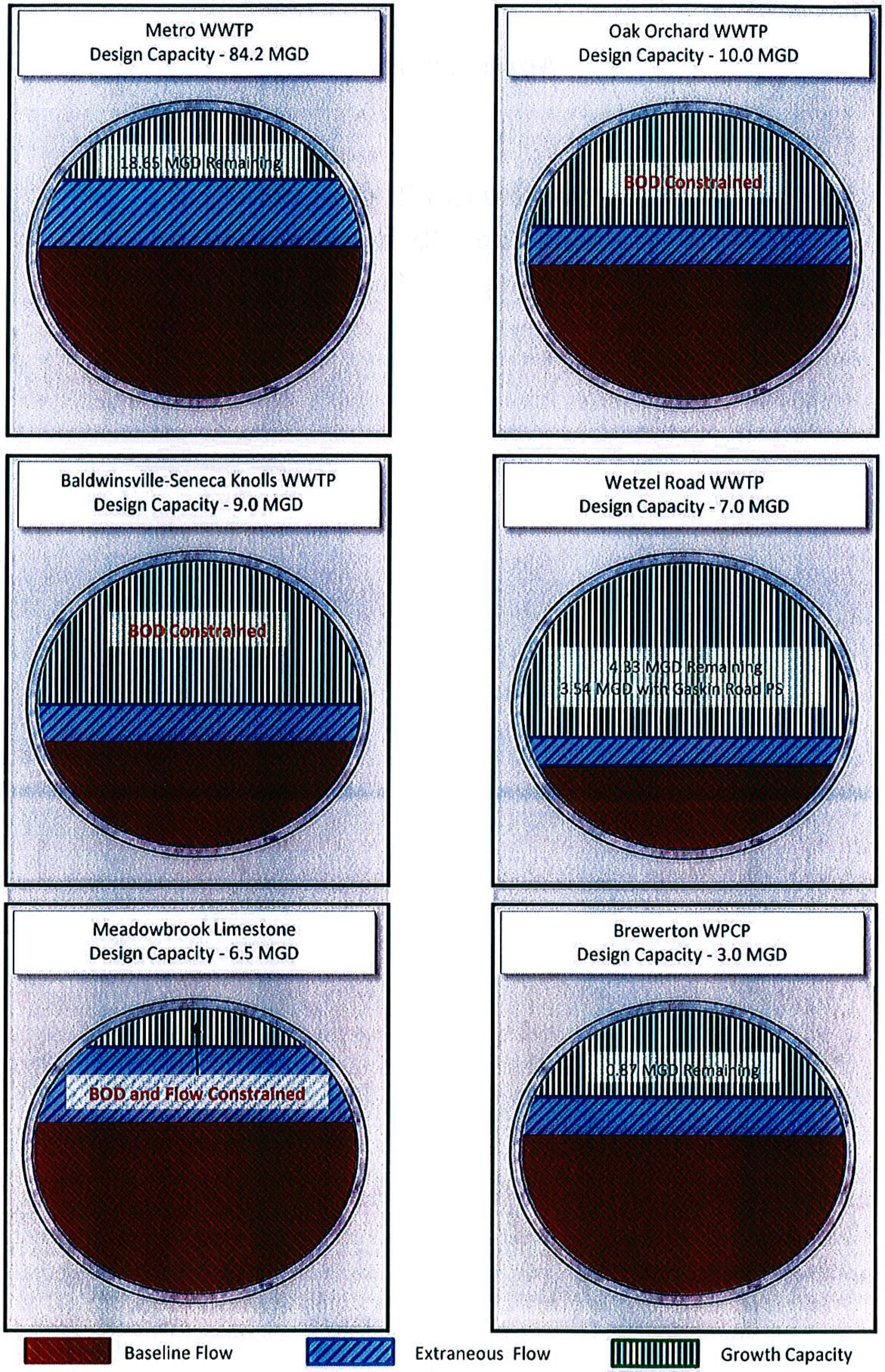
[1] Other interdepartmental charges (e.g., IT, Law, etc.) were not removed from WEP's total operational expenses.

[2] Beginning in 2012 with the County's transition to the PeopleSoft fiscal software, interdepartmental expenditure (Fleet Billing to Other County Departments, Sheriff's Department Reimbursement, Jamesville O&M Charges, and Petroleum Bulk Storage) are no longer tracked separately. There is only one account number for all interdepartmental revenues.

Appendix III

OCDWEP's Wastewater Treatment Plant Remaining Capacity Evaluation Summary and Charts

Treatment Plant Flow Capacity Utilization and Capacity for Future Growth



Based on the OCDWEP's Wastewater Treatment Plant Remaining Capacity Evaluation and Extraneous Flow Evaluation summaries (Average Values from 2010-2012).

OCDWEP's Wastewater Treatment Plant Remaining Capacity Evaluation Summary (2010-2012)

Remaining Capacity Parameters [1,3]	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak	Average	3-Year Peak	Average	3-Year Peak
Metro WWTP						
Average Daily Flow (MGD)[2]	18.65	13.29	22.1%	15.8%	77.9%	84.2%
BOD5 (lbs/day)	50,642	32,582	36.0%	23.2%	64.0%	76.8%
TSS (lbs/day)	16,337	14,588	12.9%	11.5%	87.1%	88.5%
Baldwinsville-Seneca Knolls WWTP[4]						
Average Daily Flow (MGD)[2]	4.39	4.02	48.7%	44.6%	51.3%	55.4%
BOD5 (lbs/day) - CBOD/BOD 71%	1,233	-468	9.2%	-3.5%	90.8%	103.5%
TSS (lbs/day)	5,657	3,963	42.2%	29.6%	57.8%	70.4%
Oak Orchard WWTP						
Average Daily Flow (MGD)[2]	3.77	3.44	37.7%	34.4%	62.3%	65.6%
BOD5 (lbs/day) - CBOD/BOD 81%	-638	-3,489	-4.5%	-24.6%	104.5%	124.6%
TSS (lbs/day)	9,007	7,756	53.9%	46.4%	46.1%	53.6%
Oak Orchard WWTP (if Gaskin to Wetzel)						
Average Daily Flow (MGD)[2]	4.56	4.23	45.6%	42.3%	54.4%	57.7%
BOD5 (lbs/day) - CBOD/BOD 81%	549	-2,446	3.9%	-17.2%	96.1%	117.2%
TSS (lbs/day)	10,064	8,715	60.3%	52.2%	39.7%	47.8%
Wetzel Road WWTP						
Average Daily Flow (MGD)[2]	4.33	4.28	61.8%	61.1%	38.2%	38.9%
BOD5 (lbs/day) - CBOD/BOD 86%	5,185	4,321	60.6%	50.5%	39.4%	49.5%
TSS (lbs/day)	3,597	2,573	52.6%	37.6%	47.4%	62.4%
Wetzel Road WWTP (if Gaskin to Wetzel)						
Average Daily Flow (MGD)[2]	3.54	3.49	50.6%	49.9%	49.4%	50.1%
BOD5 (lbs/day) - CBOD/BOD 86%	3,997	3,278	46.8%	38.3%	53.2%	61.7%
TSS (lbs/day)	2,587	1,615	37.8%	23.6%	62.2%	76.4%
Meadowbrook Limestone WWTP						
Average Daily Flow (MGD)[2]	0.62	-0.11	9.5%	-1.6%	90.5%	101.6%
BOD5 (lbs/day) - CBOD/BOD 64%	579	-2,527	6.3%	-27.5%	93.7%	127.5%
TSS (lbs/day)	3,454	1,598	32.0%	14.8%	68.0%	85.2%
Brewerton WPCP						
Average Daily Flow (MGD)[2]	0.87	0.72	28.9%	24.0%	71.1%	76.0%
BOD5 (lbs/day)	1,013	198	25.3%	5.0%	74.7%	95.0%
TSS (lbs/day)	1,883	1,520	40.1%	32.3%	59.9%	67.7%

[1] Refer to individual WWTP/WPCP worksheets for details regarding CBOD/BOD ratio and 3-Year Peak details/definition.

[2] Based on 95% of Design - Trigger for Flow Management Plan.

[3] Finally, this analysis does not include an evaluation of Title 6 of the New York Code, Rules and Regulations (NYCRR) 750-2.9(c)(2), specifically, within 120 days of when the permittee determines that the actual influent mass loading of Biochemical Oxygen Demand (BOD) or Total Suspended Solids (TSS) to a Publically Owned Treatment Works (POTW) has reached or exceeded the design influent loading for those parameters for any eight (8) calendar months during a calendar year, the permittee shall submit a plan for future growth at the POTW. Or, NYSDEC Subpart Part 750-2.9(c)(3), specifically, exceedance of the design influent loading criteria which is reviewed annually, a sewer connection moratorium when the effluent discharge exceeds the SPDES permit limit for BOD, or Ultimate Oxygen Demand (UOD), or TSS for any four (4) or more months during two (2) consecutive calendar quarters.

[4] Includes future impact due to the reserved capacity for Agrana Fruit US, Inc.

Metro WWTP - Remaining Capacity Evaluation (2010 - 2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	84.2
BOD5 (lbs/day)	140,500
TSS (lbs/day)	126,400

Metro WWTP Operational Data	2010	2011 [2]	2012 [3]	Average
Average Daily Flow (MGD)	60.13	66.70	57.20	61.34
BOD5 (mg/l)[1]	132	201	194	176
TSS (mg/l)	149	295	201	215

Influent Loadings (2010-2012)	Average	3-Year Peak[4]
Average Daily Flow (MGD)	61.34	66.70
BOD5 (lbs/day)	89,858	107,918
TSS (lbs/day)	110,063	111,812

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[4]	Average	3-Year Peak[4]	Average	3-Year Peak[4]
Average Daily Flow (MGD)[5]	18.65	13.29	22.1%	15.8%	77.9%	84.2%
BOD5 (lbs/day)	50,642	32,582	36.0%	23.2%	64.0%	76.8%
TSS (lbs/day)	16,337	14,588	12.9%	11.5%	87.1%	88.5%

[1] CBOD/BOD ratio not necessary due to daily BOD5 data.

[2] BOD5 and TSS abnormally high due to digester cleaning project and the handling of solids.

[3] Excluded data from 1/1/12 through 2/17/12 due to digester cleaning project impacts on BOD5 and TSS concentrations.

[4] Utilizes 2011 flow, and 2012 BOD5 and TSS concentrations. 2011 analytical data was excluded due to digester cleaning project impacts on BOD5 and TSS. It should be noted the 2011 analytical data was <u>not</u> excluded from the average claculations, only the peak calculations.

[5] Based on 95% of Design - Trigger for Flow Management Plan.

Baldwinsville-Seneca Knolls WWTP - Remaining Capacity Evaluation (2010 - 2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	9.0
BOD5 (lbs/day)	13,400
TSS (lbs/day)	13,400

BSK WWTP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	4.31	4.17	3.35	3.95
CBOD5 (mg/l)[1]	135	154	175	155
Calculated Equivalent BOD5 (mg/l)[2]	190	217	246	218
TSS (mg/l)	185	227	248	220

Influent Loadings (2010-2012)	Average	3-Year Peak[3]
Average Daily Flow (MGD)	3.95	4.31
CBOD5 (lbs/day)	5,089	6,296
BOD5 (lbs/day) - CBOD/BOD 71%	7,167	8,868
TSS (lbs/day)	7,243	8,937

Future Impact From Agrana Fruit Us, Inc	Reserved Capacity[5]
Average Daily Flow (MGD)	0.22
CBOD5 (lbs/day)	NA
BOD5 (lbs/day)	5,000
TSS (lbs/day)	500

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[3]	Average	3-Year Peak[3]	Average	3-Year Peak[3]
Average Daily Flow (MGD)[4]	4.39	4.02	48.7%	44.6%	51.3%	55.4%
BOD5 (lbs/day) - CBOD/BOD 71%	1,233	-468	9.2%	-3.5%	90.8%	103.5%
TSS (lbs/day)	5,657	3,963	42.2%	29.6%	57.8%	70.4%

[1] CBOD5 monitoring is required by permit and analyzed more frequently than BOD5, however, design treatment is based on BOD5. As a result, a ratio of CBOD to BOD has been developed to evaluate remaining capacity based on the equivalent BOD5 loadings.

[2] The CBOD/BOD ratio of 71% is based on the average of all corresponding/matching data collected from 2010 through 2012, the ratio is then applied to the individual annual CBOD5 average to calculate the equivalent annual BOD5.

[3] Utilizes 2010 flow, and 2012 BOD5 and TSS concentrations.

[4] Based on 95% of Design - Trigger for Flow Management Plan.

[5] Per the February 22, 2013, letter - Intent to Serve: Radison Business Park

Oak Orchard WWTP - Remaining Capacity Evaluation (2010 - 2012)

Proposed Industrial User Evaluation

Projected Concentrations Based on Remaining Capacities and Proposed Industrial Flows

Parameter	Average	3-Year Peak[3]
BOD5 (mg/l) at 0.12 MGD	0	0
BOD5 (mg/l) at 0.5 MGD	0	0
BOD5 (mg/l) at 1.0 MGD	0	0
TSS (mg/l) at 0.12 MGD	9,000	7,750
TSS (mg/l) at 0.5 MGD	2,160	1,860
TSS (mg/l) at 1.0 MGD	1,080	930

Gaskin Rd PS - Wetzel Road WWTP Option - Potential Reduction in Loading to OO WWTP

Average daily flow (2010 through 2012): 0.786 MGD

Parameter	Average	3-Year Min.[6]
BOD5 (lbs/day)[5]	1,187	1,043
TSS (lbs/day)	1,056	959

Projected Enhancement to Remaining Capacity at the OO WWTP (If Gaskin Diverted to Wetzel Road)

	Based on Loading		Based on Percent of Design		Utilized Capacity	
Parameter	Average	3-Year Min.	Average	3-Year Min.	Average	3-Year Min.
Average Daily Flow (MGD)[4]	4.56	4.23	45.6%	42.3%	54.4%	57.7%
BOD5 (lbs/day)[5]	549	-2,446	3.9%	-17.2%	96.1%	117.2%
TSS (lbs/day)	10,064	8,715	60.3%	52.2%	39.7%	47.8%

Projected Concentrations Based on Projected Enhancement to Remaining Capacities and Proposed Industrial Flows (Gaskin/Wetzel Option)

Parameter	Average	3-Year Min.
BOD5 (mg/l) at 0.12 MGD	549	0
BOD5 (mg/l) at 0.5 MGD	132	0
BOD5 (mg/l) at 1.0 MGD	66	0
TSS (mg/l) at 0.12 MGD	10,055	8,708
TSS (mg/l) at 0.5 MGD	2,413	2,090
TSS (mg/l) at 1.0 MGD	1,207	1,045

[3] Utilizes 2011 flow, and 2012 BOD5 and TSS concentrations.

[4] Based on 95% of Design - Trigger for Flow Management Plan.

[5] Utilizes Brewerton WPCP's average BOD5 - 181 mg/l (representative of residential contribution from Gaskin Rd service area).

[6] 3-Year Minimum is a worst case analysis. Utilizes 2010 TSS concentration (minimum), and 2011 BOD5 from Brewerton WWTP - 159 mg/l (residential minimum).

Meadowbrook Limestone WWTP - Remaining Capacity Evaluation (2010 - 2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	6.5
BOD5 (lbs/day)	9,200
TSS (lbs/day)	10,800

MBLS WWTP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	5.50	6.28	4.89	5.56
CBOD5 (mg/l)[1]	109	105	143	119
Calculated Equivalent BOD5 (mg/l)[2]	170	164	224	186
TSS (mg/l)	148	152	176	159

Influent Loadings (2010-2012)	Average	3-Year Peak[3]
Average Daily Flow (MGD)	5.56	6.28
CBOD5 (lbs/day)	5,518	7,505
BOD5 (lbs/day) - CBOD/BOD 64%	8,621	11,727
TSS (lbs/day)	7,346	9,202

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[3]	Average	3-Year Peak[3]	Average	3-Year Peak[3]
Average Daily Flow (MGD)[4]	0.62	-0.11	9.5%	-1.6%	90.5%	101.6%
BOD5 (lbs/day) - CBOD/BOD 64%	579	-2,527	6.3%	-27.5%	93.7%	127.5%
TSS (lbs/day)	3,454	1,598	32.0%	14.8%	68.0%	85.2%

[1] CBOD5 monitoring is required by permit and analyzed more frequently than BOD5, however, design treatment is based on BOD5. As a result, a ratio of CBOD to BOD has been developed to evaluate remaining capacity based on the equivalent BOD5 loadings.

[2] The CBOD/BOD ratio of 64% is based on the average of all corresponding/matching data collected from 2010 through 2012, the ratio is then applied to the individual annual CBOD5 average to calculate the equivalent annual BOD5.

[3] Utilizes 2011 flow, and 2012 BOD5 and TSS concentrations.

[4] Based on 95% of Design - Trigger for Flow Management Plan.

Brewerton WPCP - Remaining Capacity Evaluation (2010-2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	3.0
BOD5 (lbs/day)	4,000
TSS (lbs/day)	4,700

Brewerton WPCP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	1.95	2.13	1.87	1.98
BOD5 (mg/l)[1]	169	159	214	181
TSS (mg/l)	179	175	157	170

Influent Loadings (2010-2012)	Average	3-Year Peak[2]
Average Daily Flow (MGD)	1.98	2.13
BOD5 (lbs/day)	2,987	3,802
TSS (lbs/day)	2,817	3,180

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[2]	Average	3-Year Peak[2]	Average	3-Year Peak[2]
Average Daily Flow (MGD)[3]	0.87	0.72	28.9%	24.0%	71.1%	76.0%
BOD5 (lbs/day)	1,013	198	25.3%	5.0%	74.7%	95.0%
TSS (lbs/day)	1,883	1,520	40.1%	32.3%	59.9%	67.7%

[1] CBOD/BOD ratio not necessary due to available BOD5 data.

[2] Utilizes 2011 flow, 2010 TSS concentration and 2012 BOD5 concentration.

[3] Based on 95% of Design - Trigger for Flow Management Plan.

Wetzel Road WWTP - Remaining Capacity Evaluation (2010 - 2012)

Proposed Gaskin Rd Pump Station Diversion Evaluation

Gaskin Rd PS - Wetzel Road WWTP Option - Potential Reduction in Capacity if Diverted to Wetzel Rd

Average daily flow (2010 through 2012): 0.786 MGD

Parameter	Average[5]	3-Year Min.[6]
BOD5 (lbs/day)	1,187	1,043
TSS (lbs/day)	1,010	958

Projected Remaining Capacity at the Wetzel Road WWTP (If Gaskin Diverted to Wetzel Road)

	Based on Loading		Based on Percent of Design		Utilized Capacity	
Parameter	Average	3-Year Min.	Average	3-Year Min.	Average	3-Year Min.
Average Daily Flow (MGD)	3.54	3.49	50.6%	49.9%	49.4%	50.1%
BOD5 (lbs/day)	3,997	3,278	46.8%	38.3%	53.2%	61.7%
TSS (lbs/day)	2,587	1,615	37.8%	23.6%	62.2%	76.4%

[4] Based on 95% of Design - Trigger for Flow Management Plan.

[5] Utilizes Oak Orchard WWTP average TSS and Brewerton WPCP's average BOD5 - 181 mg/l (representative of residential contribution from Gaskin Rd

[6] 3-Year Minimum is a worst case analysis. Utilizes 2010 Oak Orchard TSS concentration (minimum), and 2011 BOD5 from Brewerton WWTP - 159 mg/l (residential minimum).

Brewerton WPCP - Remaining Capacity Evaluation (2010-2012)

Design Parameter	Capacity
Average Daily Flow (MGD)	3.0
BOD5 (lbs/day)	4,000
TSS (lbs/day)	4,700

Brewerton WPCP Operational Data	2010	2011	2012	Average
Average Daily Flow (MGD)	1.95	2.13	1.87	1.98
BOD5 (mg/l)[1]	169	159	214	181
TSS (mg/l)	179	175	157	170

Influent Loadings (2010-2012)	Average	3-Year Peak[2]
Average Daily Flow (MGD)	1.98	2.13
BOD5 (lbs/day)	2,987	3,802
TSS (lbs/day)	2,817	3,180

Remaining Capacity Parameters	Based on Loading		Based on Percent of Design		Utilized Capacity	
	Average	3-Year Peak[2]	Average	3-Year Peak[2]	Average	3-Year Peak[2]
Average Daily Flow (MGD)[3]	0.87	0.72	28.9%	24.0%	71.1%	76.0%
BOD5 (lbs/day)	1,013	198	25.3%	5.0%	74.7%	95.0%
TSS (lbs/day)	1,883	1,520	40.1%	32.3%	59.9%	67.7%

[1] CBOD/BOD ratio not necessary due to available BOD5 data.

[2] Utilizes 2011 flow, 2010 TSS concentration and 2012 BOD5 concentration.

[3] Based on 95% of Design - Trigger for Flow Management Plan.

Appendix IV

Case Study: Wetzel Road WWTP Cost of Capacity

The Wetzel Road Wastewater Treatment Plant (WWTP) is the Department's most recent facility to undergo a comprehensive facility upgrade having exceeded it useful life. The facility was under a Judgment on Consent from the NYSDEC (September 1988) requiring the development of new permits limits which resulted in the need for a facility with increased hydraulic capacity, increased treatment/removal capabilities, and an oxygen neutral discharge to the Seneca River (2006 upgrade). The intent of this case study is to provide an historical perspective regarding per unit cost of treatment capacity for flow, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). In addition, this study places a contemporary value on the per-unit cost of treatment.

In 1973, the initial Wetzel Road WWTP was constructed as an upgrade of the Morgan Road Sewage Treatment Plant at a cost of $3,079,256. This facility was built to accommodate additional flow and consolidated from other collection systems. The plant was upgraded from a primary treatment facility to secondary treatment with effluent disinfection. Primary effluent was treated via trickling filters, and then pumped to secondary clarifiers with the final effluent disinfected with chlorine gas prior to discharging into Seneca River. The following table summarizes the unit cost for treatment in 1973 and 2012 dollars:

Unit of Treatment	Total Facility Cost (1973)	Design Capacity	Unit Cost Per Treatment Capacity (1973)	Unit Cost Per Treatment Capacity (2012)[1]
Flow	$ 3,079,256	3.5 MGD	$0.88 per gallon	$4.55 per gallon
BOD		7,375 lbs/day	$418 per lb BOD	$2,161 per lb BOD
TSS		8,460 lbs/day	$364 per lb TSS	$1,882 per lb TSS

[1] Based on the Bureau of Labor and Statistics CPI Inflation Calculator.

The 2006 upgrade of the Wetzel Road facility cost $25,378,150. This comprehensive facility upgrade provides advanced secondary treatment of wastewater using a Biological Aerated Filter (BAF) System and tertiary treatment with Cloth Media Disk Filters (CMDF). Upgrades included mechanical screen rakes for grit removal in two covered aerated grit chambers, mechanical fine screens, intermediate pump station, Biological Aerated Filters (BAF), Cloth Media Disk Filters (CMDF), UV disinfection system, post-aeration tank, Parshall flume, gravity thickeners, primary digester rehabilitation/conversion, and secondary digester. The following table summarizes the unit cost for treatment in 2006 and 2012 dollars:

Unit of Treatment	Total Facility Cost (2006)	Design Capacity	Unit Cost Per Treatment Capacity (2006)	Unit Cost Per Treatment Capacity (2012)[1]
Flow	$25,378,150	7.0 MGD	$3.63 per gallon	$4.13 per gallon
BOD		6,560 lbs/day	$3,869 per lb BOD	$4,406 per lb BOD
TSS		5,430 lbs/day	$4,674 per lb TSS	$5,323 per lb TSS

[1] Based on the Bureau of Labor and Statistics CPI Inflation Calculator.

Clearly, the unit cost per treatment of BOD and TSS is exceeding the rate of inflation. The fundamental message to be taken from this case study is that capacity has a price, both in terms of the original capital investment and future enhancement to capacity that is exceeded.