Application of Pennsylvania-American Water Company for Acquisition of the Wastewater Assets of Butler Area Sewer Authority ("BASA")

66 Pa. C.S. § 1329
Application Filing Checklist – Water/Wastewater
Docket No. A-2022-3037047

22. Other requirements. Demonstrate compliance with the following:

b. For **wastewater** system acquisitions, provide a copy of the DEP-approved Act 537 Official Sewage Facilities Plans for the affected municipalities.

RESPONSE:

b. See enclosed copies of documents pertaining to the DEP-approved Act 537 Official Sewage Facilities Plans for BASA attached as **Appendix A-22-b**.

Butler Area Sewer Authority

Butler County, Pennsylvania

Act 537 Sewage Facilities Planning Study Update

February 2009

Butler Area Sewer Authority
Butler County, Pennsylvania

Act 537 Sewage Facilities Planning Study Update

February 2009

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Project No.: 07-0555-MC-A-99

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ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE EXECUTIVE SUMMARY

The Butler Area Sewer Authority serves seven communities in central Butler County. The service area includes the entire City of Butler plus portions of the surrounding municipalities of Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township. The Authority currently owns, operates, and maintains a 10.00 million gallon per day capacity wastewater treatment plant, over 300 miles of collector and interceptor sewers ranging in size from 6-inches to 48-inches in diameter, and 22 sewage pumping stations. Treated effluent from the plant is discharged to Connoquenessing Creek, a tributary of the Beaver River.

The Butler wastewater treatment plant is not hydraulically or organically overloaded as defined by Chapter 94 regulations. However, the conveyance system is hydraulically overloaded, whereby peak flows exceed the carrying capacity of some portions of the system and causes sanitary sewer overflows (SSOs). In the 10-year period between 1998 and 2007, an estimated 237 million gallons of untreated wastewater were discharged from four monitored locations in the system during wet weather periods. The Authority expended over $11 million on sewer rehabilitation projects to address the SSO problem under a February 20, 2001, Consent Order and Agreement (COA) with the Pennsylvania Department of Environmental Protection. Unfortunately, the rehabilitation work did not eliminate SSOs in the system.

On October 13, 2006, the Authority and all seven of its service area municipalities entered into another COA to address wet weather SSO problems. The COA requires the Authority to eliminate unpermitted discharges from the Ballpark, General Tire, and Deshon SSO structures by July 31, 2012. Given the short time frame to comply with the COA and the lack of previous success in reducing flows through sewer rehabilitation work, the Authority proposes to construct flow equalization facilities and related conveyance system upgrades to reduce the number and severity of SSO events.

A model of the interceptor sewer system was developed to assist in identifying the facilities needed to control SSOs under existing and projected future conditions. The following wet weather flow control facilities are recommended to control SSOs:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO, including two 3.00 MG capacity covered tanks.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO, including two 1.00 MG capacity covered tanks.
- Diversion and pumping facilities at the Ballpark/General Tire SSO.
- Diversion and pumping facilities on the Connoquenessing Creek interceptor.

- A central storage facility to store wastewater that is pumped from the Ballpark and Connoquenessing diversion pump stations, including three 4.70 MG capacity covered tanks.
- Conveyance system upgrades.

The Authority is also requesting a hydraulic re-rating for the BASA WWTP. The re-rated facility will have a permitted hydraulic capacity of 11.00 MGD and a peak hydraulic capacity of 28.00 MGD.

The cost for wet weather control facilities sized for existing conditions is estimated to be $21.6 million. Facilities sized for future conditions have higher diversion pumping rates and larger storage volumes than the facilities sized for existing conditions. The estimated $27.6 million cost for the larger facilities is about $6.0 million more than the facilities sized for existing conditions. However, the larger facilities will have sufficient storage volume to capture all the historic overflow events that have ever been recorded in the BASA system, except for a single overflow event that was measured at the Deshon pump station in January 2005. It is recommended that facilities sized for future conditions be constructed in order to eliminate SSOs to the maximum extent possible. The cost for conveyance system upgrades is estimated at $2.779 million, bringing the total cost for recommended system improvements to approximately $30.393 million.

The cost estimates presented in Section VI show that it is not economically feasible at this time to extend public sewer service to the unsewered areas with existing development that were identified in the Special Studies. The rates required to cover the debt service on the sewer extensions would not be affordable for the new users unless significant amounts of grant money become available to reduce the cost of the projects.

A projected implementation schedule for the recommended plan is shown below.

Project Element	Date
Submit Draft Act 537 Plan Update to DEP and Municipalities	June 3, 2008
Receive Comments on Draft Plan From DEP and Municipalities	September & October 2008
Submit Final Act 537 Plan Update to DEP and Municipalities	March 2009
Begin Design of Recommended Facilities	May 2009
Receive DEP Approval of Act 537 Plan Update	August 27, 2009
Complete Construction of Facilities and Seal Overflows	July 2012

Estimated costs for the recommended system improvements are summarized below.

Description	Estimated Cost
Deshon Diversion, Pumping, and Storage Facilities	$ 6,727,000
Monroe Diversion, Pumping, and Storage Facilities	3,521,000
Ballpark/General Tire Diversion and Pumping Facilities	3,591,000
Connoquenessing Diversion and Pumping Facilities	3,671,000
Central Storage Facilities	10,104,000
Conveyance System Upgrades	2,779,000
Total	$30,393,000

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION I
PREVIOUS WASTEWATER PLANNING

I.A.1 PREVIOUS WASTEWATER PLANNING UNDERTAKEN UNDER THE SEWAGE FACILITIES ACT

The Pennsylvania Department of Environmental Protection (DEP) website provides information on the age of Act 537 plans for Pennsylvania municipalities. Approval dates for the existing official plans of the municipalities in the Butler Area Sewer Authority (BASA) service area are listed below. This information was last updated on June 15, 2007.

Municipality	**Plan Approval Date**
City of Butler	January 6, 1971
Butler Township	March 15, 1971
Center Township	January 20, 1972
Connoquenessing Township	April 8, 1971
East Butler Borough	February 15, 1972
Oakland Township	April 5, 1971
Summit Township	December 1, 1972

As the above information indicates, the current sewage facilities plans for these seven municipalities were approved more than 35 years ago. The October 13, 2006 Consent Order and Agreement (COA) required each municipality to prepare and submit an administratively complete Official Plan revision Special Study to the DEP that focuses on the current and future sewage needs of the community. The COA also requires BASA to prepare and submit to the DEP an administratively complete Official Plan Update Revision to the Official Plans of the tributary municipalities, using the planning information developed as part of the Special Studies. The purpose of the Official Plan Update Revision is to provide adequate conveyance and treatment capacity for the future sewage needs of each municipality and to provide for the elimination of all unpermitted discharges from the separate sanitary sewer system. Plan approval dates for the special studies are listed on the following page:

Municipality	Special Study Approval Date
City of Butler	August 10, 2007
Butler Township	August 10, 2007
Center Township	October 30, 2007
Connoquenessing Township	October 30, 2007
East Butler Borough	August 17, 2007
Oakland Township	November 19, 2007
Summit Township	August 10, 2007

I.A.2 PREVIOUS WASTEWATER PLANNING THAT HAS NOT BEEN CARRIED OUT ACCORDING TO AN APPROVED IMPLEMENTATION SCHEDULE

There is no known previous wastewater planning that has not been carried out according to an approved implementation schedule.

I.A.3 ANTICIPATED OR PLANNED WASTEWATER PLANNING

Connoquenessing Township is currently preparing an Act 537 Plan update to specifically address the needs of the Route 68 corridor area.

As part of the Corrective Action Plan (CAP) associated with the February 2001 CO&A, BASA evaluated various alternative structural improvements to increase the capacity of BASA's sewerage facilities. An October 19, 2004 memo developed sizing criteria for eight potential alternatives to increase the system capacity to handle projected future sewage needs through the year 2025 and eliminate the current overflows. This memo was included as Appendix C of the CAP Summary Report dated April 28, 2006. The alternatives evaluated ranged from complete rehabilitation of public sector sewers and construction of additional treatment capacity to no public sector sewer system rehabilitation and construction of wet weather storage facilities at various overflow sites.

After review of the eight alternatives to eliminate bypasses, BASA authorized their consulting engineer to develop order of magnitude cost estimates for the three alternatives listed below to establish a range of costs for structural improvements.

1. Convey all flow to plant and expand treatment capacity

2. Convey all flow to plant and provide wet weather storage near plant site
3. Provide wet weather storage facilities at overflow sites

The cost of expanding the treatment plant was estimated to be $34.2 million, about 40 percent higher than alternatives two and three, which were estimated at $24.3 million and $24.1 million, respectively. Due to site constraints at the treatment plant property and limited availability of land near the plant site, providing wet weather storage facilities at the overflow sites was selected as the best option to eliminate sanitary sewer overflows. This alternative is evaluated in further detail in the BASA Act 537 Sewage Facilities Planning Study Update.

I.A.4 WASTEWATER PLANNING THROUGH PLANNING MODULES, PLANNING "EXEMPTIONS", AND ADDENDA

Table I-1 lists the Sewage Facility Planning Module Applications for land developments or subdivision plans that were reviewed by BASA over the past five years. This planning module information was taken from the Chapter 94 Municipal Wasteload Management Reports prepared and submitted to the DEP by BASA.

Table I-1

Recent Sewage Facility Planning Module Applications Reviewed by BASA

Year	Project Name	Proposed Number of EDUs *
2003	Aikens Plan	1
	Ferringer Plan	2
	Stein Plan	1
	Piper Plan	5
	Wash King Car Wash	25
	Henthorn Plan	1
	Myers Plan	3
	Afton Plan	11
	Krendale Quadraplex Plan	88
	Kelly Chevrolet	10
	Woods Plan	2
	Cuda Plan	2
	Spinneweber Plan	2
	Cherrywood Springs Plan	15
	Clearview Mall Additions	30
	Morgan II Building	4
	Callihan Plan	1
	Sam's Club Gas Station	1
	Total Proposed EDUs in 2003	204
	Total Planning Modules Reviewed in 2003	18
2004	Wyncrest Estates Plan	44
	Bungar Plan	1
	Perdew Plan	1
	Under Our Wings Apartments	24
	Ritenour Commercial Phase 1	110
	County of Butler LTSR Facility	15
	Spinneweber - Cunningham Plan	1
	Blain Plan	3
	Gray Plan Lot 103	1
	Pine Needles Estates	1
	Johnson Plan	3
	Liberty Youth Center	8
	County of Butler Sunnyview 911 Center	1
	Boosel Plan	1
	Route 422/Route 8 (Kecks) Plan	33
	Total Proposed EDUs in 2004	247
	Total Planning Modules Reviewed in 2004	15

Table I-1

Recent Sewage Facility Planning Module Applications Reviewed by BASA (continued)

Year	Project Name	Proposed Number of EDUs *
2005	Ponderosa @ Clearview Mall	2
	New County Prison	251
	Wyncrest Estates Modifications	3
	Lance Smith Commercial Plan	1
	Ritenour Commercial Phase 2	22
	County Prison - Temporary Dorm	8
	Erdley Plan	1
	Marchyshyn Plan	1
	William Bungar Phase III	3
	Gray-Eagle Plan	1
	Pappas Plan	1
	Winterwood Drive Area (Connoquenessing Twp.)	26
	Total Proposed EDUs in 2005	320
	Total Planning Modules Reviewed in 2005	12
2006	Patricia Green Subdivision	1
	McChesney Plan	1
	Day of the Lord Real Estate	4
	CDC Pullman Business Park Expansion	35
	West End Community Center	6
	Pappas Plan (Resubmittal)	1
	Meir Plan	1
	Homer Gray Plan	1
	CSR Development Plan	6
	Total Proposed EDUs in 2006	56
	Total Planning Modules Reviewed in 2006	9
2007	Alameda Plaza Hot Dog Shoppe	3
	Cedarwood Butler Crossing	45
	Heasley Office/Soccer Complex	2
	Casa Bella Estates	50
	IDL Worldwide	13
	Kennedy Subdivision	3
	Pullman Baseball Park	4
	Life Butler County	2
	Total Proposed EDUs in 2007	122
	Total Planning Modules Reviewed in 2007	8

* One (1) EDU = 400 gallons / day per the October 13, 2006 COA. Was 350 gpd under the 2001 COA

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION II
PHYSICAL AND DEMOGRAPHIC ANALYSIS

II.A IDENTIFICATION OF PLANNING AREA, MUNICIPAL BOUNDARIES, AND SEWER AUTHORITY SERVICE AREA BOUNDARIES

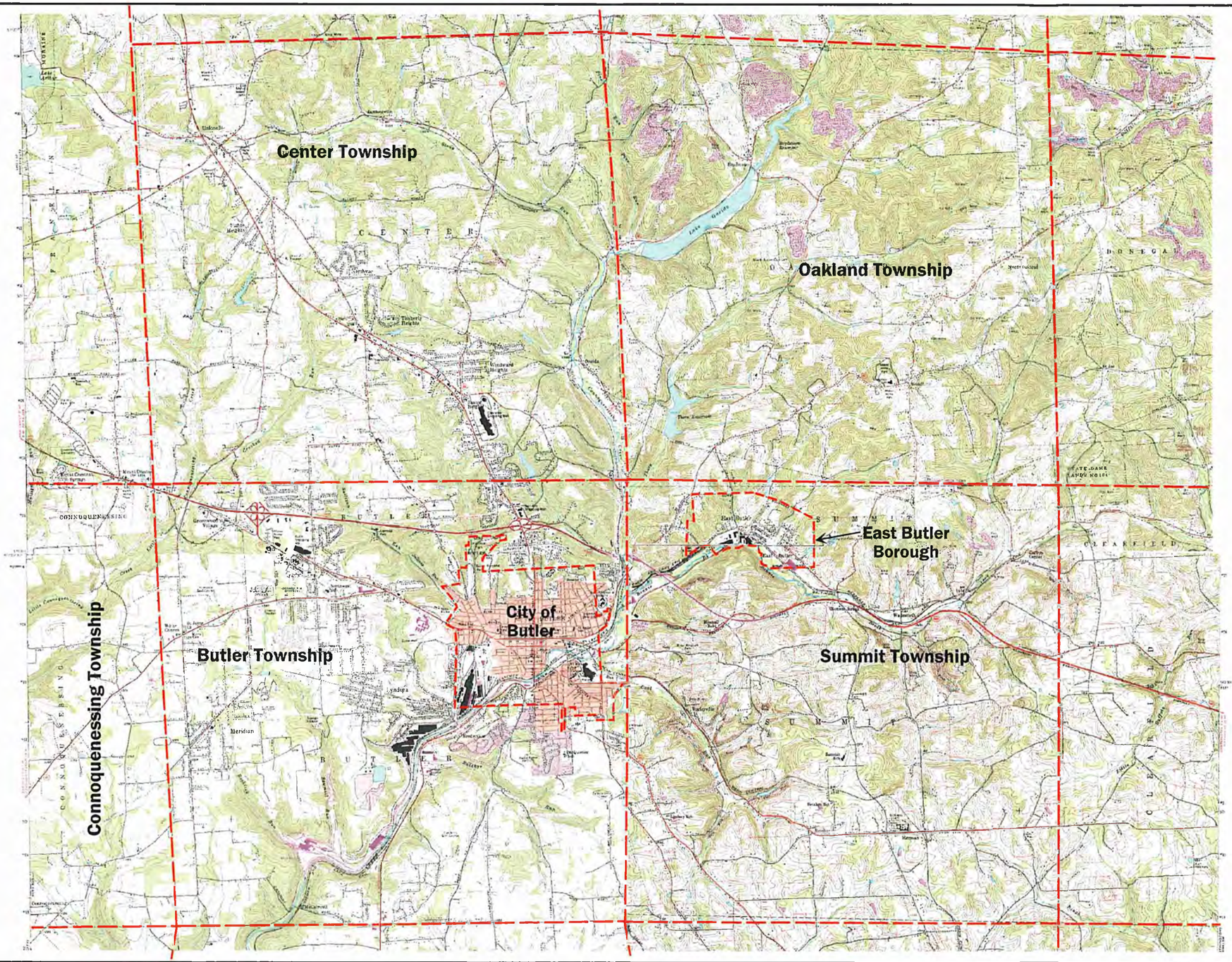
The planning area for this report is located in central Butler County. The planning area includes the entire City of Butler plus portions of the surrounding municipalities of Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township. Figure II-1 shows the municipal boundaries for these communities.

Figure II-2 delineates the current service area boundary for the Butler Area Sewer Authority (BASA). The Authority currently owns, operates, and maintains a 10.0 million gallon per day (mgd) capacity wastewater treatment plant, over 300 miles of collector and interceptor sewers ranging in size from 6-inches to 48-inches in diameter, and 22 sewage pumping stations. Based on Authority billing records, the system served 23,905 Equivalent Dwelling Units (EDUs) in 2007.

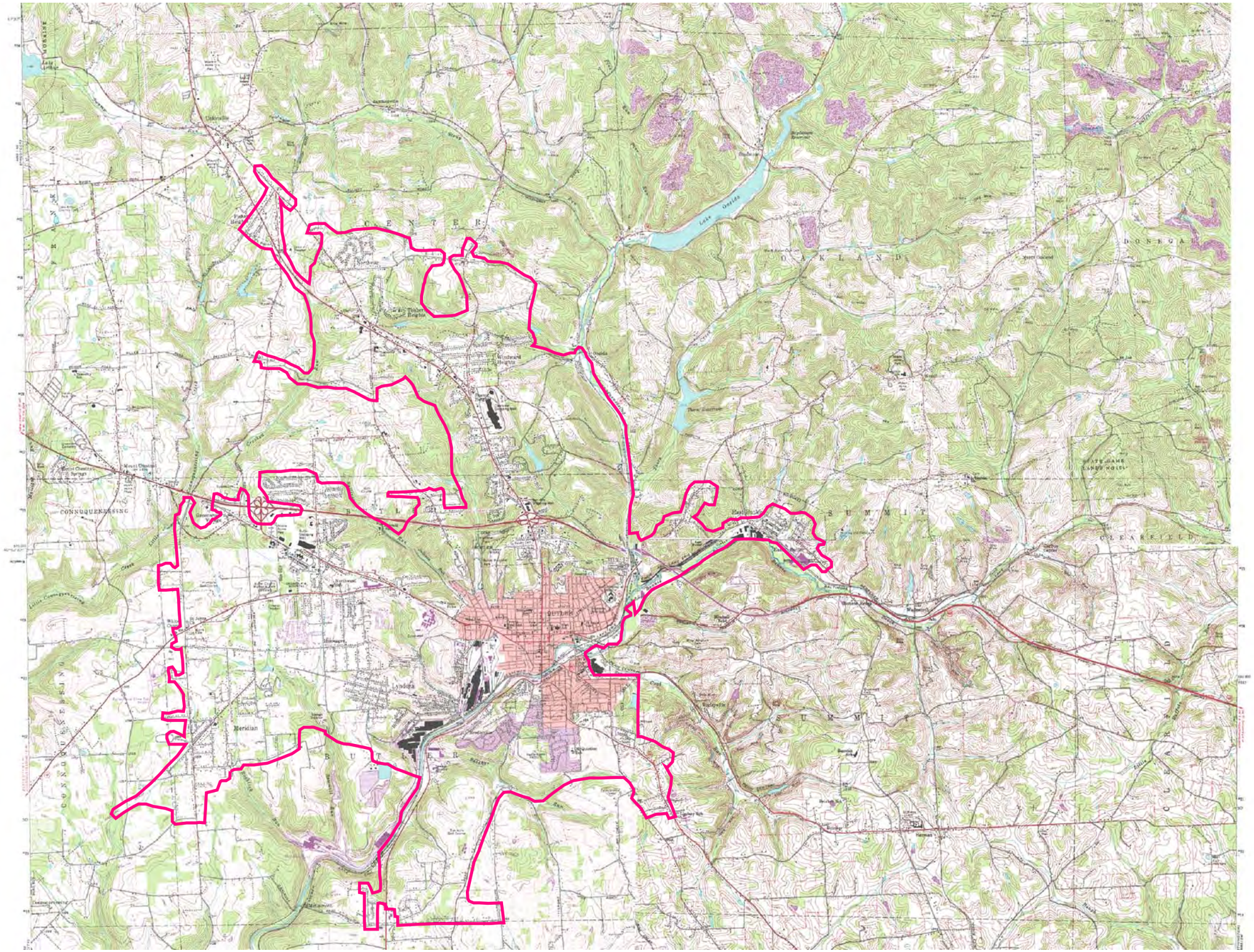
II.B IDENTIFICATION OF PHYSICAL CHARACTERISTICS IN THE PLANNING AREA

Most of the planning area for this study lies within the Connoquenessing Creek drainage basin. Connoquenessing Creek flows out of the study area in a southwesterly direction, and then travels west until it discharges into the Beaver River at a point approximately three miles west of Ellwood City. The western edge of the planning area is situated in the Little Connoquenessing Creek watershed. Portions of Center Township, Butler Township, and Connoquenessing Township are located in the Little Connoquenessing Creek drainage basin. Little Connoquenessing Creek is located north of Connoquenessing Creek and also flows south and west until it joins with Connoquenessing Creek in Jackson Township.

There are three major impoundments on Connoquenessing Creek or tributary streams that form lakes and reservoirs in the study area. Lake Oneida is situated on Connoquenessing Creek and is the largest of the three reservoirs. Boydstown Reservoir is located immediately upstream of Lake Oneida, and Thorn Reservoir is an impoundment on Thorn Creek. All three of these water bodies are located in Oakland Township.



DRW. JS	Date. 4/11/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** II-1	Municipal Boundaries	
Scale As Shown			
File Butler_maps 1, 2, 7			



DRW. JS	Date. 4/3/09	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** II-2	Current Public Sewer Service Area	
Scale As Shown			
File Butler_maps 1,4, 7			

Figure II-3 illustrates the drainage basins within the planning area. Crooked Run is a tributary of Little Connoquenessing Creek. All of the other drainage basins shown are part of the Connoquenessing Creek watershed. Tributaries to Connoquenessing Creek within the planning area include Stony Run, Thorn Creek, Bonnie Brook, Coal Run, Sullivan Run, Butcher Run, Saw Mill Run, and Rock Lick Run.

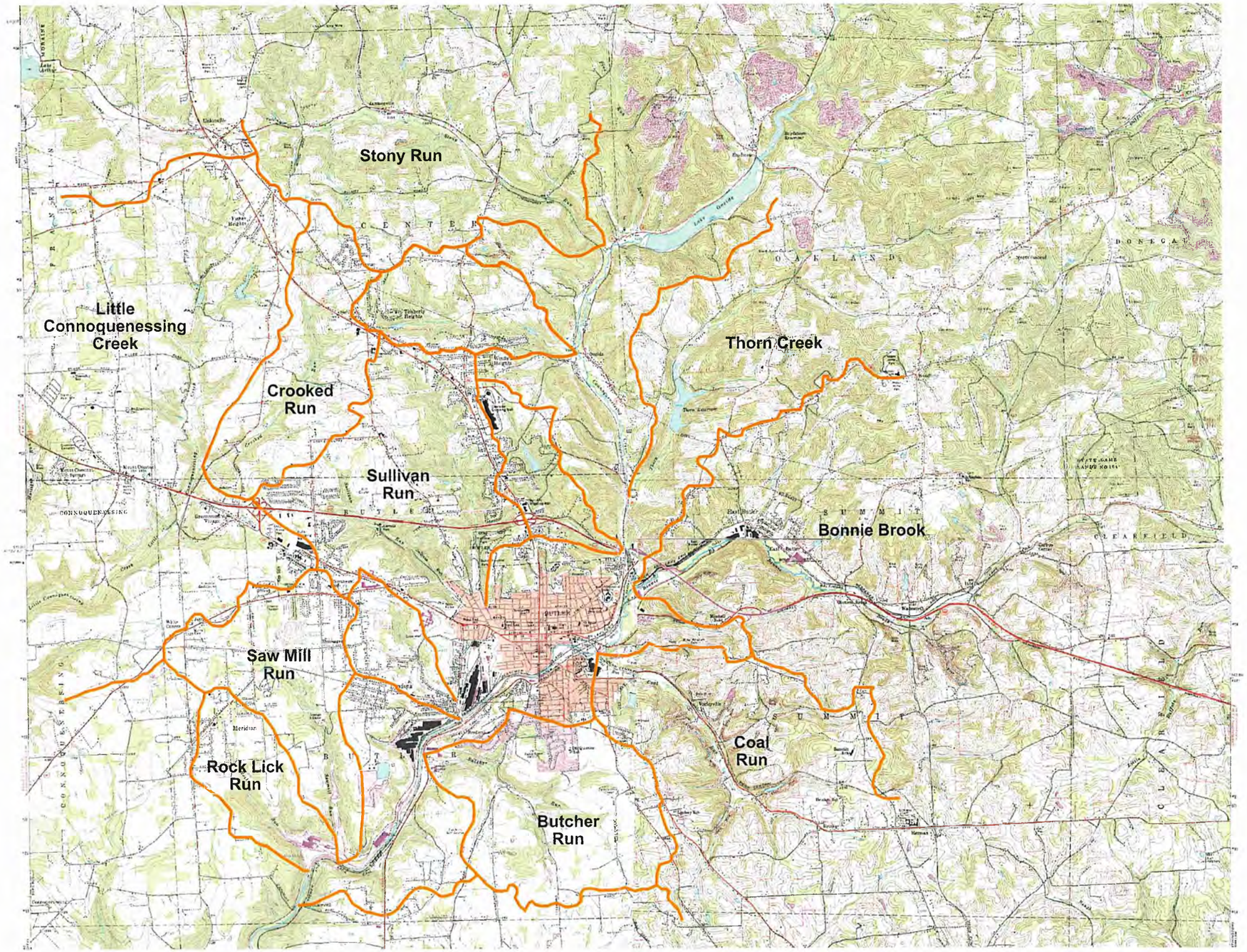
II.F POTABLE WATER SUPPLIES

The Pennsylvania American Water Company (PAWC) provides public water service to portions of the study area. PAWC Butler serves approximately 15,000 customers in the City of Butler and parts of Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township. Figure II-4 illustrates the boundaries of the PAWC Butler service area.

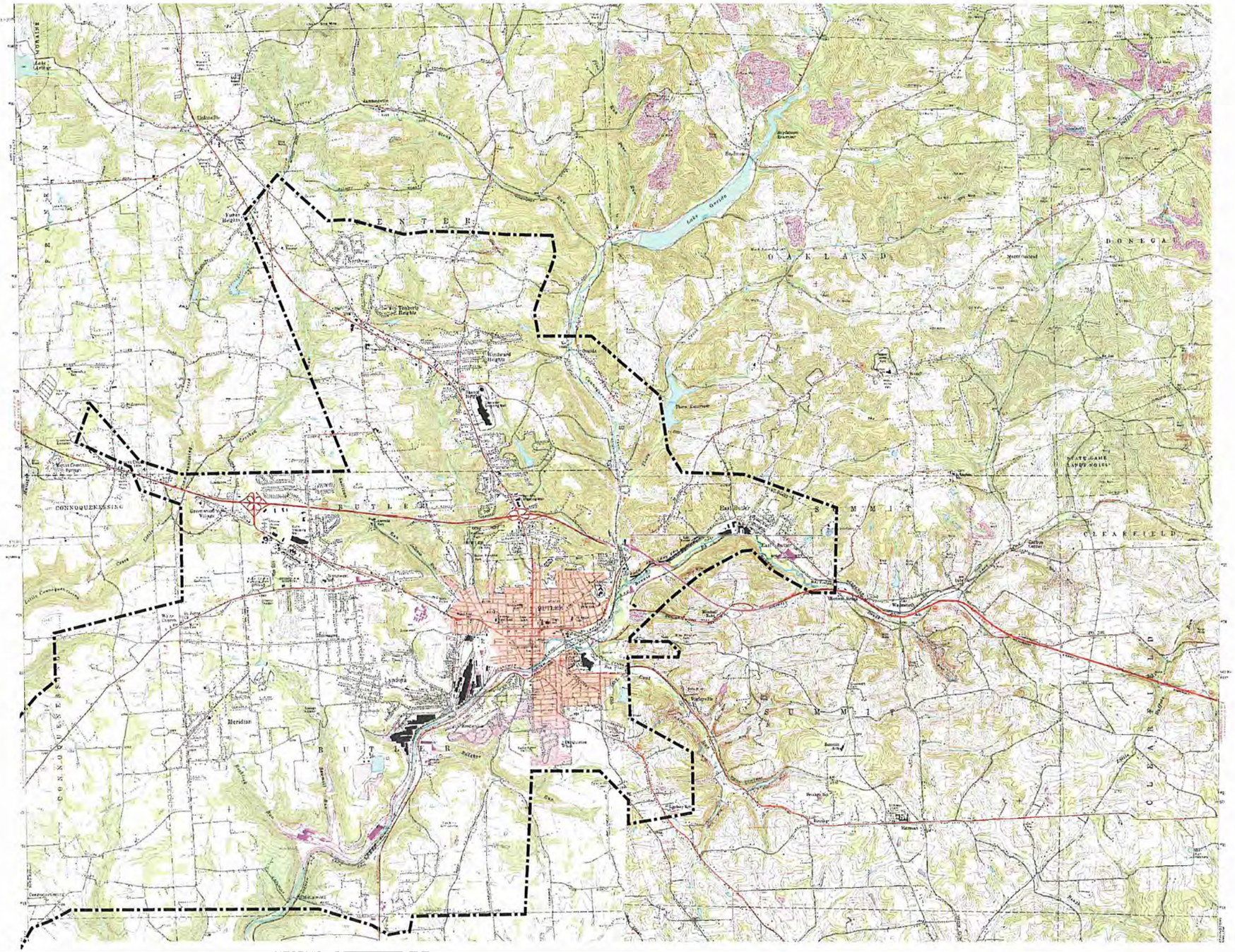
The main sources of supply for the PAWC Butler service area are the Boydstown, Oneida, and Thorn Reservoirs, all of which are located in Oakland Township. The Boydstown and Oneida Reservoirs are impoundments on Connoquenessing Creek, while the Thorn Reservoir is situated on Thorn Creek. Supplemental water during periods of drought can be transferred to these reservoirs from the Allegheny River. In addition, the PAWC Butler service area draws up to 20 percent of its treated water supply from the PAWC Ellwood City service area. Water from the Ellwood City system is supplied to parts of Butler Township, Connoquenessing Township, and Connoquenessing Borough on the west side of the BASA service area. The amount of water supplied from the Ellwood City system depends on the season and drought conditions, with more water typically provided in the summer and fall. Currently, a maximum 2.00 mgd of water can be transferred from the Ellwood City system to the Butler system.

The Oneida Valley treatment facility is located on Oneida Valley Road, approximately ¾ mile downstream of the Thorn Reservoir. This water purification plant supplies potable water to the PAWC Butler service area for residential, commercial, and industrial uses. The Oneida Valley facility is permitted to process up to 12 mgd from the surface water sources described above. PAWC is also permitted to withdraw 6.0 mgd of water from the Allegheny River to supplement the reservoir supply. The Oneida Valley plant treats raw water using coagulation, flocculation, sedimentation, filtration, and chlorine disinfection. During 2006, average daily water delivery from the Oneida Valley plant was 6.26 mgd and average daily delivery to the Butler system was 6.86 mgd.

Slippery Rock Creek is the sole source of supply for the Ellwood City service area. The PAWC Ellwood City purification facility is permitted to withdraw and process up to 5.2 mgd of raw water from a surface water intake on Slippery Rock Creek in Wayne Township, Lawrence County. Before the water is distributed to customers, it is disinfected with chlorine and is treated by coagulation, flocculation, sedimentation, and



DRW. JS	Date. 4/11/08	Butler Area Sewer Authority Act 537 Sewage Facalities Plan Update Drainage Basin Map	CHESTER ENGINEERS
APP. MM	Figure II-3		
Scale As Shown			
File Butler_maps 1, 5, 7			



DRW. JS	Date. 4/11/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** II-4	Current Public Water Service Area	
Scale As Shown			
File Butler_maps 1, 6,7			

filtration. Average daily water delivery from the Elwood City plant in 2006 was 2.97 mgd. Of that total, an average 0.60 mgd of water was supplied to the PAWC Butler system.

Residences and businesses located outside the PAWC Butler service area get their potable water supplies from private wells.

II.G WETLANDS LOCATIONS RELATIVE TO PROPOSED FACILITIES

A sewage facilities planning study must indicate if there are wetlands present in the study area and if any construction activities are proposed in wetland areas. Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and areas adjacent to open water. The procedure at the Act 537 planning stage is to identify probable wetland areas using National Wetland Inventory (NWI) maps. These maps are prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands are identified on the photographs based on vegetation, visible hydrology, and geography.

The SoilMap program was used to produce individual wetlands maps for each municipality. SoilMap is presented by the Penn State Cooperative Extension Geospatial Technology Program. SoilMap provides free and convenient online access to detailed soils information for all of Pennsylvania, as well as a wide variety of other environmental data layers. Wetlands maps for the municipalities in the BASA service area are included in Appendix A. The information from these maps will be compared to alternatives identified in later sections of this report to determine if any wetland areas may be impacted by proposed construction activities.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION III
EXISTING SEWAGE FACILITIES IN THE PLANNING AREA

III.A.1 TREATMENT FACILITIES, INTERCEPTING SEWERS, SEWAGE PUMPING STATIONS, AND FORCE MAINS

BASA owns and operates sewage collection, conveyance, and treatment facilities that serve the City of Butler, Butler Township, East Butler Borough, a significant portion of Center Township, as well as small portions of Summit Township, Connoquenessing Township, and Oakland Township.

The locations of the existing sewers, pump stations, force mains, and the treatment facility are shown in Exhibit III-1. There are a total of 22 sewage pump stations within the system. Table III-1 lists information about each station. The Deshon, Bryson Road, and Monroe Street pump stations have the highest capacity utilization rates.

The BASA wastewater treatment plant discharges its effluent to Connoquenessing Creek, a tributary of the Beaver River. Effluent discharge requirements for the Butler plant are listed in Table III-2. The current National Pollutant Discharge Elimination System (NPDES) permit, No. PA0026697, became effective on November 1, 2006 and expires on October 12, 2011. A requirement for chronic whole effluent toxicity (WET) testing on a quarterly basis was included when the permit was issued. However, Permit Amendment No. 1, dated January 14, 2008, removed the WET testing requirement from the NPDES permit.

III.A.2 WASTEWATER TREATMENT PROCESSES AND CAPACITY

The BASA wastewater treatment plant has a permitted hydraulic capacity of 10.0 mgd and a permitted organic loading of 12,750 pounds of five-day biochemical oxygen demand (BOD_5) per day. The Butler treatment facility is a tertiary treatment plant utilizing a two-stage, biological treatment system with high-rate trickling filters and a second-stage activated sludge nitrification process. Unit treatment processes include preliminary treatment, primary settling, trickling filters, aeration, final setting, reactor clarifier settling, and chlorine disinfection.

A schematic diagram of the basic treatment processes at the Butler plant is presented as Figure III-1. The wastewater treatment plant includes the following treatment processes:

- Two mechanically cleaned bar screens.
- Two aerated grit removal tanks.

Table III-1

Sewage Pumping Station Information

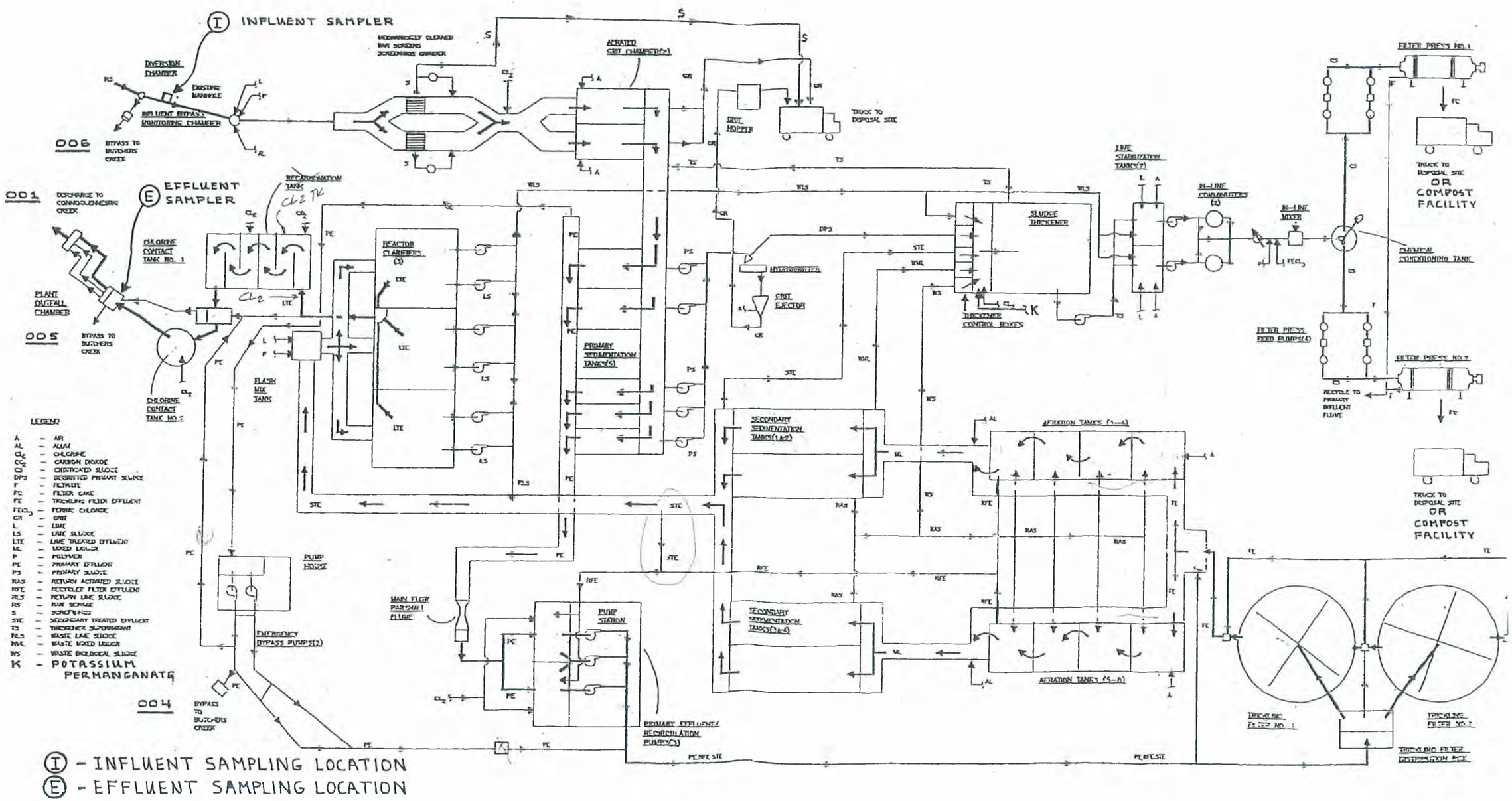
Station Name	Number of Pumps	Pump Capacity (gpm)	2003-2007 Average (gpd)	Annual Maximum (gpd)	Annual Minimum (gpd)	Average Station Utilization
Negley Avenue	2	420	130,460	195,000	108,600	54%
Center Avenue	2	300	82,838	96,159	67,053	48%
Diamond Street	2	100	19,340	23,100	16,300	34%
Ziegler Avenue	2	150	19,680	27,600	15,300	23%
Monroe Street	3	2,250	1,715,300	1,952,600	1,524,000	66%
Deshon	3	1,750	1,718,325	2,036,900	1,429,400	85%
Karns Crossing	3	1,800	647,240	694,300	580,500	31%
Garden Grove	2	320	76,757	95,424	68,430	42%
Township Line	3	90	44,198	57,700	29,300	51%
Northvue	2	280	8,136	9,260	7,340	5%
Fisher Heights	2	250	61,460	121,200	29,300	43%
Brewster Road	2	600	177,779	190,014	138,330	51%
Brewster Booster	2	600	173,571	181,206	161,400	50%
Greenwood Drive	2	500	161,175	193,300	142,775	56%
Benbrook Road	2	500	134,318	171,286	115,950	47%
Bryson Road	2	500	192,178	226,600	149,590	67%
Cupps Road	1	400	291,903	380,100	232,600	51%
	2	700				
Rock Lick	1	550	455,732	577,500	325,560	51%
	2	1,050				
Sugar Creek *	2	80	263	400	50	1%
September Drive	2	75	11,647	22,778	6,382	27%
Foxcroft	2	40	10,501	15,493	8,270	46%
Links	2	30	1,240	1,400	600	51%

* Sugar Creek Pump Station Only Serves 3 Homes

Table III-2

NPDES Effluent Limitations for the Butler Area Sewer Authority Wastewater Treatment Plant
Permit Number PA0026697

Discharge Parameter	Mass Units (lb/day)		Concentrations (mg/l)		
	Monthly Average	Average Weekly	Monthly Average	Average Weekly	Instant. Maximum
CBOD - 5 day - May 1 to Oct. 31	1,001	1,501	12	18	24
CBOD - 5 day - Nov. 1 to Apr. 30	2,001	3,002	24	36	48
Total Suspended Solids	2,502	3,753	30	45	60
Ammonia Nitrogen - May 1 to Oct. 31	167		2		4
Ammonia Nitrogen - Nov. 1 to Apr. 30	500		6		12
Phosphorus	167		2		4
Total Residual Chlorine			0.33		1.1
Fecal Coliform - May 1 to Sept. 30	200/100ml				
Fecal Coliform - Oct. 1 to Apr. 30	2,000/100ml				
Flow (mgd)	Monitor and Report				
Dissolved Oxygen	5.0 mg/l minimum				
pH	Not less than 6.0 nor greater than 9.0 Standard Units				



DRW. JS	**Figure**	**Butler Area Sewer Authority**	CHESTER ENGINEERS
APP. CS	III - 1	Act 537 Sewage Facilities Plan Update	
Scale None		Treatment Plant Flow Diagram	
File butlerflow 4/22/08			

- Five primary sedimentation tanks.
- Three recirculation pumps.
- Two trickling filters.
- Eight aeration tanks.
- Four final sedimentation tanks.
- One flash mix tank.
- Three reactor clarifier tanks.
- One recarbonation tank.
- Two chlorination tanks.
- One gravity sludge thickener.
- Two lime stabilization tanks.
- Two filter presses.

Appendix B contains design criteria for the BASA wastewater treatment process. The clarified effluent is dosed with chlorine before entering the two chlorine contact tanks, which provide the required contact time for disinfection. The disinfected effluent is discharged to Connoquenessing Creek through a 48-inch outfall sewer.

III.A.3 PROBLEMS WITH EXISTING FACILITIES

The Butler Area Sewer Authority prepares a report each year to fulfill the requirements of Chapter 94, Municipal Wasteload Management, of the Commonwealth of Pennsylvania Department of Environmental Protection's Rules and Regulations. The Chapter 94 report describes the hydraulic and organic loadings placed upon the treatment plant over the past five years and projects future loadings for the next five years.

Table III-3 summarizes past and projected loadings on the Butler treatment facility based on the Chapter 94 report for operating year 2007. The annual average influent flow to the plant over the past five years varied from a high of 8.790 mgd in 2004 to a low of 7.501 mgd in 2005, and averaged 7.982 mgd. The average flow rate to the plant in 2007 was 7.799 mgd. Organic loadings to the Butler treatment plant during the 2003 through 2007 period averaged 8,143 lb BOD_5/day, ranging from a high of 8,752 lb/day in 2006 to a low of 7,509 lb/day in 2004. The average 2007 organic loading of 8,417 lb BOD_5/day was lower than the permitted value of 12,750 lb BOD_5/day.

Table III-3
Past and Projected Future Loadings on the BASA WWTP

Year	Recorded Hydraulic Loading (mgd)	Projected Hydraulic Loading (mgd)	Recorded Organic Loading (lb/day)	Projected Organic Loading (lb/day)	Average EDUs Served	Projected EDUs Served
2003	7.971		8,185		23,911	
2004	8.790		7,509		23,918	
2005	7.501		7,854		24,119	
2006	7.849		8,752		23,894	
2007	7.799		8,417		23,505	
2008		7.960		8,127		23,903
2009		7.959		8,126		23,901
2010		7.958		8,126		23,899
2011		7.958		8,125		23,897
2012		7.957		8,124		23,895
Averages	7.982	7.958	8,143	8,126	23,869	23,899
Per Capita	334		0.340			

Chapter 94 defines a hydraulic overload as follows:

> *"The condition that occurs when the monthly average flow entering a plant exceeds the hydraulic design capacity for 3-consecutive months out of the preceding 12 months or when the flow in a portion of the sewer system exceeds its hydraulic carrying capacity".*

Monthly average flows to the Butler treatment facility exceeded the permitted design hydraulic capacity of the plant during eight months between 2003 and 2007. However, influent flows have never exceeded the plant capacity during three-consecutive months. During 2004, the year with the highest recorded flows, monthly average flows exceeded the permit limit in February, March, and September. Therefore, the plant is not hydraulically overloaded according to Chapter 94 criteria.

Chapter 94 defines an organic overload as follows:

> *"The conditions that occur when the average daily organic load exceeds the organic design capacity upon which the permit and the plant design are based."*

Data from the Chapter 94 report for operating year 2007 shows that monthly average organic loading to the Butler plant did not exceed the permitted organic loading capacity of the facility during the previous five years. Therefore, the Butler plant is not organically overloaded per Chapter 94 criteria.

The BASA wastewater treatment plant is neither hydraulically nor organically overloaded per Chapter 94 criteria. However, the conveyance system tributary to the treatment plant has been and continues to be hydraulically overloaded, whereby peak flows exceed the hydraulic carrying capacity of some portions of the system and cause overflows. On October 13, 2006, the Authority and all seven of its service area municipalities entered into a Consent Order and Agreement (COA) with the Pennsylvania Department of Environmental Protection (DEP) to address the wet weather sanitary sewer overflow (SSO) problems in the Authority's sewer system. Information regarding the SSO problem can be found in Section IV.B.5 of this report.

III.A.4 SCHEDULED UPGRADING OR EXPANSION OF SEWAGE TREATMENT FACILITIES

No sewage treatment plant upgrade or expansion projects are currently scheduled. This 537 Plan update will determine the need for any plant upgrades or expansions.

The Authority has recently performed a large amount of rehabilitation to the sewer system. Approximately 39,000 linear feet of 8-inch through 18-inch main line sanitary sewers were rehabilitated using full-length open-cut replacement, open-cut spot repairs, and full length cured-in-place pipe relining. In addition, 16,000 linear feet of 4-inch and 6-inch service lateral pipe was rehabilitated by open-cut replacement and cured-in-place pipe relining from the main sewer line to the approximate property line. The Authority installed inspection tees on service lines in areas where public sewer rehabilitation was performed.

III.C.1 SOURCES OF WASTEWATER SLUDGE OR SEPTAGE

The major source of wastewater sludge in the planning area is the Authority-owned and operated wastewater treatment plant.

III.C.2 QUANTITIES AND TYPES OF SLUDGE OR SEPTAGE GENERATED

The BASA wastewater treatment plant dewaters sludge on-site using plate and frame filter presses. The dewatered sludge is currently sent to a landfill for disposal. A portion of the sludge used to be processed at an Authority owned and operated sludge composting facility. However, the sludge composting facility ceased operations in 2003. Sludge quantities disposed and composted during the past five years are listed below.

Year	Total Sludge To Compost (Tons)	Total Sludge To Landfill (Tons)
2003	1,123.73	6,166.43
2004	0	7,640.93
2005	0	7,876.71
2006	0	8,049.57
2007	0	8,091.57

The BASA wastewater treatment plant does not accept septage.

III.C.3 PRESENT SLUDGE/SEPTAGE TRANSPORTATION AND DISPOSAL METHODS

Dewatered sludge from the Butler wastewater treatment plant is removed by truck and is hauled to Allied Waste Carbon Limestone Landfill in Lowellville, OH for disposal. The dewatered sludge typically contains about 34 percent solids.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION IV
FUTURE GROWTH AND LAND DEVELOPMENT

IV.A.1 LAND USE PLANS AND ZONING MAPS

As part of the October 13, 2006 Consent Order and Agreement with the Pennsylvania Department of Environmental Protection, the communities served by the Butler Area Sewer Authority (BASA) were required to revise their official sewage facilities plans. The Consent Order and Agreement refers to these municipalities collectively as the Tributary Municipalities. Each of the Tributary Municipalities prepared a Special Study to provide BASA with planning information to be used in the design of sewerage facilities to meet future needs. The Special Studies focused on areas in each community that are currently served or expect to be served by BASA in the future. Due to the large volume of data, maps and other information contained in the Special Studies, they are included by reference in the BASA Sewage Facilities Planning Study Update rather than being reproduced herein.

Center Township recently adopted a comprehensive plan that identifies two growth areas. One area is in the north-central portion of the Township south of Elliot Road. The other is situated in the south-central portion of the municipality and includes the Mercer Road corridor and properties north of Cornell Drive. None of the other Special Studies contained any information about land use plans.

Zoning Information from the Special Studies is summarized below for each municipality.

City of Butler

The Special Study for the City of Butler reports that the City has a total land area of about 1,805 acres or 2.82 square miles. The entire City is located within the BASA service area. The City has a zoning ordinance with the following classifications:

Zoning Designation	Zoning Classification
C-1	General Business
C-2	Central Business
M-1	Light Industrial
M-2	Heavy Industrial
R-0	Residential – Office
R-1	Low Density Residential
R-2	Medium Density Residential
R-3	High Density Residential

Areas zoned for business occur primarily in the downtown area and along the western edge of the City. Industrial zoned areas are situated adjacent to Connoquenessing Creek and along the lower reaches of Sullivan Run. The section of town zoned for residential-office use is located along PA Route 8, just north of the downtown area. Residential zoned areas are interspersed throughout the City. High-density residential areas are adjacent to the central business district. Medium and low-density residential districts are located further away from the center of the City, with most of the low-density residential development occurring in the north.

Butler Township

The Special Study for Butler Township indicates that the entire Township, with the exception of the southwest section, is located within the BASA service area. The southwest corner of the Township flows towards the Saxonburg Area Sewer Authority treatment plant in Renfrew. The Township has a total area of approximately 13,695 acres or 21.4 square miles.

Butler Township currently has six zoning districts. The zoning districts and percentage of land included in each district is summarized below.

Zoning Designation	Zoning District	Land Area
A-1	Agricultural	20.7%
C-1	General Commercial	2.1%
C-2	Convenience Commercial	4.6%
M	Manufacturing	14.0%
R-1	Single Family Residential	47.0%
R-2	Multifamily Residential	11.6%

The zoning district with the largest amount of land is single family residential, followed by agricultural, manufacturing, and multifamily residential. Land zoned for single-family residential and agricultural use occurs throughout the Township. Land zoned for manufacturing use is concentrated in the south central portion of the community, in and around the AK Steel plant. Properties zoned for multifamily residential use occur in the southeast and southwest corners of Butler Township.

Center Township

The Center Township Special Study reports that the Township is 24.4 square miles in size. The southeast and south central portions of the municipality are located within the

BASA service area. The northern and western portions of the Township are not expected to be served by BASA within the next 20 years.

Center Township currently has the eight zoning districts listed below. In addition, there is a Mineral Extraction Overlay District for the northern portion of the Township.

Zoning Designation	Zoning District
R-1A	Single Family Residential - Agriculture
R-1	Single Family Residential
R-2	Two Family Residential
R-3	Multi Family Residential
C-1	Retail and Service Commercial
C-2	Highway Commercial
M-1	Light Industrial
M-2	Heavy Industrial

Zoned commercial areas are generally situated adjacent to PA Route 8, as are the areas zoned for residential use only. Areas zoned for industrial use are located in the southeast corner of the Township along Connoquenessing Creek and in the northwest portion of the municipality, near the intersection of Route 8 and Unionville Road. The largest amount of land in Center Township is zoned Single Family Residential – Agriculture. Most of the land in this zoning classification can be found in the northern half of the Township. The remainder is located along the western side and southwest corner of the community.

Connoquenessing Township

The Special Study for Connoquenessing Township identifies two small areas of the community that are currently served by the BASA system. The Cupps Road pump station serves the majority of current BASA customers in the Township. The Greenwood Drive pump station also serves a small number of Township residents.

Connoquenessing Township and Connoquenessing Borough recently completed a Joint Comprehensive Plan. The Township adopted the Comprehensive Plan on November 7, 2007.

East Butler Borough

The East Butler Borough Special Study identifies the entire municipality as being located within the BASA service area. The Borough has a total area of about 665 acres or one square mile.

East Butler Borough currently has three zoning districts. The residential district is the largest zoning classification and includes an estimated 60 to 70 percent of the land in the Borough. This zoning district is generally located north of Grant Avenue and Valvoline

Road. The next largest classification is the industrial zoning district, which is primarily situated adjacent to Bonnie Brook. The commercial zoning district contains the smallest area, less than 5 percent of the total land in the community. The commercial zoning district is located along Grant Avenue, between 2nd Street and 11th Street.

Oakland Township

The Special Study for Oakland Township states that the entire Township is in the BASA service area and that all portions of the municipality could flow to existing BASA sewerage facilities by gravity via extensions to the existing system. Only a small number of residents located in the southwest corner of the Township are currently served by the BASA system.

At the present time, Oakland Township has no zoning ordinance or zoning districts.

Summit Township

Per the Summit Township Special Study, the west side of the municipality is located within the BASA service area. The Township has a total area of about 15,380 acres or 24 square miles. The Special Study area includes 12.5 square miles or 52 percent of the total area in the municipality.

Summit Township currently has the following zoning classifications:

Zoning Designation	Zoning District
A-1	Agricultural
C-1	Commercial
I-1	Industrial
R-1	Residential
R-2	Residential
V-1	Village

The western half of Summit Township includes districts with all six zoning classifications. Land zoned for agricultural use is located in the southwest corner of the municipality. Industrial districts are situated immediately south and west of East Butler Borough. Commercial, village, and R-2 residential districts can be found in various locations throughout the study area. However, the R-1 residential classification is the most prevalent zoning district on the west side of Summit Township.

IV.A.2 ZONING OR SUBDIVISION REGULATIONS THAT ESTABLISH LOT SIZES PREDICATED ON SEWAGE DISPOSAL METHODS

None of the Special Studies prepared by the Tributary Municipalities contained discussions about zoning or subdivision regulations that establish lot sizes based on sewage disposal methods. Center Township has noted that their RA1 zoning district requires a minimum lot size of 0.75 acre with public sewers and 1.0 acre without public sewers.

IV.A.3 PLANS RELATED TO FLOOD PLAIN, STORMWATER MANAGEMENT, AND SPECIAL PROTECTION AREAS

Oakland Township contains several streams with protected water uses. The table below lists the protected use stream segments in Oakland Township, as defined in Chapter 93.

Stream	Zone	County	Protected Water Uses	Exceptions to Specific Criteria
Connoquenessing Creek	Basin, Source to Oneida Dam	Butler	HQ-WWF	None
Unnamed Trib. To Connoquenessing Creek	Basins, Oneida Dam to Mouth	Butler	WWF	None
Thorn Creek	Basin, Source to Thorn Dam	Butler	HQ-WWF	None
Thorn Creek	Basin, Thorn Dam to Mouth	Butler	WWF	None
Bonnie Brook	Basin	Butler	WWF	None

Key:
HQ = High Quality Waters
WWF = Warm Water Fishes

IV.B.1 AREAS WITH EXISTING DEVELOPMENT OR PLOTTED SUBDIVISIONS

The Special Studies prepared by most of the Tributary Municipalities identified specific areas with existing development that are not currently served by public sewers. The Special Study for the City of Butler did not provide this type of information because the entire City is located within the BASA service area and public sewers serve virtually all residents and businesses. Similarly, the Butler Township Special Study identified unsewered areas within the Township and provided estimated numbers of existing structures in those areas. However, specific locations for the structures were not identified. With the exception of the southwest corner of the municipality, Butler Township is also located within the BASA service area and public sewers serve nearly all existing development.

Table IV-1 summarizes areas with existing development in each municipality, as identified in the Special Studies. Exhibit IV-1 shows the locations of the areas listed in Table IV-1. Package sewage treatment plants currently serve some of the areas, but most are not served by public sewers and wastewater treatment facilities. Brief descriptions of existing development areas in each municipality are listed below.

Center Township

The five identified areas with existing development in Center Township include an estimated 315 equivalent dwelling units (EDUs). The Special Study for Center Township provided specific location information for the EDUs in all of the areas. Areas 2 through 5 are situated within the current BASA service area and could be served by constructing extensions to the existing gravity sewer system. Areas 2 and 3 drain to the Sullivan Run sewershed, while Areas 4 and 5 are tributary to the Monroe pump station.

Area 1 includes the Baxter Mobile Home Park with 96 units and the Caravan Court Mobile Home Park with 35 trailers. Each mobile home park currently has a package plant to treat the wastewater that is produced. The package treatment plants would be taken out of service if public sewers were extended to Area 1. The remaining 69 EDUs in this area include homes and businesses in and around Unionville.

Area 1 is beyond the northwest boundary of the current BASA system. Wastewater from this area would be collected by new sewers and pumped to the BASA system through new pumping facilities. The wastewater would then pass through the Fisher Heights pump station, the Brewster Road pump station, and the Brewster Booster pump station before reaching the Sullivan Run sewershed. From that point, the wastewater could flow by gravity to the BASA wastewater treatment plant.

Connoquenessing Township

The three identified areas in the Township with existing development have a total of approximately 504 EDUs. All three areas are located beyond the western boundary of the current BASA system. Wastewater from these areas would be collected by new sewers and pumped to the BASA system through new pumping facilities.

The Connoquenessing Township Special Study provided specific location information for the EDUs in Areas A and B. Area A, Winterwood Drive, has 22 existing EDUs. Wastewater from this area would pass through the Cupps Road, Rocklick, and Deshon pump stations before reaching the BASA treatment plant. The EDUs for Area B are all located in the Golden L Mobile Home Park. Half of the Golden L Mobile Home Park is located in Franklin Township. Flows from Area B would pass through the Greenwood, Benbrook, Bryson, and Deshon pump stations on their way to the BASA wastewater treatment facility.

Table IV-1

Identified Areas With Existing Development

Municipality	Location	Existing EDUs
Center Township	Area 1 - Baxter and Caravan Court Mobile Home Parks	200
	Area 2 - Mercer Road	10
	Area 3 - Duffy Road	50
	Area 4 - Oneida	45
	Area 5 - Morgan Lane	10
	Center Township Subtotal	315
Connoquenessing Township	Area A - Winterwood Drive	22
	Area B - Golden L Mobile Home Park	32
	Area C - North and South	450
	Connoquenessing Township Subtotal	504
East Butler Borough	Grant Avenue	6
	Eyth Road	6
	6th Street	1
	East Butler Borough Subtotal	13
Oakland Township	Pine Run Watershed	30
	Thorn Creek Watershed	98
	Bonnie Brook Watershed	119
	Oakland Township Subtotal	247
Summit Township	Southwest Corner of Township	77
	Central Portion of Township Along US Route 422	92
	Summit Township Subtotal	169
System Total		1,248

Area C includes a north and south section. The northern portion includes 261 existing EDUs and the southern part has 189 existing EDUs, for a total of 450 EDUs. The Special Study did not provide specific locations for the unsewered units in Area C, but two new pump stations and force mains would be required to convey the wastewater from this area to the BASA system. Wastewater from the north section of Area C would flow through the Deshon pump station. Wastewater from the south section of this area would pass through the Cupps Road, Rocklick, and Deshon pump stations before reaching the BASA treatment plant.

East Butler Borough

A total of 13 EDUs in East Butler Borough are situated within the BASA system but are located slightly beyond the reach of the existing sewers. All of the EDUs could be served by constructing extensions to the existing sewer system. Wastewater from East Butler flows by gravity to the Karns Crossing pump station.

Oakland Township

A total of 247 EDUs with existing development were identified in three areas of Oakland Township. All three areas are located north and east of the current BASA system boundary. Wastewater from these unsewered areas could potentially flow to the BASA system by gravity via new collection and conveyance facilities. The Special Study for Oakland Township provided EDU counts by watershed area but did not specifically identify where the existing dwelling units are located.

Summit Township

Two areas with existing unsewered development were identified in Summit Township. The Special Study for Summit Township provided specific location information for 169 EDUs. Both areas are located east of the current BASA service area but could be served by constructing new sewage collection and pumping facilities. An estimated 77 EDUs are situated in the southeast corner of the municipality. Another 92 EDUs are located in the central portion of the Township along US Route 422.

Summit Township is in the process of preparing an Act 537 Plan for the Herman area of the municipality. It is expected that the Herman area will be served by its own sewage treatment plant. Parts of the unsewered areas in the southeast corner and central portions of the Township could be served by either the BASA system or a new treatment facility in the Herman area.

IV.B.2 ESTABLISHED LAND USE DESIGNATIONS INCLUDING RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL

Land use designations within the Tributary Municipalities are discussed in Section IV.A.1 of this report. Connoquenessing Township and Oakland Township do not have any zoning ordinances or zoning districts.

IV.B.3 FUTURE GROWTH AREAS WITH POPULATION AND EDU PROJECTIONS

Population Projections

Historic and projected population data from the Special Studies for the Tributary Municipalities is presented in Table IV-2. Historic population information is from the US Census Bureau. The Southwestern Pennsylvania Commission (SPC) provided population projections beyond the 2000 census data. The Special Studies for the City of Butler and Summit Township included historic populations for each community but did not provide population projections. The Special Study for Butler Township did not contain specific information about the population of the municipality.

The information in Table IV-2 shows that the City of Butler's population peaked in 1940 and declined continuously through the 2000 census. Similarly, Butler Township's population peaked in 1980 and continued to drop through 2000. The population of East Butler Borough peaked in 1960 and reached a low point in 2000, but is expected to rebound slightly in the future. Population data from the Special Studies indicates that the remaining communities are still growing. Connoquenessing Township and Oakland Township are expected to reach their maximum populations in 2010, and the population of Center Township is projected to peak in 2020. Summit Township reached its maximum population in 2000.

At the time the Special Studies were prepared, the Cycle 7 population forecasts were the most up-to-date projections available from SPC. Since that time, SPC has released their Cycle 8 Forecast of Population, Households, and Employment for communities in western Pennsylvania. The Cycle 8 forecast was adopted by the Commission on June 28, 2007 and supersedes any earlier SPC forecasts. The Cycle 8 projection uses base year data for 2005 and forecasts for 2010 and beyond.

Table IV-3 presents historic and Cycle 8 population projections for the Tributary Municipalities. The Cycle 8 data shows that populations in the City of Butler, Butler Township, and East Butler Borough are expected to continue their declines through 2010. After 2010, populations in these communities are projected to level off and show slight increases. Population growth in the other four Tributary Municipalities is projected to continue through 2030.

Table IV-2

Population Data From Special Studies for Tributary Municipalities

Year	City of Butler	Butler Township	Center Township	Connoquenessing Township	East Butler Borough	Oakland Township	Summit Township
1930	23,568	8,641	1,372	832	521	1,081	2,193
1940	**24,477**	9,248	1,800	967	559	1,432	2,379
1950	23,482	12,069	2,614	1,035	758	1,789	3,236
1960	20,975	15,219	4,303	1,420	**1,007**	2,168	3,735
1970	18,691	17,422	5,606	1,880	919	2,548	4,271
1980	17,026	**18,651**	6,224	2,840	799	2,767	4,628
1990	15,714	17,625	6,239	3,093	725	2,820	4,284
2000	15,121	17,185	8,071	3,653	679	3,074	**4,728**
2010			13,688	**4,590**	774	**3,590**	
2020			**14,234**	4,504	778	3,530	
2030			14,191	4,474	778	3,514	

Note: 1930 to 2000 Data From US Census Bureau
2010 to 2030 Data From Southwestern Pennsylvania Commission, Cycle 7 Forecast

Table IV-3

Population Data for Tributary Municipalities

Year	City of Butler	Butler Township	Center Township	Connoquenessing Township	East Butler Borough	Oakland Township	Summit Township
1930	23,568	8,641	1,372	832	521	1,081	2,193
1940	**24,477**	9,248	1,800	967	559	1,432	2,379
1950	23,482	12,069	2,614	1,035	758	1,789	3,236
1960	20,975	15,219	4,303	1,420	**1,007**	2,168	3,735
1970	18,691	17,422	5,606	1,880	919	2,548	4,271
1980	17,026	**18,651**	6,224	2,840	799	2,767	4,628
1990	15,714	17,625	6,239	3,093	725	2,820	4,284
2000	15,121	17,185	8,071	3,653	679	3,074	4,728
2010	14,328	16,520	9,541	4,076	669	3,356	4,971
2020	14,656	16,696	10,000	4,339	728	3,730	5,593
2030	16,041	17,415	**10,478**	**4,650**	836	**4,286**	**6,551**

Note: 1930 to 2000 Data From US Census Bureau
2010 to 2030 Data From Southwestern Pennsylvania Commission, Cycle 8 Forecast

A comparison of the two population projections illustrates that the Cycle 7 forecast for Center Township is significantly higher than the Cycle 8 forecast. The Cycle 7 data projected that the Township would have a 2010 population of 13,688 and a peak population of 14,234 in 2020. The updated Cycle 8 data forecasts a 2010 population of 9,541 and a 2020 population of 10,000 persons. The Cycle 8 forecast projects a 30 percent population increase in Center Township through 2030 rather than the 76 percent increase contained in the Cycle 7 forecast.

EDU Projections

EDU projections were provided in all of the Special Studies prepared by the Tributary Municipalities. All of the Special Studies projected EDU growth for 5-year, 10-year, and 20-year planning periods. With the exception of Summit Township, anticipated EDU growth was also developed for 20+ or 30-year planning periods. Table IV-4 summarizes the EDU projections in each community. Brief summaries of the methods used to project future EDUs are presented below.

City of Butler

The City's population has experienced a continuous decrease since 1940. Generally speaking, most property in the City is developed to full capacity. Therefore, it is anticipated that future EDU growth will be minimal and will primarily result from redevelopment projects.

Future growth estimates were based on the number of new EDUs in the City of Butler over the five-year period from 2001 through 2005. A total of 295 EDUs were applied for in the City during this time period. The Butler County Jail project accounted for 259 of the EDUs issued, so the EDUs for the jail project were subtracted from the total, leaving 36 EDUs for other projects. The 36 EDU figure was converted to a unit growth rate of 0.020 EDU per acre for the City as a whole. Future growth was projected using the calculated unit growth rate, plus estimates for future development projects that are expected to take place in the City.

Butler Township

The Butler Township Special Study used the following methodology to project future growth in the community:

1. Sewersheds in the Township were delineated and analyzed based on existing development, known future developments, and available "buildable" vacant land.

Table IV-4

Summary of EDU Projections From Special Studies

Municipality and Subarea	EDU Projections				
	5-year	10-year	20-year	30-year	Total
City of Butler					
Butler Park	5	5	10	10	30
Downtown	274	9	18	18	319
Karns Crossing	2	2	4	4	12
Alameda	0	0	0	0	0
Hansen	162	5	10	10	187
North Island	0	0	0	0	0
Monroe	4	139	40	25	208
South Island	6	2	152	27	187
Center Avenue	1	1	2	2	6
Bredinville	2	2	4	4	12
Brown Avenue	0	3	3	3	9
Ziegler Avenue	0	0	0	0	0
City of Butler Subtotal	456	168	243	103	970
Butler Township					
Belmont Road	1	1	1	0	3
Benbrook Road	2	2	2	0	6
Bredinville	1	1	1	0	3
Bryson Road	2	2	2	0	6
Butcher Run	105	105	210	2,070	2,490
Butler Park	1	10	20	20	51
Butler Road	2	10	40	0	52
Cupps Road	5	5	5	0	15
Decatur Drive	20	40	60	0	120
Dellwood Road	0	10	15	35	60
Deshon	90	25	20	5	140
Duffy	20	20	2	0	42
Erdley	1	1	1	0	3
Foxcroft	0	0	0	0	0
Garden Grove	1	1	1	0	3
Greenwood Drive	2	12	32	0	46
Hansen	5	5	5	0	15
Henricks Road	5	5	30	20	60
Karns Crossing	58	5	5	0	68
Links	0	0	5	0	5
Lyndora	5	5	5	0	15
Monroe	1	1	1	0	3
Rocklick	5	5	5	0	15
Sawmill Run	2	2	2	0	6
September Drive	0	0	0	0	0
Sugar Creek	0	0	0	0	0
Sullivan Run	94	65	48	433	640
Sunnyview Avenue	5	5	5	20	35
Township Line	1	1	1	0	3
Butler Township Subtotal	434	344	524	2,603	3,905

Table IV-4 (continued)

Summary of EDU Projections From Special Studies

Municipality and Subarea	EDU Projections				
	5-year	10-year	20-year	30-year	Total
Center Township					
Monroe Subsystem	113	118	295	465	991
Sullivan Run Subsystem	236	250	639	221	1,346
Crooked Run / Little Connoq. Creek	131	142	354	2,162	2,789
Center Township Subtotal	480	510	1,288	2,848	5,126
Connoquenessing Township					
Area A	26	0	0	0	26
Area B	5	32	8	0	45
Area C North	0	412	16	18	446
Area C South	0	222	63	34	319
Connoq. Township Subtotal	31	666	87	52	836
East Butler Borough	6	6	12	102	126
Oakland Township					
Pine Run Watershed	55	54	109	N/A	218
Thorn Creek Watershed	66	65	131	N/A	262
Bonnie Brook Watershed	69	68	136	N/A	273
Oakland Township Subtotal	190	187	376	N/A	753
Summit Township					
Southwest	32	33	70	117	252
Northcentral	33	35	72	121	261
Summit Township Subtotal	65	68	142	238	513
Tributary Municipality Totals	1,662	1,949	2,672	5,946	12,229

2. Projected residential development of "buildable" vacant land was estimated based on minimum lot sizes specified in the current zoning regulations.
3. Projected commercial development of "buildable" vacant land was estimated based on Township staff's knowledge of planned future commercial developments and discussions with Developers about their future plans.

A review of past building permit applications indicates that approximately 50 new structures are constructed in the Township each year. Although the Township population has been on the decline since 1980, the number of EDUs has been increasing over the same time period.

Center Township

The Center Township Special Study projected future development by identifying areas within the municipality that are expected to develop in the short-term (0 to 10 years), mid-term (11 to 20 years), and long-term (20 + years). Each of the potential development areas was analyzed with regards to zoning requirements and development constraints such as wetlands, soils and geologic features, and slopes. In addition, the following information was reviewed as part of the analysis:

1. Center Township Comprehensive Plan
2. SPC Cycle 7 population forecast
3. Center Township Building Permits, 1990 through 2004
4. 2006 Land Use Assumptions Report

The Special Study concluded that the population forecast contained in the Township's Comprehensive Plan is probably the most reasonable projection based on the statistical data reviewed. However, the projected population growth in the Land Use Assumptions Report was used to estimate future EDUs in Center Township. The higher growth figures were used to make sure that sufficient capacity is provided as part of any future sewer construction projects.

Connoquenessing Township

The Special Study for Connoquenessing Township identified three additional areas of the Township adjacent to the BASA service area to which public sewer service could be extended. The number of existing customers in each area was determined and projected future growth was based on SPC Cycle 7 population forecasts for the municipality.

East Butler Borough

EDU projections for East Butler Borough were developed after review of SPC Cycle 7 population projections and building permits issued between 1990 and 2004. The Special Study noted that the SPC population projections for the Borough are higher than would be expected based on building permit data and other historical trends. Therefore, EDU projections for a 20-year planning period were based upon extending service to existing unsewered customers and providing future service for the limited growth that is expected in East Butler. EDU projections for the 30-year planning period assume full development of several vacant properties located along the western edge of the Borough.

Oakland Township

Projections for EDU growth in Oakland Township were determined by examining SPC Cycle 7 population projections and the number of building permits issued in the municipality between 1990 and 2004. The Special Study states that the SPC population projections are consistent with current and historical growth as verified by building permit records. However, the Oakland Township Planning Commission regards the SPC projections as conservatively low figures and expects approximately three times the number of new housing units by 2030. Therefore, the higher EDU projections were used in the special study. Future EDUs were allocated to three watersheds that could be served by BASA, based on the amount of developable land in each area.

Summit Township

Two methods of estimating future EDUs were used for Summit Township. The first method projected future growth using the current number of BASA EDUs in Summit Township in conjunction with the expected population increase in the Township. The second method looked at areas that could potentially be served by BASA in the next 30 years based on topography, ease of sewer access, and general desirability for development. The growth projection in the Special Study for Summit Township was based on the average number of EDUs determined by these two methods.

IV.B.4 ZONING/SUBDIVISION REGULATIONS AND PLANS RELATED TO LAND AND WATER RESOURCES

No zoning/subdivision regulations or plans related to land and water resources were discussed in the Special Studies prepared by the Tributary Municipalities.

IV.B.5 NECESSARY SEWAGE PLANNING TO PROVIDE ADEQUATE WASTEWATER TREATMENT FOR 5 AND 10 YEAR PLANNING PERIODS

This section of the report includes analyses of the BASA wastewater treatment plant and sanitary sewer overflows within the BASA system. It also presents projections of future system flows and loadings based on the EDU projections contained in the Special Studies prepared by the Tributary Municipalities.

BASA Wastewater Treatment Plant

The BASA wastewater treatment facility was expanded to its current capacity as part of a 1978 construction project that greatly extended the service area to adjacent municipalities. The treatment processes were also upgraded to provide tertiary treatment. The existing treatment plant has a design average flow capacity of 10 mgd and a design peak wet weather flow capacity of 25 mgd. An October 2002 hydraulic analysis and capacity evaluation determined that the peak flow rate through the BASA plant is limited to approximately 28 mgd by the capacity of the two trickling filter rotary distributors. The analysis showed that the plant can handle a hydraulic load of up to 33 mgd if flows in excess of the trickling filter capacity are bypassed to the aeration tanks. However, the calculations demonstrated that a 33 mgd flow rate would cause weirs to be submerged in several locations throughout the treatment processes. Peak flows in excess of 35 mgd would cause overflows of tanks and channels.

Overview

Table IV-5 presents a summary of annual average influent loadings and the number of EDUs served by the BASA wastewater treatment plant. The table also shows the average flow contribution per EDU served and identifies months in which the average flow exceeded the 10 mgd permitted capacity of the treatment facility. This information was taken from previous annual wasteload management (Chapter 94) reports and covers the time period between 1988 and 2007. Influent flow figures since 1999 include the metered amount of flow entering the treatment plant plus all measured sanitary sewer overflows.

Flow to the BASA wastewater treatment plant averaged 7.122 mgd during the 20-year period reviewed, equivalent to 71 percent of the permitted 10 mgd average hydraulic capacity for the facility. A maximum annual average flow rate of 8.790 mgd was recorded in 2004 and a minimum average flow of 6.014 mgd was registered in 1991. The maximum month average flow during this period was 13.515 mgd in March 2007 and the minimum month average flow of 3.351 mgd occurred in June 1992. Average flows to the BASA treatment facility exceeded the 10 mgd permitted hydraulic capacity during 13 months of the 20 years reviewed.

Table IV-5

BASA Wastewater Treatment Facility
Annual Average Loading and EDUs Summary

Year	Average Influent Flow * (mgd)	Average Influent BOD-5 (lb/day)	Average Number of EDUs Served	Average GPD per EDU	Month(s) in Which Permitted Flow Rate Was Exceeded
1988	7.056	5,903	20,251	348	
1989	7.295	6,514	20,344	359	
1990	7.533	5,177	20,967	359	
1991	6.014	7,155	21,123	285	
1992	6.795	6,444	21,794	312	
1993	7.008	7,162	22,269	315	March
1994	7.042	7,042	22,697	310	March
1995	6.118	7,212	23,171	264	
1996	8.167	7,239	23,521	347	March
1997	6.993	7,096	23,500	298	March
1998	6.156	6,613	23,921	257	
1999	6.651	6,278	24,422	272	January
2000	6.473	5,664	24,281	267	
2001	6.334	7,349	24,306	261	
2002	6.886	8,257	24,356	283	
2003	7.971	8,185	23,911	333	
2004	8.790	7,509	23,918	367	February, March, September
2005	7.501	7,854	24,119	311	January
2006	7.849	8,752	23,894	328	October
2007	7.799	8,417	23,905	326	January, March, December
Permit Limits	10.000	12,750			
Average	7.122	7,091	23,034	310	
Maximum	8.790	8,752	24,422	367	
Minimum	6.014	5,177	20,251	257	

* 1999 and Later Flows Include Recorded Sanitary Sewer Overflows

A review of the data in Table IV-5 indicates that flows to the BASA treatment plant have been elevated over the past five years. The maximum average annual flow recorded in 2004 was influenced in part by the remnants of Hurricanes Francis and Ivan, which struck the northeastern United States in September 2004. The average flow recorded during this month was 11.55 mgd, more than two times the influent flow typically received in September. The average flow to the plant from 2003 to 2007 was 7.982 mgd, 1.15 mgd or 17 percent higher than the 6.835 mgd average influent flow between 1988 and 2002. Due to the higher flows recorded during the past 5 years, the 2003 to 2007 time period will be used as a baseline condition for projecting future loadings on the BASA system.

During the 20-year period of review, organic loadings on the BASA treatment facility averaged 7,091 pounds of BOD_5 per day or 56 percent of the permitted plant capacity of 12,750 pounds per day. A maximum average annual influent loading of 8,752 pounds of BOD_5 per day was measured in 2006, which is equivalent to 69 percent of the permitted loading rate. Monthly average influent BOD_5 loading rates were reviewed for the period between 2003 and 2007 to identify the magnitude of variations in plant loadings. The monthly average loading rate during this period averaged 8,135 pounds of BOD_5 per day. A maximum month loading of 11,377 pounds per day was recorded in June 2007 and a minimum month loading of 5,783 pounds per day occurred in February 2004. This analysis indicates that the permitted organic loading capacity of the BASA wastewater treatment facility is not exceeded on an annual or monthly basis.

Table IV-5 illustrates that the average number of EDUs served by the BASA system increased by about 20 percent between 1988 and 1998. The service population reached almost 24,000 EDUs in 1998 and has remained relatively constant since that time. The 23,905 EDUs served in 2007 is essentially unchanged from the 23,921 EDUs served ten years ago in 1998.

Table IV-5 also shows the calculated average flow contribution per EDU for each of the years reviewed. The average flow contribution for the 1998 to 2007 time period is 310 gpd per EDU. The maximum unit contribution was 367 gpd per EDU in 2004 and the minimum was 257 gpd per EDU in 1998. These historic unit flow contributions for the BASA system are all less than the 400 gpd figure used by the PA DEP. The October 13, 2006 Consent Order and Agreement defines the term "EDU" as a connection to a sewerage system with the amount of sewage flow equal to 400 gallons per day.

WWTP Performance

The ability of the BASA wastewater treatment facility to meet NPDES permit limits under various operating conditions was evaluated for the period from 2003 to 2007. Results of this evaluation are summarized below.

Flow

The NPDES permit requires continuous measurement of the wastewater that enters the BASA wastewater treatment facility. The permit does not contain any specific restrictions on flow but the effluent limitations for the plant were determined using an effluent discharge rate of 10 mgd. The hydraulic design capacity of 10 mgd is also used in the annual Municipal Wasteload Management Report to help determine whether a "hydraulic overload" situation exists, as defined in Title 25 Pa. Code Chapter 94.

Flows during the 2003 to 2007 time period averaged 7.883 mgd and a maximum day flow of 29.506 mgd was recorded. There were 2 days where the flow rate exceeded the 28 mgd capacity of the trickling filter rotary distributors and 12 days where flows exceeded the 25 mgd design peak wet weather flow capacity of the facility. Influent flows exceeded the 10 mgd design average flow capacity of the BASA treatment facility on 289 days of the review period. Monthly average flows to the BASA wastewater treatment plant exceeded 10 mgd during 8 months of the 60-month review period.

$CBOD_5$

The NPDES permit for the BASA facility requires an average monthly $CBOD_5$ effluent concentration of 12 mg/l or less between May 1 and October 31 and specifies a 24 mg/l limit from November 1 to April 30. Effluent $CBOD_5$ concentrations averaged 3.3 mg/l during the period of review. A maximum concentration of 25 mg/l was recorded but all other $CBOD_5$ effluent results were less than the monthly average limits specified in the NPDES permit. The average 3.3 mg/l effluent concentration is only 28 percent of the permitted 12 mg/l $CBOD_5$ discharge limit during warm weather months.

Part A of the permit also specifies that the 30-day average removal for $CBOD_5$ shall not be less than 85 percent. The minimum removal for $CBOD_5$ between 2003 and 2007 was 86 percent and the average removal rate was 97 percent.

TSS

The NPDES permit restricts total suspended solids (TSS) discharges from the BASA plant to 30 mg/l as a monthly average. The average TSS effluent concentration between 2003 and 2007 was 7.1 mg/l, equivalent to 25 percent of the monthly average permit limit. There were only 5 days on which the measured TSS exceeded the monthly average permit limit. Three of the days with TSS concentrations higher than 30 mg/l were in September 2004 and all were associated with extraordinary precipitation events. A maximum concentration of 50 mg/l was recorded on September 16 as the remnants of Hurricane Ivan were

moving through the area. A 40 mg/l TSS concentration was also measured the following day. One week earlier, a 47 mg/l reading was influenced by very heavy rainfall from Hurricane Francis. No effluent TSS concentrations recorded during the review period exceeded the 60 mg/l instantaneous maximum discharge limit or caused the 45 mg/l weekly or 30 mg/l monthly permit limits to be exceeded.

Part A of the permit also requires a minimum 85 percent removal for TSS as a 30-day average. TSS removal averaged 94.7 percent for the five-year review period but was only 82.6 percent in March 2007. Average TSS removal during all other months was 86.6 percent or higher and average removals were greater than 91 percent in 53 of the 60 months reviewed. Reduced TSS removal during March 2007 was caused by high flows that diluted the concentration of TSS coming into the plant. The 16.4 mg/l average effluent TSS concentration in March 2007 was well within the 30 mg/l effluent limit but the 94 mg/l average influent concentration was only about 60 percent of the average TSS loading from 2003 to 2007. As a result, the calculated TSS removal rate was lower than normal.

Ammonia Nitrogen

Between May 1 and October 31, the NPDES discharge limitations for ammonia nitrogen are 2 mg/l as a monthly average and 4 mg/l as an instantaneous maximum. The permit limits are less stringent between November 1 and April 30, increasing to 6 mg/l as a monthly average and 12 mg/l as an instantaneous maximum.

Between 2003 and 2007, effluent ammonia nitrogen concentrations averaged 1.23 mg/l. A peak effluent concentration of 12.59 mg/l was recorded. There were 10 days between 2003 and 2007 where measured ammonia nitrogen discharges from the BASA plant exceeded the instantaneous maximum discharge limits specified in the permit. The 12 mg/l instantaneous maximum limit was exceeded on the four days from April 19 to April 22, 2005. The recorded 8.31 mg/l monthly average for ammonia nitrogen during April 2005 also exceeded the 6 mg/l permit limit. Shortly thereafter, the 6 mg/l instantaneous maximum permit limit was exceeded on the six days from May 1 to May 6, 2005. However, the 1.82 mg/l monthly average for May 2005 was less than the 2 mg/l permit limit.

All of the ammonia nitrogen permit exceedances during April and May of 2005 were caused by a mechanical failure of the rotary distributor on the west trickling filter that occurred on March 4. The anchor bolts that connected the distributor bearing assembly to the concrete support column sheared off and caused the distributor to stop rotating. Upon further inspection, the concrete support column was also found to be cracked and deteriorated. A new concrete center column was poured and a new bearing and seal were installed to repair the damage. The rehabilitated tricking filter was started up on May 4 after the concrete and grout

had been allowed a satisfactory curing period. Within a week of the trickling filter being placed back into service, effluent ammonia nitrogen concentrations decreased to 2 mg/l. By May 16, ammonia nitrogen levels were down to 0.5 mg/l.

Fecal Coliform

The BASA NPDES permit requires a monthly geometric average fecal coliform concentration not greater than 200/100 ml during the swimming season (May 1 through September 30). During the period from October 1 to April 30, the fecal coliform concentration shall not exceed 2,000/100 ml as a geometric average. From 2003 to 2007, monthly fecal coliform effluent readings averaged 2.50 colonies per 100 ml and a maximum reading of 18 per 100 ml was recorded.

Phosphorus

NPDES effluent limitations for phosphorus at the BASA treatment plant are 2 mg/l as a monthly average and 4 mg/l as an instantaneous maximum. Between 2003 and 2007, the average effluent phosphorus concentration measured at the BASA plant was 1.00 mg/l or 50 percent of the permitted monthly average discharge limit. A maximum phosphorus concentration of 3.45 mg/l was recorded, which is less than the permitted 4 mg/l instantaneous maximum. The 2 mg/l monthly average discharge limit was exceeded on a total of 21 days but there were no permit violations for monthly average phosphorus discharges during the 5-year period of review.

Total Residual Chlorine

The BASA NPDES permit limits total residual chlorine concentrations in the effluent to 0.33 mg/l as a monthly average and 1.1 mg/l as an instantaneous maximum. Total residual chlorine concentrations averaged 0.244 mg/l during the 2003 to 2007 time period and a maximum monthly average concentration of 0.293 mg/l was recorded.

Dissolved Oxygen

The NPDES permit requires the effluent leaving the BASA treatment plant to have a minimum dissolved oxygen (DO) content of 5 mg/l. During the 2003 to 2007 review period, effluent DO concentrations were 5 mg/l or higher on all but the four days listed below.

August 30, 2003	4.6 mg/l
June 14, 2004	3.9 mg/l
April 2, 2005	4.7 mg/l

August 31, 2005 4.6 mg/l

The low DO readings appear to have been caused by high flow events that flushed accumulated solids from the sanitary sewer system. The materials flushed from the system created additional oxygen demand at the treatment plant and caused the effluent DO concentration to drop below normal levels. The rainfall events that caused the low DO measurements were all preceded by extended low flow periods ranging from three weeks to three months.

pH

The permit for the BASA wastewater treatment facility requires effluent pH in the range of 6 to 9 standard units at all times. During the 2003 to 2007 time period, the pH of the effluent discharged from the plant averaged 7.0 standard units. The maximum pH measured was 7.5 units and the minimum was 6.5 units.

Table IV-6 summarizes the findings of the performance review. The BASA wastewater treatment facility is affected by elevated influent flows during wet weather periods but consistently meets the effluent limitations required by the NPDES permit.

High Flow Effluent Analysis

A separate analysis of effluent concentrations was conducted for 289 days between 2003 and 2007 where measured wastewater flows entering the plant were 10 mgd or higher. Appendix C contains a table with effluent concentration data arranged in descending order with respect to flow. It also contains graphs of the data points that identify trends between flow rates and effluent concentrations. This analysis demonstrates that some effluent parameters are influenced by the amount of flow entering the plant while others show no relationship to flow. Results of this evaluation are summarized below.

$CBOD_5$

Appendix C includes graphs that show measured $CBOD_5$ effluent concentrations relative to summer and winter discharge limitations. Effluent discharges demonstrate a direct correlation to the influent flow rate and increase as the flow rate increases. A trend line was added to the graphs to show this relationship. However, the graphs also show that the BASA wastewater treatment plant is capable of meeting effluent limitations for $CBOD_5$ at high flow rates under both summer and winter permit limits. No $CBOD_5$ effluent discharge concentrations even reached the monthly average permit limits until flows exceeded 15 mgd.

Table IV-6

Summary of BASA WWTP Performance, 2003 to 2007

Parameter	Average Value During Review Period	Monthly Average Effluent Limit *	Percent of Permit Limit	Number of Permit Exceedances	Reason for Permit Exceedance(s)
Flow	7.883 mgd	10.000	78.8%	8	High Flows During Wet Weather
CBOD-5	3.3 mg/l	12.0	27.9%	0	N/A
TSS	7.1 mg/l	30.0	23.7%	1	82.6% TSS Removal in March 2007
Ammonia Nitrogen	1.23 mg/l	2.0	61.5%	1	Trickling Filter Mechanical Failure
Fecal Coliform	2.5 per 100 ml	200	1.3%	0	N/A
Phosphorus	1.00 mg/l	2.0	50.1%	0	N/A
Total Residual Chlorine	0.244 mg/l	0.33	73.9%	0	N/A
DO	8.3 mg/l	5.0 min.	N/A	4	Four Days With DO < 5 mg/l
pH	7.01 Std. Units	6 to 9	N/A	0	N/A

* Minimum Effluent Permit Concentration Shown Where Seasonal Limits Apply

TSS

The graph for TSS effluent concentrations also shows a direct correlation with flow, as demonstrated by the trend line on the chart. However, the plant is capable of meeting current permitted discharge requirements for TSS regardless of the rate of flow. The monthly average permit limit for TSS was never reached until flows exceeded 15 mgd.

Ammonia Nitrogen

The analysis for ammonia nitrogen was conducted by deleting the permit exceedances in March and April of 2005 that were caused by failure of the trickling filter rotary distributor. The graphs in Appendix C show that effluent concentrations of ammonia nitrogen are not affected by the amount of wastewater flow and exhibit relatively constant concentrations at all flow rates. The graphs also illustrate that the BASA plant is capable of meeting effluent concentration limits for ammonia nitrogen under either winter or summer operating conditions, regardless of the influent flow rate.

Phosphorus

The graph in Appendix C demonstrates that phosphorus discharges are not influenced by the amount of flow entering the BASA plant. Effluent phosphorus concentrations remain relatively constant at flows greater than 10 mgd. The BASA plant is capable of meeting the monthly average permit limit for phosphorus at all flow rates.

Dissolved Oxygen

Average DO concentrations exhibit a slight decrease as wastewater flow rates increase. However, the graph in Appendix C shows that effluent DO concentrations remain well above the 5 mg/l minimum permit limit at all flow rates. The only time that DO drops below the permit limit is when the plant receives a slug load of solids with high oxygen demand after a heavy storm.

pH

Effluent pH remains relatively constant regardless of the flow rate that enters the plant and stays within the 6 to 9 standard unit range specified in the NPDES permit.

The high flow effluent analysis was undertaken to determine how well the BASA wastewater treatment plant performs when flows exceed the design average flow capacity of the facility. Past performance demonstrates that the treatment plant is

capable of meeting effluent discharge limitations when flow rates are significantly higher than the permitted plant capacity. Therefore, the plant could be re-rated to a higher design average flow capacity. Re-rating the plant will have no effect on daily operations but could avoid a situation where the facility is considered hydraulically overloaded based on Chapter 94 criteria. Chapter 94 defines a hydraulic overload as "The condition that occurs when the monthly average flow entering a plant exceeds the hydraulic design capacity for 3-consecutive months out of the preceding 12 months or when the flow in a portion of the sewer system exceeds its hydraulic carrying capacity."

Monitored Sanitary Sewer Overflows

Table IV-7 summarizes sanitary sewer overflows recorded in the BASA system between January 1998 and December 2007. Information includes the number of events, total event duration, and the total volume of sanitary sewer overflows discharged. The calculated average SSO duration and volume are also presented for each location. Appendix D contains the same information shown in Table IV-7 but on an annual basis.

In the 10-year period between 1998 and 2007, approximately 237 million gallons of sanitary sewer overflows were discharged from the BASA sewer system during wet weather periods. The Ballpark SSO had the highest number of overflow events, the longest total duration of overflow events, and the largest total discharge volume. However, the Deshon SSO was a close second in the total volume discharged. Due to a smaller number of events, the Deshon Pump Station had the largest average SSO discharge and the longest average SSO event duration. The General Tire SSO had nearly as many overflow events as the Ballpark location but the total volume and duration were somewhat less. The smallest number of events and discharges were recorded at the Monroe Pump Station SSO. The average event duration was not substantially different from the other overflow locations, but the total duration and average volume per discharge were significantly less than for the other sites.

Flow Equalization Tank Sizing Analysis

The October 13, 2006 Consent Order and Agreement (COA) was initiated to address sanitary sewer overflows (SSOs) caused by hydraulic overloads in the BASA system. BASA expended over $11.2 million in construction costs under a February 20, 2001 COA to address sanitary sewer overflows in the system through the design and construction of numerous large-scale sewer rehabilitation projects. However, flow reductions resulting from the work completed were not sufficient to eliminate sanitary sewer overflows in the system. The October 13, 2006 COA requires BASA to eliminate unpermitted discharges from the Ballpark, General Tire, and Deshon SSO structures by July 31, 2012. Given the short time frame to comply with the Consent Order requirements and the limited flow reduction success associated with previous

Table IV-7
Summary of BASA Monitored Sanitary Sewer Overflows - 1998 to 2007

SSO Location	Number of Overflow Events	Total Duration (hours)	Total Volume (gallons)	Average Duration (hours)	Average Volume (gallons)
General Tire	126	1,183	64,178,404	9.4	515,810
Ball Park	130	1,290	80,911,469	9.8	562,009
Deshon Pump Station	93	1,004	80,054,629	10.2	751,024
Monroe Pump Station	31	271	11,890,305	9.1	392,015
Total			237,034,807		

sewer rehabilitation projects, BASA intends to focus on providing flow equalization facilities and related conveyance system upgrades to reduce the number and severity of SSO events.

The overflow events summarized in Table IV-7 were reviewed and an equalization tank sizing analysis was completed for the four SSO locations in the BASA system. Appendix E contains a Technical Memorandum on SSO Data Review and Equalization Tank Sizing Analysis that was sent to the DEP Meadville office on December 7, 2007. The Technical Memorandum describes the tank sizing analysis in detail and includes graphs, overflow data, and precipitation information for recorded SSO events through October 2007.

The overflow analysis developed best-fit linear regression lines for each SSO location to estimate the sizes of flow equalization tanks required to contain historic SSOs. Chester Engineers has used a 2-year, 24 hour design storm in the past to size numerous flow equalization tanks for other clients in Pennsylvania. The same procedures were used to develop preliminary storage requirements for the BASA system. The overflow analysis indicates that tanks sized to contain overflows from a 2-year, 24-hour storm event would capture more than 90 percent of the historic SSOs recorded at the Ballpark, General Tire, and Deshon Pump Station locations. A tank sized to capture overflows from a 2-year, 24-hour storm event would store 76 percent of the historic SSOs recorded at the Monroe Pump Station.

Table IV-8 summarizes the results of the tank sizing analysis contained in Appendix E. The storage volume required at each overflow location is listed, along with the corresponding SSO capture rate and design storm. The total storage requirement for the BASA system using this sizing method is 7.10 million gallons.

Table IV-8
Results of Flow Equalization Facility Sizing Analysis

SSO Location	Tank Volume (million gallons)	Capture of Historic SSO Events	Design Storm
Ballpark	2.30	92%	2-year, 24 hour
General Tire	1.60	91%	2-year, 24 hour
Deshon Pump Station	2.50	90%	2-year, 24-hour
Monroe Pump Station	0.70	76%	2-year, 24 hour
Total Volume	7.10		

A February 7, 2008 site visit to the four SSO locations showed that there appears to be sufficient land available to construct flow equalization storage facilities adjacent to the Deshon and Monroe pump station sites. However, no vacant land is available near the Ballpark and General Tire overflows. The closest site with sufficient space available to construct large equalization tanks is located approximately 1,600 feet south of the Ballpark and General Tire overflows, in the vicinity of Allegheny Axle and the BASA Negley Avenue pump station.

Projected Future System Loadings

Information from the Special Studies was used to estimate future average loadings on the BASA wastewater treatment plant. Table IV-9 presents projected EDU growth and corresponding increases in hydraulic and organic loading on the BASA treatment facility. Unit loading contributions were applied to the EDU projections from Table IV-4 to estimate future increases in average flow and BOD_5. The unit flow contribution of 400 gpd per EDU is specified in the October 13, 2006 COA. The unit organic loading contribution represents the average BOD_5 loading recorded at the BASA plant during the five-year period from 2003 to 2007. Projected increases in loadings to the BASA system over the next 30 years have the potential to add almost 5 million gallons of flow and more than 4,100 pounds per day of BOD_5 to the current average loadings on the system.

Table IV-10 projects future average hydraulic and organic loadings in the BASA system. The EDUs shown for 2008 are based on the number of accounts by municipality on April 10, 2006. The average flow and BOD_5 listed for 2008 represent average loadings on the BASA system for the period from 2003 through 2007. Future system loadings were estimated by adding the information in Table IV-9 to the baseline data for 2008. Table IV-10 shows that the BASA plant will not need additional treatment capacity in the immediate future. If the growth projections from the Special Studies are realized, the plant will not reach its current 10 mgd average hydraulic capacity for another 10 to 15 years. The facility is not expected to reach its permitted 12,750 pound per day organic loading capacity in the next 30 years.

Sewer connection restrictions will limit growth in the near future, further delaying the need for additional treatment capacity. As part of the October 13, 2006 COA, the DEP granted an initial new sewer connection permit allocation of 200 EDUs that can be used until all of the permits are exhausted. On June 18, 2008, the DEP approved an additional 200 EDUs of new sewer connection permits to be used during the period from April 1, 2008 through March 31, 2009. As of February 5, 2009, 45 EDUS of the initial new sewer permits are still available and 173 EDUs of the additional new sewer permits are also available. The Authority plans to submit a written request for additional sewer connection permits but there is no guarantee that the DEP will approve any new permits.

Table IV-9 shows that the BASA service population in the Tributary Municipalities is projected to increase by 1,662 EDUs in the next 5 years. Given that a prohibition on new connections will go into effect after the remaining EDUs are issued; only a very small fraction of the projected development will be able to occur. Therefore, the tap prohibition contained in the COA will effectively push back the growth projections contained in the Special Studies by at least 5 years and it is anticipated that additional treatment capacity for the BASA system will not be required for 15 to 20 years.

Table IV-9

Projected EDU Growth and Plant Loading Increases

Time Period	Projected EDU Growth During Each Time Period							Increase in Current EDUs	Increase in Average Flow (1) (gpd)	Increase in Average BOD (2) (lb/day)
	City of Butler	Butler Township	Center Township	Connoq. Township	East Butler Borough	Oakland Township	Summit Township			
5 years	456	434	480	31	6	190	65	1,662	664,800	565
10 years	168	344	510	666	6	187	68	1,949	779,600	663
20 years	243	524	1,288	87	12	376	142	2,672	1,068,800	909
30 years	103	2,603	2,848	52	102	N/A	238	5,946	2,378,400	2,022
Totals	970	3,905	5,126	836	126	753	513	12,229	4,891,600	4,159

(1) Based on a unit contribution of 400 gpd per EDU as specified in the October 13, 2006 COA
(2) Based on a unit contribution of 0.34 pound of BOD-5 per EDU (average for 2003 to 2007 time period)

Table IV-10

Projected Future Loadings on BASA System

Year	Estimated EDUs by Municipality								Average Flow to WWTP (gpd)	Average BOD-5 to WWTP (lb/day)	Additional Flow to WWTP (gpd)
	City of Butler	Butler Township	Center Township	Connoq. Township	East Butler Borough	Oakland Township	Summit Township	Total EDUs			
2008	9,592	9,290	2,966	208	1,273	15	605	23,949	7,978,000	7,488	0
2013	10,048	9,724	3,446	239	1,279	205	670	25,611	8,642,800	8,053	664,800
2018	10,216	10,068	3,956	905	1,285	392	738	27,560	9,422,400	8,716	1,444,400
2028	10,459	10,592	5,244	992	1,297	768	880	30,232	10,491,200	9,624	2,513,200
2038	10,562	13,195	8,092	1,044	1,399	768	1,118	36,178	12,869,600	11,646	4,891,600
Current Permitted Plant Loadings									10,000,000	12,750	

Note: EDUs for 2008 Are Based on Estimated Number of Accounts by Municipality on April 10, 2006
2008 Values for Average Flow and BOD-5 Loading to WWTP Represent 2003 to 2007 Averages

BASA Interceptor Sewer Model

The estimated equalization storage volumes shown in Table IV-8 were based on historic overflow data and the current BASA service population. Future growth in areas tributary to the SSO locations will generate additional wastewater and increase storage requirements. Efforts to control peak flows to the treatment plant will further increase the required sizes of the storage tanks. Computer modeling techniques were used to determine how equalization storage requirements are impacted by peak flow control requirements and potential future system growth.

An interceptor sewer model originally developed as part of the February 20, 2001 COA was updated to determine required storage volumes for flow equalization facilities in the BASA system. Appendix F contains a technical memorandum that describes the procedures used to size wet weather flow diversion and storage facilities for a 2-year, 24-hour design storm. Model simulations were conducted to determine the flow diversion rates and volumes required to eliminate existing overflows and to restrict flows to the wastewater treatment plant to approximately 28-mgd, under both existing and projected future loading conditions.

Alternative 1 is for existing conditions and includes four diversion facilities and three equalization storage facilities. Under this option, flow diversion facilities would be constructed at the identified SSO locations to eliminate existing overflows. Separate diversion facilities would be placed at the Deshon and Monroe pump stations, and a common diversion facility would be built for the Ballpark and General Tire overflows. In addition, a fourth diversion facility would be constructed on the Connoquenessing interceptor at a point located east of where the Sullivan Run interceptor connects to the Connoquenessing Creek interceptor. The additional diversion is required to limit wastewater treatment plant flows to 28-mgd. The diversion facilities would include flow measurement equipment, flow control/diversion chambers, pump stations at the diversion locations, and force mains from the pump stations to the storage tanks. Wet weather storage facilities would be constructed adjacent to the Deshon and Monroe diversion facilities, and centralized storage facilities would be constructed near the Sullivan Run interceptor to service the Ballpark/General Tire and Connoquenessing diversions.

Alternative 2 is for future conditions and includes the same system components described under Alternative 1 above. Table IV-11 summarizes storage requirements at each location.

Table IV-11
Flow Equalization Storage Requirements From Computer Model

Location	Existing Conditions (million gallons)	Future Conditions (million gallons)	Design Storm
Central Storage	9.7	14.1	2-year, 24 hour
Deshon Pump Station	4.0	4.6	2-year, 24 hour
Monroe Pump Station	1.0	1.8	2-year, 24 hour
Total Volume	14.7	20.5	

A comparison of Tables IV-11 and IV-8 shows that the total storage requirement from the computer model is more than two times the estimated 7.1 million gallon volume for existing conditions per the initial flow equalization tank sizing analysis. The total storage volume for future conditions is almost three times higher than the initial estimate. The difference in total modeled storage volumes versus the original estimated volumes is due to the following reasons.

- The model uses a Soil Conservation Service (SCS) Type 2 storm distribution, a synthetic distribution that generates high peak rates of flow. The storage volumes described in the DEP memo were based on precipitation from an actual storm having a total rainfall amount equivalent to a 2-year, 24-hour storm. The rainfall pattern associated with the actual storm was more uniform than the synthetic distribution and would generate lower peak rates of flow.
- The model results include storage volumes necessary to keep influent plant flows at 28-mgd or less throughout the storm event. This requirement contributes to the larger volumes associated with the model results.

Table IV-12 compares maximum historic SSO volumes recorded in the BASA system through October 2007 to the storage requirements determined by the interceptor sewer model. The 14.7 MG of total storage required for existing conditions per the sewer model is slightly less than the 15.4 MG total SSO discharge volume recorded during Hurricane Ivan but exceeds the 14.5 MG total SSO discharge volume measured during Hurricane Francis. An average total rainfall depth of 6.38 inches was recorded over 18.33 hours during Ivan, a rainfall amount approximately equal to a 500-year design storm. During Hurricane Francis, an average total rainfall of 5.74 inches fell over 22.92 hours, equivalent to a 200-year design storm. The 20.5 MG of total storage required for future conditions per the sewer model is more than the total volume of the maximum historic SSOs events ever recorded in the BASA system.

Table IV-12

Maximum Historic BASA SSO Events Versus Sewer Model Storage Requirements

SSO Location	SSOs Resulting From Ivan (MG)	SSOs Resulting From Francis (MG)	SSOs Resulting From Other Events (MG)	Maximum Recorded SSO Event (MG)	Model Requirements for Existing Conditions (MG)	Model Requirements for Future Conditions (MG)
Ballpark & General Tire	7.933	8.098	10.147	10.147	9.7	14.1
Deshon PS	5.998	5.036	7.374	7.374	4.0	4.6
Monroe PS	1.477	1.415	1.478	1.478	1.0	1.8
Total	15.407	14.549	18.999	18.999	14.7	20.5

Table IV-13 shows potential capture rates for the required storage volumes from the interceptor sewer model under existing and future conditions, based on historic overflow data. For existing conditions, a 9.7 MG capacity Central storage facility would be sufficient to capture all but one historical overflow event at the Ballpark and General Tire SSO locations, equivalent to a SSO capture rate of 99 percent. A 4.0 MG facility at the Deshon pump station would have enough capacity to store 93 percent of historic overflows, and 1.0 MG of storage at the Monroe pump station would capture 76 percent of historic SSOs. The required storage for existing conditions would have sufficient volume to capture all but 13 of the largest historic overflow events.

Under future conditions, the required storage volumes from the interceptor sewer model would be adequate to contain 100 percent of historic overflows that have occurred at the Ballpark, General Tire, and Monroe SSO locations. The increased storage volume for the Deshon overflow would contain almost 94 percent of historic overflows but there would still be five historic overflow events with volumes larger than the required storage.

Between November 2007 and March 2008, the maximum overflow volume recorded at the Ballpark/General Tire SSO was 7,034 million gallons. This volume is less than the storage requirements for existing conditions from the computer model. However, the maximum overflows recorded at the Deshon and Monroe SSOs during this period both exceeded the storage requirements for existing conditions based on the computer model. The overflow at the Deshon pump station also exceeded the modeled storage requirements for future conditions. A maximum overflow volume of 5.331 million gallons was recorded at the Deshon Pump station and a maximum overflow of 1.375 million gallons was registered at the Monroe Pump Station. This information indicates that additional storage capacity is needed at the Deshon and Monroe pump station locations to eliminate SSOs under existing conditions. Total storage capacity of 6.00 million gallons at Deshon would be large enough to hold the 5.331 million gallon overflow that occurred in March 2008 and capture all but one historic overflow event. For the Monroe pump station, the 1.8 million gallon storage requirement identified by the interceptor model for future conditions is sufficient to hold the 1.375 million gallon overflow in February 2008 and capture all historic overflows.

Capacity Analyses for BASA Conveyance System

The BASA interceptor sewer model covers the following portions of the BASA conveyance system:

- Sullivan Run interceptor main branch from Alameda Park south to Connoquenessing Creek interceptor.

Table IV-13

Potential Capture Rates for Model Storage Volumes Based on Historic SSO Events

Storage Facility	Existing Conditions			Future Conditions			Volume Increase for Future Conditions
	Required Storage From Model (MG)	Capture Rate for Historic SSO Events	Number of Historic SSO Events Not Captured	Required Storage From Model (MG)	Capture Rate for Historic SSO Events	Number of Historic SSO Events Not Captured	
Central	9.7	99.2%	1	14.1	100.0%	0	45%
Deshon	4.0	92.7%	6	4.6	93.9%	5	15%
Monroe	1.0	76.0%	6	1.8	100.0%	0	80%
Totals	14.7		13	20.5		5	39%

- Sullivan Run interceptor north branch from US Route 422 south to Sullivan Run interceptor main branch.
- Connoquenessing Creek interceptor from Karns Crossing pump station southwest to BASA wastewater treatment plant.
- Force main/gravity sewer from Deshon pump station east to BASA wastewater treatment plant.
- Connoquenessing Creek interceptor north from Penn Township to BASA wastewater treatment plant.

Output from the sewer model indicates that the Sullivan Run interceptors can be overloaded under flows resulting from a 2-year design storm, under both existing and future conditions.

A separate capacity analysis was completed for sewerage facilities not included in the interceptor sewer model. This analysis examined main line sewers, pump stations, and force mains in regions situated upstream of the area included in the interceptor sewer system model. Upstream regions were broken down into smaller areas and the current number of EDUs in each area was determined using customer information from the interceptor sewer model. The number of future EDUs in each area was based on growth projections contained in the Special Studies. Sewage flows from each area were estimated using an average flow contribution of 400 gpd per EDU and a peak flow contribution of 1,000 gpd per EDU. Full-pipe sewer capacities were calculated using the Manning equation with a roughness coefficient or "n" factor of 0.013, assuming minimum grade for each line segment based on the pipe diameter.

Line segments identified as having inadequate carrying at minimum grade were further evaluated by estimating their capacities using sewer grades based on elevations from USGS maps.

Appendix G includes a map that shows the areas examined in the capacity analysis. It also contains capacity calculations for the following three scenarios:

- Existing conditions.
- Existing conditions plus current unsewered areas.
- Future conditions (20 + years).

Table IV-14 summarizes the required conveyance system improvements. The system capacity analyses indicate that one sewer segment in the Butcher Run watershed and three segments in the Sullivan Run watershed need to be upgraded to meet current capacity requirements. The locations of these sewer segments are identified in Section VI. Information for Sullivan Run is from the Interceptor sewer model. The analyses did not identify additional segments that need increased capacity to handle wastewater flows from current unsewered areas. Conveyance enhancements for future conditions include

pump upgrades at the Brewster Road and Brewster booster pump stations, as well as larger lines in the upper reaches of Sullivan Run to accommodate projected growth in Connoquenessing Township.

Table IV-14
Summary of Results from Capacity Analyses

Condition	Watershed	Area	Existing Sewer Diameter (inches)	Required Sewer Diameter (inches)	Length of Sewer Segment (LF)	Comment
Existing	Butcher Run	53	10	12	3,200	
	Sullivan Run	N/A	12/15	18	1,400	
		N/A	18	24	3,500	
		N/A	24	36	2,400	
Existing Plus Unsewered	Butcher Run	53	10	12	3,200	
	Sullivan Run	N/A	12/15	18	1,400	
		N/A	18	24	3,500	
		N/A	24	36	2,400	
Future	Butcher Run	53	10	18	3,200	
	Sullivan Run	3	10	10	N/A	See Note
		10	8	12	6,100	
		11	12	15	1,900	
		N/A	12/15	18	1,400	
		N/A	18	24	3,500	
		N/A	24	36	2,400	

Note: Increase Pump Capacity at Brewster Road and Brewster Booster Pump Stations from current 600 gpm to 1,000 gpm for future conditions.

Hydraulic Re-Rating Study

A hydraulic re-rating study of the BASA WWTP was conducted using the information contained in Section IV.B.5 of the Act 537 Sewage Facilities Planning Study Update. The purpose of re-rating the plant to a higher hydraulic capacity is to avoid a situation where the facility is considered hydraulically overloaded by the Pennsylvania DEP based on Chapter 94 criteria.

An October 2002 hydraulic analysis of the treatment facility determined that peak flows through the BASA plant are limited to 28 mgd by the capacity of the trickling filter rotary distributors. A one-year review of historical operating data demonstrated that the plant produces an excellent quality effluent across a wide range of flows and is capable of meeting applicable discharge limits even during high flow periods.

A more detailed analysis of plant treatment performance from 2003 to 2007, conducted as part of the Act 537 Plan update, demonstrated that the BASA treatment facility consistently meets the effluent limitations required by the NPDES permit during wet weather periods. A separate analysis of effluent concentrations was also conducted on days where measured wastewater flows to the BASA treatment plant exceeded 10 mgd. The high flow effluent analysis showed that the facility is capable of meeting existing effluent limitations at flow rates up to 15 mgd.

The information presented in the re-rating study supports an increase in the hydraulic capacity of the BASA wastewater treatment plant based on the historic performance of the facility. The re-rating study requests a 10 percent increase is requested in the current 10.00 mgd permitted hydraulic capacity of the facility. The re-rated facility would have a permitted hydraulic capacity of 11.00 mgd and a peak hydraulic capacity of 27.50 mgd based on a 2.50 wet weather peaking factor.

The BASA hydraulic re-rating study is included as Appendix H.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION V
ALTERNATIVES TO PROVIDE NEW OR IMPROVED WASTEWATER DISPOSAL FACILITIES

V.A.1 POTENTIAL FOR REGIONAL WASTEWATER TREATMENT ALTERNATIVES

BASA owns and operates a regional wastewater treatment facility that serves all or portions of seven municipalities in central Butler County. Regional wastewater treatment has been practiced in the study area since the 1970's and this approach will continue in the future.

V.A.2 POTENTIAL FOR EXTENSION OF EXISTING SEWAGE FACILITIES TO NEEDS AREAS

The BASA sewer system can be extended to provide public sewer service to identified needs areas. The wastewater treatment plant has sufficient capacity to serve additional customers under dry weather conditions. Portions of the sewer system exhibit capacity limitations during peak flow conditions. However, this sewage facility planning study update proposes to address these limitations through a combination of conveyance system upgrades in certain areas and the addition of flow diversion and storage facilities at identified SSO locations.

V.A.3 POTENTIAL FOR CONTINUED USE OF EXISTING SEWAGE FACILITIES THROUGH REPAIR, UPGRADING, REDUCED LOADING, IMPROVED O&M, OR OTHER ACTIONS

The BASA owned and operated wastewater treatment facility has been well maintained over the years and is not in need of any major upgrades. BASA staff continuously monitors the condition of plant equipment and makes periodic recommendations to the Authority Board for improvements when a need is recognized. The staff has identified a number of maintenance and equipment replacement projects that should be completed. These projects should continue to be funded by the normal capital improvement budget and reserves.

Portions of the sewer system do not have sufficient capacity to convey peak wastewater flows to the treatment facility, resulting in SSO discharges at several locations. Section IV.B.5 of this report identifies sewer upgrades needed to increase conveyance capacity and equalization tank volumes required to address SSOs.

The BASA system is hydraulically overloaded under wet weather peak flow conditions. Activities completed under the February 20, 2001 COA focused on reducing hydraulic loadings to the treatment plant through implementation of several large-scale sewer rehabilitation projects. The sewer rehabilitation work from the earlier COA has all been completed. Unfortunately, no discernable change in peak system flows has been observed. This result suggests that continued efforts to reduce peak hydraulic loading in the BASA system will meet with limited success. It is not anticipated that improved O&M or other actions offer significant potential to reduce peak flow rates.

V.A.4 REPAIR OR REPLACEMENT OF EXISTING COLLECTION AND CONVEYANCE SYSTEM COMPONENTS

Section IV.B.5 of this report identifies sewer upgrades needed to increase the conveyance capacity in certain parts of the BASA system. Figures VI-8 and VI-9 illustrate the locations of the identified segments in the system. Table VI-8 presents project cost estimates for the identified sewer upgrades.

V.A.5 THE NEED FOR CONSTRUCTION OF NEW COMMUNITY SEWAGE SYSTEMS INCLUDING SEWER SYSTEMS AND/OR TREATMENT FACILITIES

Exhibit IV-1 is included in a map pocket at the end of this report and identifies unsewered areas with existing development in the tributary municipalities. Costs for extending public sewers to these areas are included in Section VI.D. New treatment facilities are not needed because the existing Butler wastewater treatment plant has sufficient capacity to serve the additional customers.

V.A.6 USE OF INNOVATIVE/ALTERNATIVE METHODS OF COLLECTION/CONVEYANCE TO SERVE NEEDS AREAS

Most wastewater collection systems rely on conventional gravity sewers to the greatest extent possible. A gravity sewer system is the most basic type of community system available and is the accepted standard against which alternative systems are measured. However, the high cost of constructing gravity sewers in areas with hilly terrain or shallow bedrock has led to the development of alternative wastewater collection and conveyance systems such as pressure sewers and vacuum sewers.

Pressure sewer systems are an alternative to provide wastewater collection in areas unsuitable for gravity sewers. Pressure sewers utilize the same principle as a public water supply distribution system in reverse. Instead of a single inlet pressurization point and numerous user outlets such as a water system, pressure sewers utilize numerous inlet pressurization points and a single outlet. The on-site equipment for a pressure sewer system consists of individual grinder pump units that pump raw sewage via small

diameter pipe to a pressure main. The small diameter pressure main then typically follows a direct route along the streets to a gravity sewer, pump station, or treatment facility.

The major advantage of a pressure sewer is lower line installation cost relative to conventional gravity sewers in low population density areas or in areas with hilly terrain, shallow depth to bedrock, or a high water table. The major disadvantages of pressure sewer systems are the high capital cost for the pumping units, the high operation and maintenance costs for the on-site mechanical equipment, and the necessity of a more complex management arrangement. The capital cost for grinder pumps is added to the cost of the pressure main, which reduces the cost advantage offered by the smaller diameter pipes used in a pressure sewer system. However, use of a pressure sewer system to serve the needs areas is technically feasible.

Vacuum sewer systems utilize a central vacuum source that maintains a negative pressure of about 15 to 25 inches of mercury throughout a small diameter collection system. A gravity vacuum interface valve is located in each home's service line to separate atmospheric pressure from the vacuum within the collection system. When the valve is opened, a volume or slug of sewage enters the collection sewer followed by a volume of atmospheric air. The slug of sewage is transported along the sewer by the pressure differential until the slug breaks up and the pressure is equalized. The sewage then proceeds by gravity to the next low spot or transport pocket built into the system. This procedure is repeated until the sewage eventually arrives at a collection tank located at the central vacuum source. The wastewater in the collection tank is then pumped to a gravity sewer or to a treatment plant.

Vacuum sewers offer potential cost savings on line installation costs, similar to a pressure sewer system. However, the use of vacuum systems is limited by the operating characteristics of vacuum pumps. Information published by the United States Environmental Protection Agency (EPA) indicates that vacuum pumps are normally set to operate at 16 to 20 inches of mercury. At the minimum vacuum, 18 feet of head is available in the system. Approximately 5 feet of the head is required to operate the vacuum valves, leaving only 13 feet to transport wastewater through the system. In other words, the sum of static head plus friction loss from any point on the sewer network to the vacuum station cannot exceed 13 feet.

Topography precludes the use of vacuum sewers to serve the study area because static head requirements in the needs areas are well in excess of 13 feet. Therefore, vacuum sewers are not a feasible alternative and will not be considered further. However, pressure sewers will be evaluated as an alternative in Section VI.D of this report.

V.H NO-ACTION ALTERNATIVE INCLUDING SHORT AND LONG-TERM IMPACTS

A no-action alternative would not address current conveyance system deficiencies that cause SSOs. This lack of action would have negative short and long-term impacts on water quality because illegal overflows would continue to occur during peak wet weather conditions and pollute surface waters. The pollutants emitted by untreated discharges reduce recreational opportunities and potentially impact downstream drinking water sources. No action in addressing the identified problems would also adversely affect growth potential and economic conditions in local communities because a ban on new taps to the public sewer system would continue in the BASA service area until the overload condition is addressed. Finally, no action in addressing the current SSO problem would be in direct violation of the October 13, 2006 COA and would lead to additional fines and legal actions.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION VI
EVALUATION OF ALTERNATIVES

VI.A.1 CONSISTENCY WITH PLANS UNDER SECTIONS 4 AND 5 OF THE CLEAN STREAMS LAW OR SECTION 208 OF THE CLEAN WATER ACT

A "Comprehensive Water Quality Management Plan (COWAMP) for the Ohio Valley Study Area" was prepared for the Pennsylvania DEP in October 1979 by Green International. This plan determined the facilities, costs, and institutional arrangements to meet existing and future water quality needs of the area and was prepared as part of the overall State Water Plan. The recommended plan was for a regional treatment system for the Central Butler County Area. This 537 Plan update for the Butler Area Sewer Authority is consistent with the recommendations of the COWAMP study. The 537 Plan is also consistent with the water quality management goals and objectives of the State Water Plan, preventing further pollution of the waters of the Commonwealth and restoring presently polluted waters through development of water quality management programs that include regional waste collection and treatment systems.

VI.A.2 CONSISTENCY WITH MUNICIPAL WASTELOAD MANAGEMENT PLANS DEVELOPED UNDER PA CODE, TITLE 25, CHAPTER 94

The Municipal Wasteload Management Report for the Butler Area Sewer Authority was reviewed to determine consistency with the potential alternatives discussed in this report. The Chapter 94 report for operating year 2007 shows that the Butler sewage treatment plant itself is not hydraulically overloaded. However, the system as a whole is considered overloaded because there are active sanitary sewer overflow structures located before the headworks of the sewage treatment plant. Flow equalization facilities will be constructed in the BASA system to capture the sanitary sewer overflows. In the future, sanitary sewer overflows will be stored and subsequently treated rather than being released to Connoquenessing Creek and tributary streams.

VI.A.3 CONSISTENCY WITH PLANS UNDER TITLE II OF THE CLEAN WATER ACT OR TITLES II AND VI OF THE WATER QUALITY ACT OF 1987

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and, where attainable, to achieve a level of

water quality which provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water. Constructing flow equalization tanks will reduce or eliminate SSOs and improve water quality in area streams. Therefore, the plan is consistent with the objectives of the Clean Water Act and the Water Quality Act of 1987.

VI.A.4 CONSISTENCY WITH COMPREHENSIVE PLANS DEVELOPED UNDER THE PENNSYLVANIA MUNICIPALITIES PLANNING CODE

The proposed alternative described in this report is consistent with the goals, objectives, and other requirements of the 1997 "Butler County Comprehensive Plan."

VI.A.5 CONSISTENCY WITH ANTIDEGRADATION REQUIREMENTS CONTAINED IN PA CODE, TITLE 25, CHAPTERS 93, 95, AND 102 AND THE CLEAN WATER ACT

Inadequately treated sewage from sanitary sewer overflows can exert an oxygen demand and produce nutrient loadings that can exceed the assimilative capacity of the stream. Inadequately treated wastewater lowers dissolved oxygen concentrations in the receiving watercourse and can render affected stream reaches uninhabitable to aquatic life. Increased nutrient loadings may result in algal blooms or excessive levels of aquatic plant life, which further deplete dissolved oxygen levels, impede stream flow, produce odors, and lower the aesthetic value of the waterway.

Implementation of the proposed alternative will have a beneficial impact upon the environment within the study area. The primary impact of the proposed project will be improvement of the local environment through elimination of sanitary sewer overflows and their discharges to groundwater and surface water supplies. Public health threats posed by sewage discharges and the degradation of local water quality will be reduced or eliminated by the proposed alternatives. Elimination of these discharges will improve water quality, and the overall environmental setting of the area will be enhanced.

Secondary impacts are generally socioeconomic and include changes in the rate, density, or location of development and population growth. The proposed alternatives will remedy existing environmental problems in developed areas. As a result, there is little chance for wholesale and unregulated shifts in land use or population. Existing zoning regulations along with topography provide additional mechanisms to control growth.

Construction projects include temporary negative impacts including noise pollution, temporary traffic disruptions, and the potential creation of dust, litter, and stream siltation. Sound construction practices and soil erosion and sediment control procedures will be required by the construction contract specifications to minimize these problems. Some degree of minor environmental upset is unavoidable during the course of

construction. However, these upsets are transient and are justified by the resulting long-term environmental improvement. Construction of public sewage facilities will also require commitments of economic, energy, and land resources that realistically cannot be retrieved. Implementation of the recommended project will require expenditure of capital funds and moneys for operation of the facilities.

A minimal commitment of land resources will be required for construction of new equalization tanks and related facilities, so the proposed alternative will not have a significant impact upon land resources. It is impractical to incorporate recreational features into the facilities.

The proposed alternative in this plan represents an effective solution to existing environmental problems and provides a means of avoiding further environmental degradation. The beneficial impacts of the alternative are significant and long term in nature. The benefits outweigh the short-term adverse impacts inherent in most public works projects.

VI.A.6 CONSISTENCY WITH STATE WATER PLANS DEVELOPED UNDER THE WATER RESOURCES PLANNING ACT

The alternatives contained in this Act 537 Plan Update are consistent with the goals and objectives of the State Water Plan for Subbasin 20, Ohio River. According to the State Water Plan, water quality is one of the most critical problems facing this basin. Water quality problems in Subbasin 20, which includes the Conoquenessing Creek watershed, arise principally from discharges of municipal wastes, industrial wastes, and drainage from abandoned coal mines. The recommended alternative in this 537 Plan Update will address sanitary sewer overflows in the study area and protect the waters of the Commonwealth.

VI.A.7 CONSISTENCY WITH PENNSYLVANIA PRIME AGRICULTURAL LAND POLICY IN TITLE 4 OF THE PENNSYLVANIA CODE, CHAPTER 7, SUBCHAPTER W

The Soil Conservation Service office in Butler was contacted for information on prime farmland in Butler County. The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources. An area identified as prime farmland must be used for producing food or fiber, and must be available for these uses. By this definition, urban or built-up land areas are not classified as prime farmland.

Table VI-1 lists the soil map units in Butler County that qualify as prime farmland. Appendix I contains maps that illustrate the locations of prime farmland in the BASA member municipalities. The map for Butler Township shows that soils in and around the

Table VI-1

Butler County Prime Farmland

Map Symbol	Soil Map Unit
BeA	Braceville loam, 0 to 3 percent slopes
BeB	Braceville loam, 3 to 8 percent slopes
BuB	Buchanan loam, 3 to 8 percent slopes
CfB	Canfield silt loam, 3 to 8 percent slopes
CmB	Clymer loam, 3 to 8 percent slopes
CoA	Cookport loam, 0 to 3 percent slopes
CoB	Cookport loam, 3 to 8 percent slopes
GlB	Gilpin silt loam, 3 to 8 percent slopes
HaB	Hazleton channery loam, 3 to 8 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
Ph	Philo loam
Po	Pope loam
RaA	Ravenna silt loam, 0 to 3 percent slopes
RaB	Ravenna silt loam, 3 to 8 percent slopes
RdB	Riverhead sandy loam, 3 to 8 percent slopes
TaA	Tilsit silt loam, 0 to 3 percent slopes
TeB	Titusville silt loam, 3 to 8 percent slopes
WaA	Wharton silt loam, 0 to 3 percent slopes
WaB	Wharton silt loam, 3 to 8 percent slopes
WhA	Wheeling silt loam, 0 to 3 percent slopes
WhB	Wheeling silt loam, 3 to 8 percent slopes
WoB	Wooster gravity silt loam, 3 to 8 percent slopes

Deshon pump station is Atkins silt loam. The proposed new diversion pump station at the Deshon location will also be constructed on Atkins silt loam. The proposed flow equalization tank will be located primarily on Hazelton and Gilpin soils but part of the tank may be situated on Andover loam. None of these soils are classified as prime farmland.

The remaining diversion, pumping, and storage facilities will be situated in the City of Butler. Prime farmland in the City is limited to a few map units along the northern border where there is less development. None of the proposed construction alternatives within the City will impact areas with prime farmland. Therefore, the plan is consistent with Pennsylvania's Prime Agricultural Land Policy.

VI.A.8 CONSISTENCY WITH COUNTY STORMWATER MANAGEMENT PLANS APPROVED BY THE DEPARTMENT UNDER THE STORM WATER MANAGEMENT ACT

No Act 167 stormwater management plans have been prepared for any of the municipalities in the study area.

VI.A.9 CONSISTENCY WITH WETLAND PROTECTION UNDER PA CODE, TITLE 25, CHAPTER 105

The procedure at the Act 537 planning stage is to identify probable wetland areas using the National Wetland Inventory Map for the area and to identify mitigation measures for any encroachments on wetlands from the construction or operation of proposed wastewater facilities. The United States Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers define wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands were discussed in Section II.G of this report. One mapped wetland in the City of Butler, identified as PEMY or a semi-permanent palustrine emergent wetland, is situated in the vicinity of the proposed Monroe diversion and storage facility. However, this wetland area is located approximately 300 feet from both alternative sites for the proposed facility and will not be impacted by construction.

VI.A.10 CONSISTENCY WITH PROTECTION OF RARE, ENDANGERED OR THREATENED PLANT AND ANIMAL SPECIES AS IDENTIFIED BY THE PENNSYLVANIA NATURAL DIVERSITY INVENTORY (PNDI)

The Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry was contacted to conduct a search of the Pennsylvania Natural Diversity

Inventory (PNDI) to identify any species of concern which might be impacted by the proposed sewage facilities plan. The same information was sent for review to the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, and the US Fish and Wildlife Service. Review comments from these agencies regarding potential project impacts are included in Appendix J and are summarized below.

PNDI Search	No project impact anticipated
PA Fish & Boat Commission	No adverse impacts expected
PA Game Commission	Should not cause any adverse impacts
US Fish and Wildlife Service	No effect

VI.A.11 CONSISTENCY WITH HISTORICAL AND ARCHAEOLOGICAL RESOURCE PROTECTION UNDER P.C.S. TITLE 37, SECTION 507

A Cultural Resource Notice was completed and sent to the Pennsylvania Historical and Museum Commission (PHMC). A copy of the PHMC review letter is included in Appendix K of this report. As required by PHMC, a Phase I archaeological survey of the project area was prepared. A Historical Industrial Resource and Site Survey Form was also completed for a building on one of the properties. Copies of the PHMC review letters for these items can be found in Appendix K as well.

PHMC agreed with the findings of the Phase I report and is of the opinion that no further archaeological work is necessary for this project. The building for which the site survey form was completed is not eligible for listing in the National Register of Historic Places. Therefore, the proposed project will have no effect on historic properties.

VI.B RESOLUTION OF ANY INCONSISTENCIES

The Act 537 Sewage Facilities Planning Study Update for the Butler Area Sewer Authority complies with all applicable consistency requirements. Future consultations with the Pennsylvania Historical and Museum Commission may be required to assess the effects of individual projects on historical and archaeological resources identified by the Phase I archaeological survey. Detailed wetland delineation studies may also be required prior to construction activities in any potential wetland areas.

VI.C EVALUATION OF ALTERNATIVES RELATIVE TO WATER QUALITY STANDARDS, EFFLUENT LIMITATIONS, AND OTHER REQUIREMENTS

The alternatives identified in this report all address conveyance capacity limitations and untreated discharges resulting from SSOs. The alternatives differ somewhat in the type

and amount of new construction required. However, applicable water quality standards and effluent limitations could be met by any of the alternatives.

VI.D COST ESTIMATES FOR IDENTIFIED ALTERNATIVES

The description for this task in Part 3, General Plan Content Checklist, of Appendix I in the DEP publication "A Guide for Preparing Act 537 Update Revisions" states that the cost estimates in this section shall be limited to areas identified in the plan as needing improved sewage facilities within five years from the date of plan submission. Accordingly, this section presents cost estimates for the short-term sewer improvements identified in Sections IV and V of the report. Estimated costs for equalization tanks and related facilities were developed for both existing and future conditions to allow the incremental cost of the larger facilities to be evaluated.

Flow Equalization Tanks and Appurtenances

Budget cost estimates for aboveground flow equalization tanks were obtained from manufacturers of glass fused to steel tanks and wire-wound, prestressed concrete tanks. Glass fused to steel tanks use a factory applied silica glass coating to guard against weather and corrosion. The glass coating forms a hard, inert barrier on both the interior and exterior surfaces. Tanks are available in diameters from 11 to 204 feet and in capacities from 20,000 to over 6 million gallons. Tank covers are free span and do not require support columns. Glass fused to steel covers is available for tanks up to 31 feet in diameter, and aluminum geodesic domes are available for all tank sizes. Benefits of glass-fused-to-steel tanks include low maintenance requirements, fast construction without need for cranes or special equipment, and no need for painting over the life of the tank.

Wire-wound prestressed concrete tanks feature a continuous watertight steel diaphragm embedded in the wall and multiple layers of bonded prestress wire that hold the tank in permanent compression. Wall and dome panels are cast on site to ensure quality and minimize construction time. Tanks range in size from 100,000 gallons to 20 million gallons or more. The minimum tank diameter is 35 feet and there is no established maximum tank diameter. Tank covers can be prestressed concrete clear span domes in diameters up to 350 feet or a column supported flat concrete roof. A wire-wound prestressed concrete tank combines the water-tightness of a steel tank with the corrosion resistance of concrete to provide long-term, maintenance free storage.

Budget pricing information for Aquastore glass fused to steel tanks and Natgun wire-wound prestressed concrete tanks is contained in Appendix L. Budget prices were requested for flow equalization tanks at the Deshon pump station, the Monroe Pump Station, and a Central Storage Facility. The installed budget price estimates include

foundation work, tank erection, and testing of the completed tank. Pricing was provided for both open tanks and tanks with dome covers.

The budget prices in Appendix L were plotted on a graph to evaluate the relative costs for the two types of tank construction. The cost data produced a linear relationship between the costs for tanks of differing volumes. Figure VI-1 displays the budget prices received for glass fused to steel and wire-wound prestressed concrete tanks. Best-fit lines were added to the data points to illustrate the relative costs of glass fused to steel and wire-wound prestressed concrete tanks. Figure VI-1 shows that Aquastore tanks are more cost effective than wire-wound prestressed concrete tanks for tank capacities up to 3.25 million gallons, and prestressed concrete tanks are more cost effective for larger volumes. This figure was used to estimate costs for proposed flow equalization tanks in the BASA system.

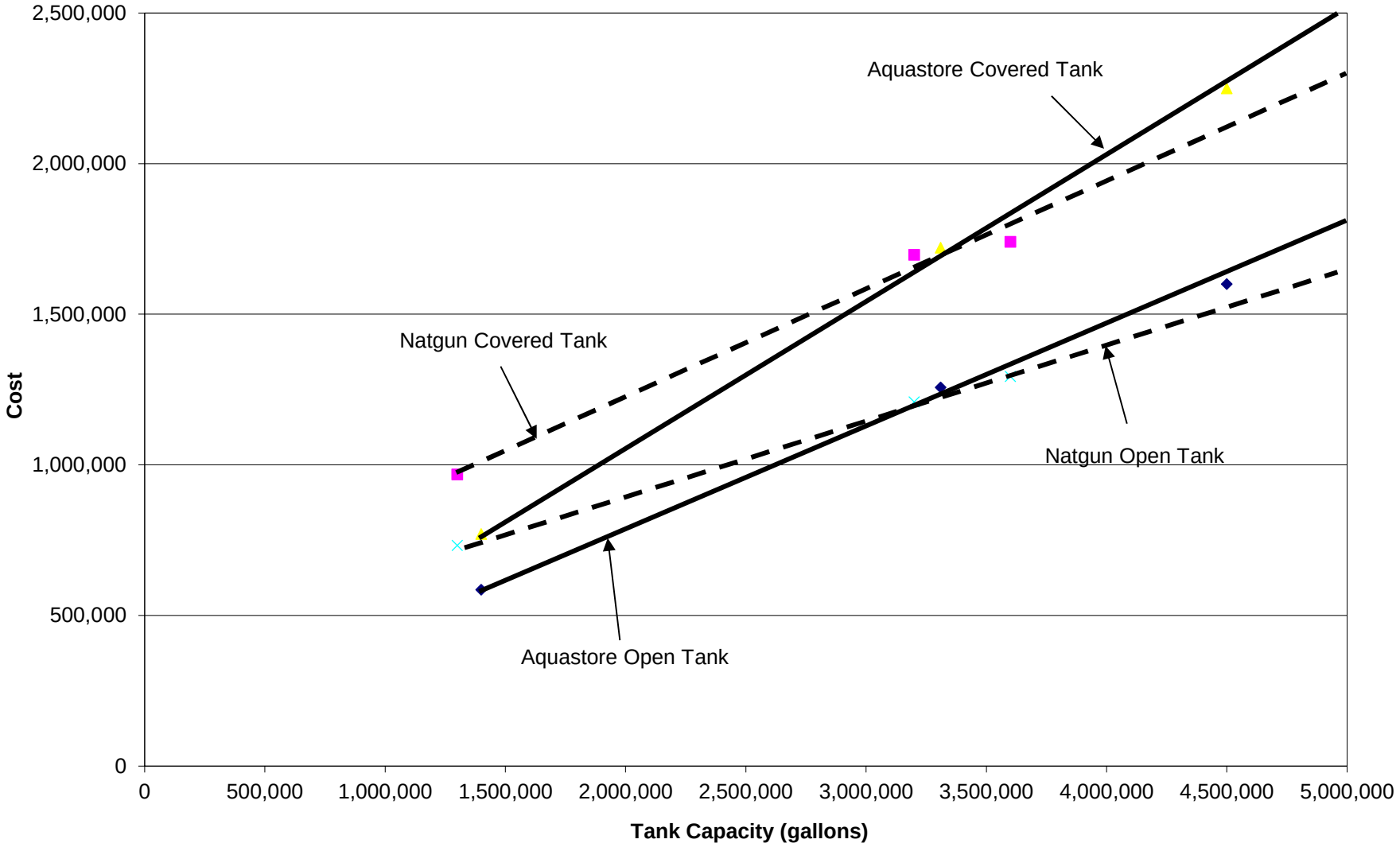
The following sections present cost estimates for flow equalization tanks and related facilities. Appendix M contains opinions of probable cost for diversion pump stations sized for existing and future conditions, along with budget quotes for submersible pumps. Costs were developed for the required tank volumes determined by the interceptor sewer model for existing and future conditions. The estimates include construction and project costs (engineering, legal, and administration) as well as land acquisition costs.

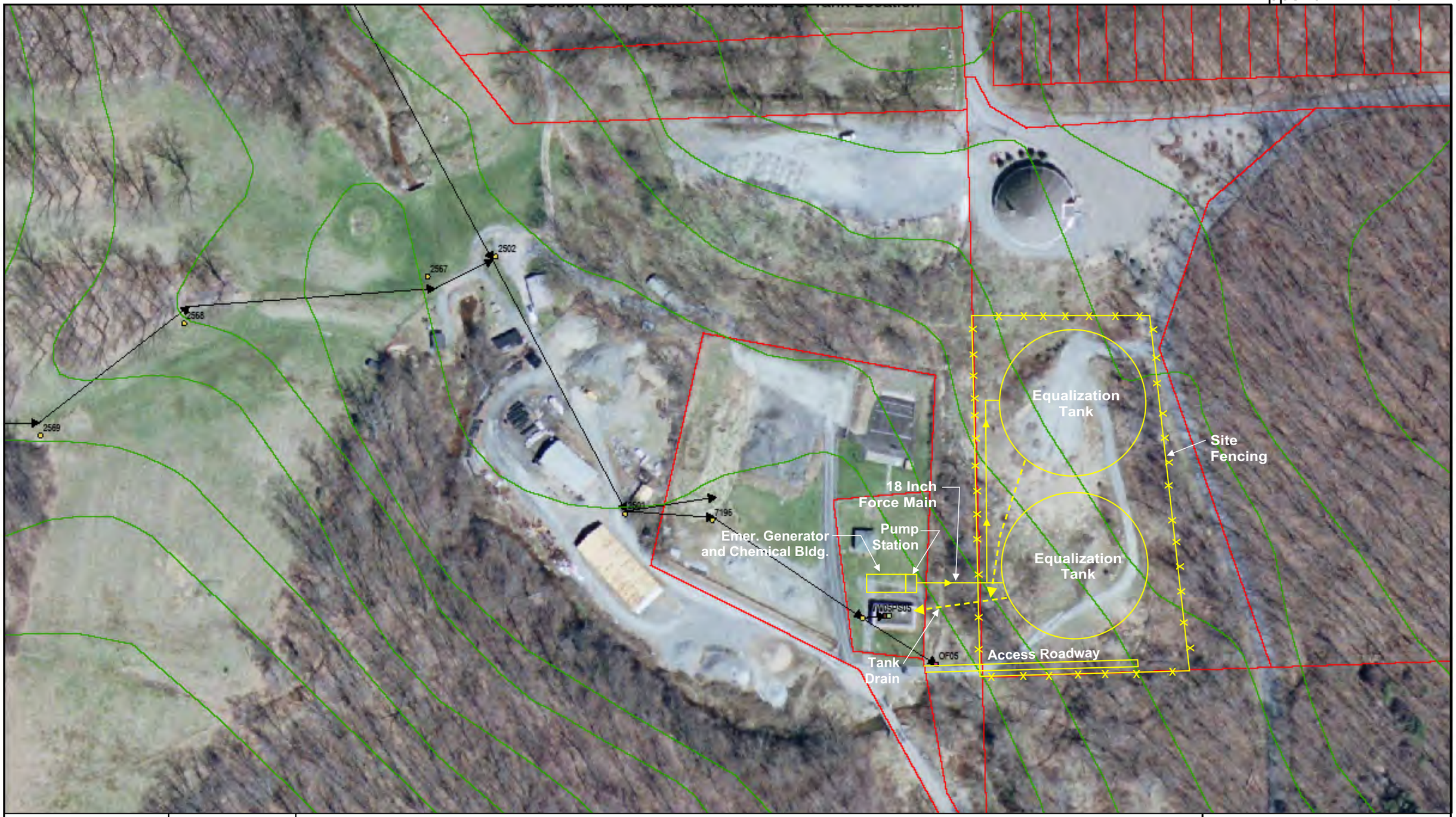
Deshon Diversion, Pumping and Storage Facilities

Figure VI-2 shows preliminary locations for proposed diversion, pumping, and storage facilities at the Deshon pump station. These facilities will include a new pump station situated next to the Deshon station, a force main from the new pump station to the covered equalization tank, and a drain line from the tank back to the existing pump station wet well. The new pump station will receive sanitary sewer overflows that exceed the capacity of the Deshon station via a connection between the existing pump station wet well and the new pump station. The new pump station will transfer the excess wastewater to the storage tank. After sewer system flows decrease, the stored wastewater will be released back to the Deshon station so it can be pumped to the BASA plant for treatment.

Table VI-2 presents cost estimates for proposed facilities at the Deshon pump station. The cost of diversion, pumping and storage facilities sized for existing conditions is estimated at $4.695 million. For future conditions, the equalization storage was increased from the 4.00 million gallon volume identified by the interceptor sewer model to 6.00 million gallons to provide sufficient capacity to store the 5.33 million gallon overflow that occurred in March 2008 at the Deshon SSO. The estimated cost for facilities sized for future conditions increases to $6.727 million, due in large part to the increased storage tank capacity. Future facilities are shown in Figure VI-2, including two equalization tanks to provide the required storage volume.

Figure VI-1
Cost Estimates for Flow Equalization Tanks





DRW. JS	Date. 1/16/09	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** VI-2	Deshon Pump Station Proposed Diversion, Pumping, and Storage Facilities	
Scale 1" = 100'			
File BASA_des2			

Table VI-2

Estimated Cost for Deshon Diversion, Pumping, and Storage Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions			
Site Work	1 LS	$240,000	$240,000
18-inch Force Main to Tank	120 LF	135	16,200
4.00 MG Capacity Covered Tank	1 EA	1,925,000	1,925,000
Chemical Building (Odor Control)	400 SF	200	80,000
18-inch Tank Drain	120 LF	110	13,200
Subtotal			2,274,400
Construction Contingency (25%)			568,600
Pump Station			1,199,000
Construction Subtotal			4,042,000
Project Costs (15%)			606,000
Land Acquisition Costs *			47,000
Total Estimated Project Cost			$4,695,000
Future Conditions			
Site Work	1 LS	360,000	360,000
20-inch Force Main to Tank	240 LF	150	36,000
3.00 MG Capacity Covered Tank	2 EA	1,574,000	3,148,000
Chemical Building (Odor Control)	400 SF	200	80,000
21-inch Tank Drain	240 LF	120	28,800
Subtotal			3,652,800
Construction Contingency (25%)			913,200
Pump Station			1,243,000
Construction Subtotal			5,809,000
Project Costs (15%)			871,000
Land Acquisition Costs *			47,000
Total Estimated Project Cost			$6,727,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation

Monroe Diversion, Pumping and Storage Facilities

Figure VI-3 illustrates locations for diversion, pumping, and storage facilities at the Monroe pump station. The proposed facilities will include a new pump station to handle excess flows, a force main from the pump station to the storage tank, a covered 1.00 million gallon capacity equalization tank, and a drain line from the tank back to the existing pump station wet well. Two alternative sites were considered for the equalization tank location. The first site is adjacent to the Monroe pump station on property currently occupied by a car wash. The other site for the equalization tank is on property situated northwest of the Monroe pump station, on the opposite side of Connoquenessing Creek. .

Table VI-3 presents estimated costs for proposed facilities at the Monroe pump station. The cost of facilities at the car wash site is estimated to be $2.044 million for existing conditions and $3.150 million for future conditions. Estimated costs for the other site are $2.408 million for facilities sized for existing conditions and $3.521 million for facilities sized for future conditions. Future facilities are shown in Figure VI-3, including two equalization tanks.

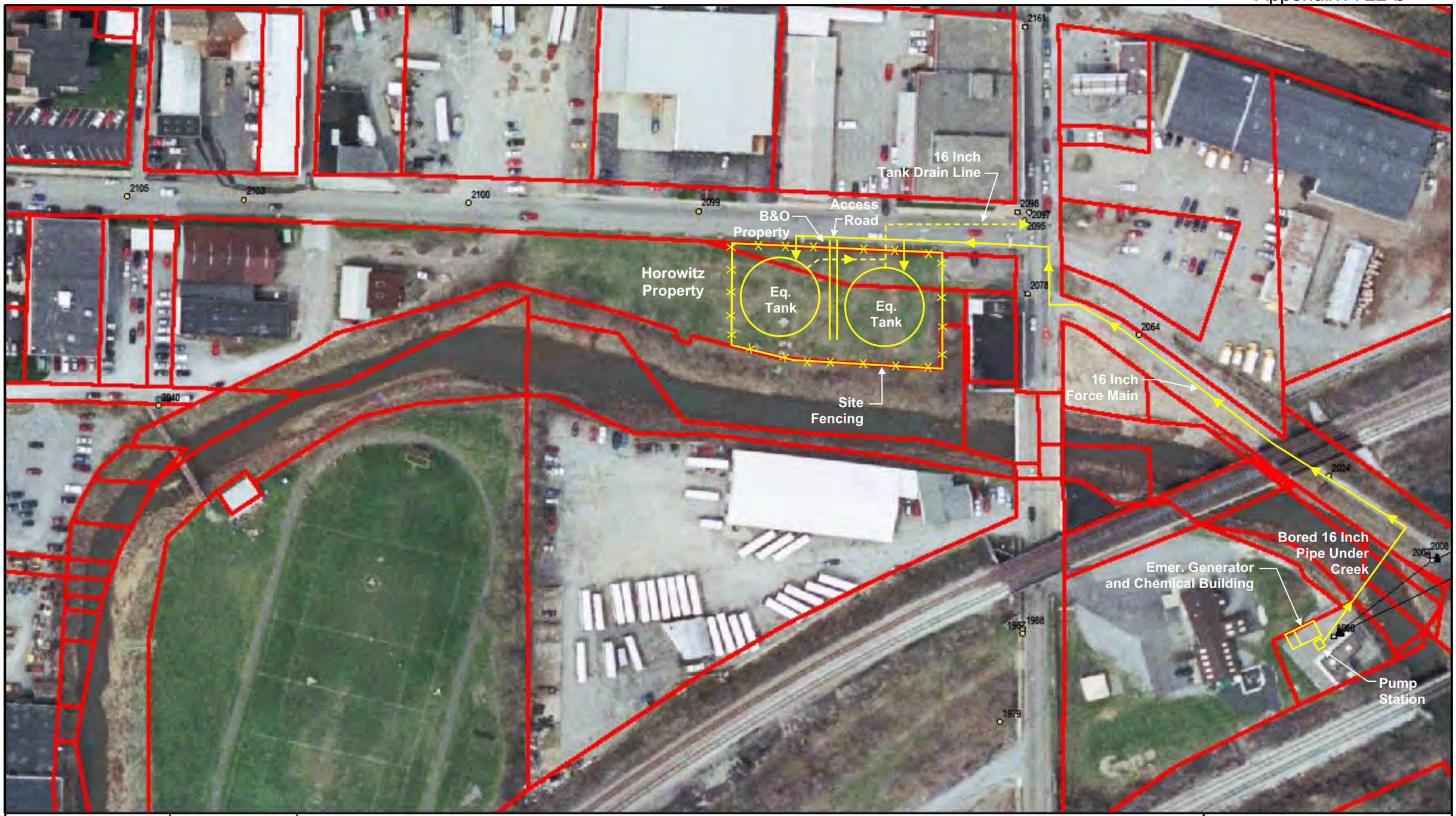
Ballpark/General Tire Diversion and Pumping Facilities

Figure VI-4 shows a layout for diversion and pumping facilities in the vicinity of the Ballpark and General Tire SSOs. Proposed facilities include a diversion structure in the vicinity of the overflows, a new pump station located on the west side of Sullivan Run, and a force main from the new pump station to the Central Storage Facility. The existing 36-inch sewer between the General Tire overflow and the diversion structure would also have to be increased to a 48-inch sewer to eliminate SSOs at the General Tire location.

Table VI-4 presents a cost estimate for facilities at the Ballpark/General Tire location. Facilities sized for existing conditions have a projected cost of $3.431 million and the cost of facilities sized for future conditions is estimated at $3.591 million. Except for differences in pipe sizes, facilities are the same for existing and future conditions.

Connoquenessing Diversion and Pumping Facilities

Figure VI-5 illustrates locations for the proposed Connoquenessing Creek diversion and pumping facilities. Facilities include two diversion structures, one on the Connoquenessing Creek interceptor and the other on the force main from the Monroe pump station. A diversion on the force main from the Monroe pump station has been added so that all flows from this part of the system can be diverted from the Connoquenessing interceptor sewer. Approximately 600 feet downstream from the



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APP. MM	**Figure** VI-3		
Scale 1" = 100'			
File BASA_Monr (2)			

Table VI-3

Estimated Cost for Monroe Diversion, Pumping, and Storage Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions - Car Wash Site			
Site Work	1 LS	$15,000	$15,000
16-inch Force Main to Tank	70 LF	120	8,400
1.00 MG Capacity Covered Tank	1 LS	588,000	588,000
Chemical Building (Odor Control)	400 SF	200	80,000
15-inch Tank Drain	90 LF	100	9,000
Subtotal			700,400
Construction Contingency (25%)			174,600
Pump Station			888,000
Construction Subtotal			1,763,000
Project Costs (15%)			264,000
Land Acquisition Costs *			17,000
Total Estimated Project Cost			2,044,000
Future Conditions - Car Wash Site			
Site Work	1 LS	22,500	22,500
18-inch Force Main to Tank	70 LF	135	9,450
1.00 MG Capacity Covered Tank	2 LS	588,000	1,176,000
Chemical Building (Odor Control)	400 SF	200	80,000
18-inch Tank Drain	90 LF	110	9,900
Subtotal			1,297,850
Construction Contingency (25%)			324,150
Pump Station			1,102,000
Construction Subtotal			2,724,000
Project Costs (15%)			409,000
Land Acquisition Costs *			17,000
Total Estimated Project Cost			$3,150,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation

Table VI-3 (continued)

Estimated Cost for Monroe Diversion, Pumping, and Storage Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions - Horewitz Property			
Site Work	1 LS	$15,000	$15,000
Bore 16-inch FM Under Creek	150 LF	650	97,500
16-inch Force Main to Tank	750 LF	120	90,000
1.00 MG Capacity Covered Tank	1 EA	588,000	588,000
Chemical Building (Odor Control)	400 SF	200	80,000
15-inch Tank Drain	200 LF	150	30,000
Subtotal			900,500
Construction Contingency (25%)			224,500
Pump Station			888,000
Construction Subtotal			2,013,000
Project Costs (15%)			302,000
Land Acquisition Costs *			93,000
Total Estimated Project Cost			2,408,000
Future Conditions - Horewitz Property			
Site Work	1 LS	22,500	22,500
Bore 18-inch FM Under Creek	150 LF	650	97,500
18-inch Force Main to Tank	750 LF	135	101,250
1.00 MG Capacity Covered Tank	2 EA	588,000	1,176,000
Chemical Building (Odor Control)	400 SF	200	80,000
18-inch Tank Drain	200 LF	130	26,000
Subtotal			1,503,250
Construction Contingency (25%)			375,750
Pump Station			1,102,000
Construction Subtotal			2,981,000
Project Costs (15%)			447,000
Land Acquisition Costs *			93,000
Total Estimated Project Cost			$3,521,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation



DRW. JS	Date. 1/15/09	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** VI-4	Ball Park / General Tire Proposed Diversion and Pumping Facilities	
Scale 1" = 100'			
File BASA_Gen			

Table VI-4

Estimated Cost for Ballpark/General Tire Diversion and Pumping Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions			
Upsize 36-inch Sewer to 48-inch	200 LF	$300	$60,000
Diversion Structure	1 LS	235,000	235,000
Bore 36-inch Line Under Creek	150 LF	1,100	165,000
Site Work	1 LS	12,000	12,000
Chemical Building (Odor Control)	400 SF	200	80,000
24-inch Force Main to Storage Tanks	2,600 LF	225	585,000
Subtotal			1,137,000
Construction Contingency (25%)			284,000
Pump Station			1,521,000
Construction Subtotal			2,942,000
Project Costs (15%)			441,000
Land Acquisition Costs *			48,000
Total Estimated Project Cost			3,431,000
Future Conditions			
Upsize 36-inch Sewer to 48-inch	200 LF	300	60,000
Diversion Structure	1 LS	235,000	235,000
Bore 36-inch Line Under Creek	150 LF	1,100	165,000
Site Work	1 LS	12,000	12,000
Chemical Building (Odor Control)	400 SF	200	80,000
30-inch Force Main to Storage Tanks	2,600 LF	250	650,000
Subtotal			1,202,000
Construction Contingency (25%)			301,000
Pump Station			1,578,000
Construction Subtotal			3,081,000
Project Costs (15%)			462,000
Land Acquisition Costs *			48,000
Total Estimated Project Cost			$3,591,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation



DRW. JS	Date. 1/16/09	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** VI-5	Connoquenessing Creek Proposed Diversion and Pumping Facilities	
Scale 1" = 100'			
File BASA_Conn			

proposed location for the diversion and pumping facilities, the Connoquenessing interceptor sewer enters a 3,000-foot long tunnel. Due to a limited number of manholes and other access restrictions, this part of the interceptor sewer has not been inspected or cleaned since it was installed more than 45 years ago. The diversion structure on the force main, along with the diversion on the interceptor sewer itself, will allow wastewater flows to be redirected from the pipeline inside the tunnel so that this sewer segment can be inspected, cleaned, and/or rehabilitated as required. The remaining item is a force main to the Central Storage Facility. A bored crossing under Connoquenessing Creek will be needed to install the force main.

Table VI-5 presents estimated costs for the proposed Connoquenessing diversion and pumping facilities. The projected cost for facilities sized for existing conditions is $3.249 million and the cost for facilities sized for future conditions is estimated at $3.671 million. The facilities for future conditions require larger pumps and force mains than for existing conditions.

Central Storage Facility

Figure VI-6 shows the locations of proposed items at the Central Storage Facility. Three tanks are needed to store the wastewater pumped from the Ballpark/General Tire and Connoquenessing diversion structures. A common pipeline will be provided to drain the tanks and transport the stored wastewater back to the Sullivan Run interceptor.

Table VI-6 presents estimated costs for the Central Storage Facility. The estimated cost for facilities sized for existing conditions is $7.794 million and the cost for facilities sized for future conditions is projected to be $10.104 million. Except for larger capacity tanks and pipelines, facilities for future conditions are the same as illustrated in Figure VI-6.

Figure VI-7 shows general locations for the wet weather flow control facilities proposed for the BASA system. Table VI-7 summarizes the total estimated cost for these facilities. The estimated cost of facilities sized for existing conditions range from $21.2 to $21.6 million depending on the site selected for facilities at the Monroe pump station. Facilities sized for future conditions have projected costs between $27.4 and $27.6 million.

Conveyance System Upgrades

Conveyance system improvements include upsizing the 10-inch sewer in the Butcher Run watershed that is closest to the BASA wastewater treatment plant. Figure VI-8 illustrates the location of the Butcher Run line segments that needs to be increased in size. Per the interceptor sewer model results, several line segments in the Sullivan Run watershed also need to be increased in size. Figure VI-9 shows the locations of these sewers in the Sullivan Run watershed. Cost estimates for conveyance system upgrades are shown in Table VI-8. The estimated cost of increasing the size of the Butcher Run sewer is

Table VI-5

Estimated Cost for Connoquenessing Diversion and Pumping Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions			
Diversion Structure on Interceptor	1 LS	$118,000	$118,000
Flow Diversion on Monroe Force Main	1 LS	95,000	95,000
Bore 24-inch FM Under Creek	250 LF	850	212,500
Site Work	1 LS	7,000	7,000
Chemical Building (Odor Control)	400 SF	200	80,000
24-inch Force Main to Storage Tanks	2,450 LF	225	551,250
Subtotal			1,063,750
Construction Contingency (25%)			266,250
Pump Station			1,438,000
Construction Subtotal			2,768,000
Project Costs (15%)			415,000
Land Acquisition Costs *			66,000
Total Estimated Project Cost			3,249,000
Future Conditions			
Diversion Structure on Interceptor	1 LS	118,000	118,000
Flow Diversion on Monroe Force Main	1 LS	95,000	95,000
Bore 30-inch FM Under Creek	250 LF	1,200	300,000
Site Work	1 LS	7,000	7,000
Chemical Building (Odor Control)	400 SF	200	80,000
30-inch Force Main to Storage Tanks	2,450 LF	250	612,500
Subtotal			1,212,500
Construction Contingency (25%)			302,500
Pump Station			1,620,000
Construction Subtotal			3,135,000
Project Costs (15%)			470,000
Land Acquisition Costs *			66,000
Total Estimated Project Cost			$3,671,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation



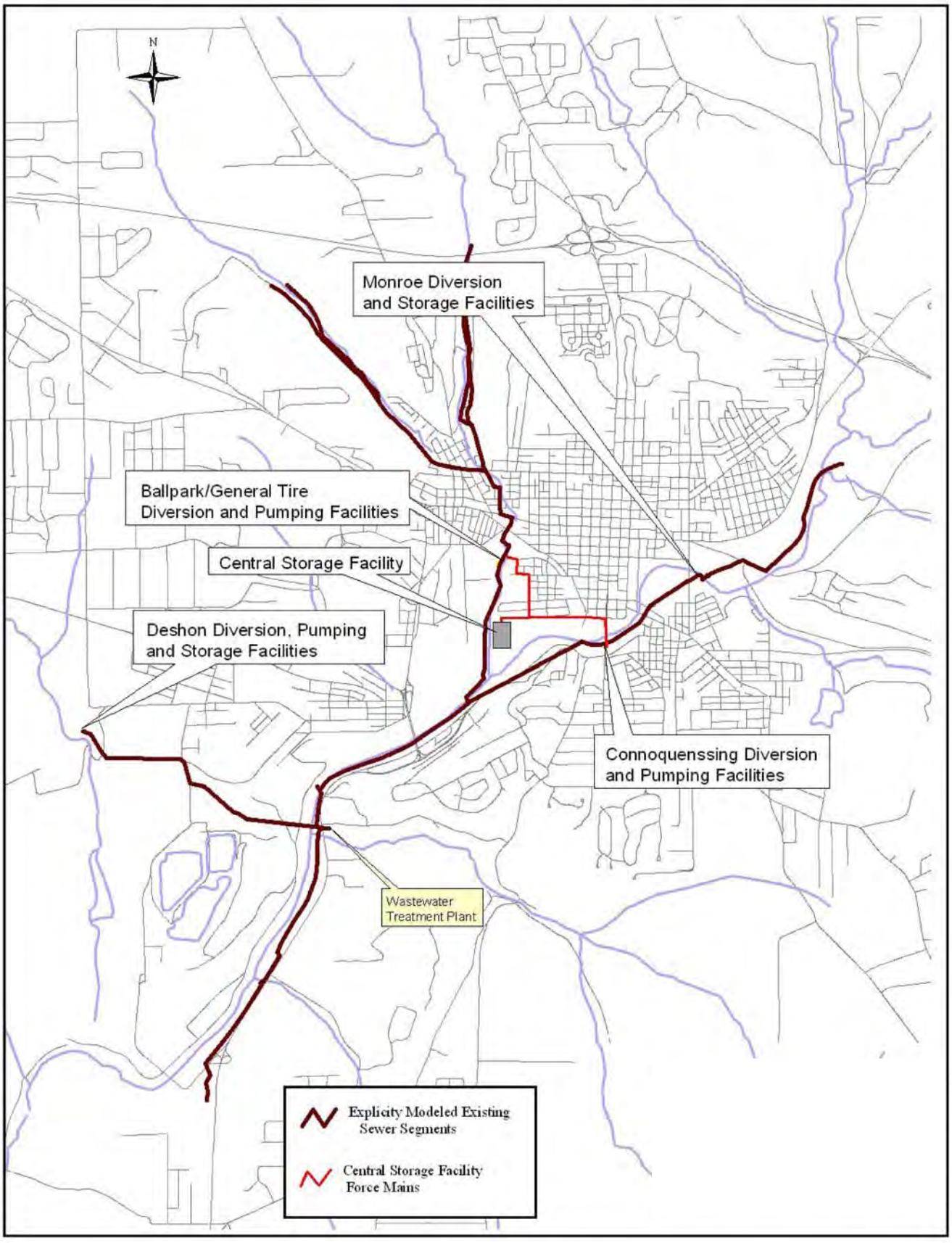
DRW. JS	Date. 1/16/09	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure**	Proposed Central Storage Facilities	
Scale 1" = 100'	VI-6		
File BASA_Cent			

Table VI-6

Estimated Cost for Central Storage Facilities

Description	Estimated Quantity	Unit Cost	Total Cost
Existing Conditions			
Site Work	1 LS	$39,000	$39,000
3.25 MG Capacity Covered Tank	3 EA	1,656,000	4,968,000
36-inch Tank Drain	900 LF	250	225,000
Construction Subtotal			5,232,000
Construction Contingency (25%)			1,308,000
Project Costs (15%)			981,000
Land Acquisition Costs *			273,000
Total Estimated Project Cost			7,794,000
Future Conditions			
Site Work	1 LS	58,500	58,500
4.70 MG Capacity Covered Tank	3 EA	2,170,000	6,510,000
48-inch Tank Drain	900 LF	300	270,000
Construction Subtotal			6,838,500
Construction Contingency (25%)			1,710,500
Project Costs (15%)			1,282,000
Land Acquisition Costs *			273,000
Total Estimated Project Cost			$10,104,000

* Includes Property Appraisal, Survey, Site Assessment, Monitoring, and Remediation



DRW BY:	CHK BY:	Scale	Date	File
JS	MM		5/12/08	BUT_flow

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Figure VI-7

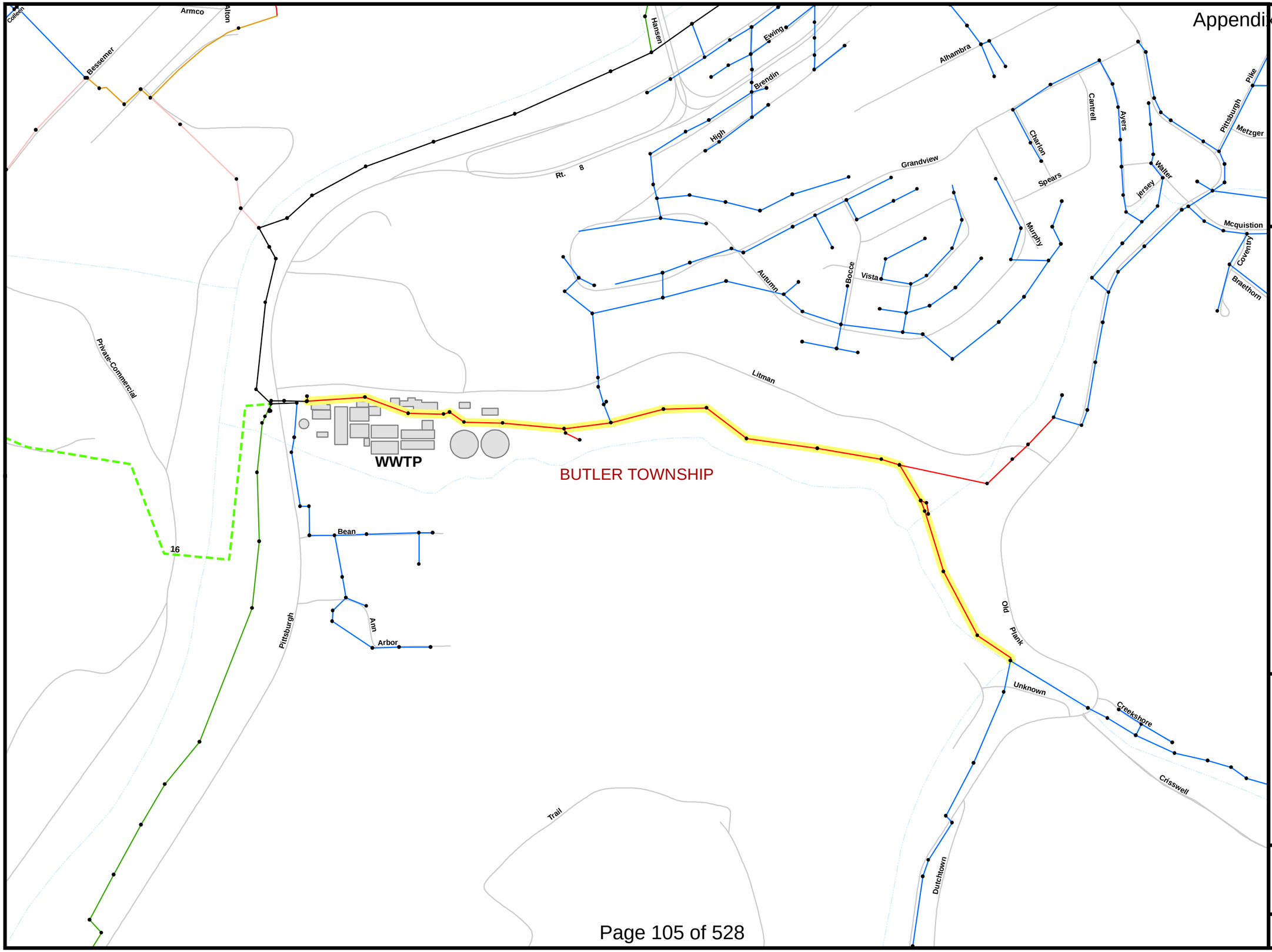
General Locations of Wet Weather Flow Control Facilities

Table VI-7

Total Estimated Cost for Diversion, Pumping, and Storage Facilities

Facility Description	Existing Conditions	Future Conditions	Extra Cost for Larger Facilities
Deshon Diversion, Pumping and Storage	$4,695,000	$6,727,000	$2,032,000
Monroe Diversion, Pumping and Storage - Car Wash Property	2,044,000	3,150,000	1,106,000
Monroe Diversion, Pumping and Storage - Horewitz Property	2,408,000	3,521,000	1,113,000
Ballpark/General Tire Diversion and Pumping	3,431,000	3,591,000	160,000
Connoquenessing Diversion and Pumping	3,249,000	3,671,000	422,000
Central Storage	7,794,000	10,104,000	2,310,000
Total Estimated Cost (1)	21,213,000	27,243,000	6,030,000
Total Estimated Cost (2)	$21,577,000	$27,614,000	$6,037,000

(1) Monroe Facilities Constructed on Car Wash Property
(2) Monroe Facilities Constructed on Horewitz Property



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BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-8

REQUIRED SEWER UPGRADES IN BUTCHER RUN WATERSHED

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Future Upgrades
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch = 500 feet

0 130 260 520 Feet

BUTLER COUNTY

PROJECT: 07-0555-MC-A T. 99
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DATE: 04/16/08
FILE:
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CHESTER ENGINEERS

BUTLER TOWNSHIP

BUTLER TOWNSHIP

CITY OF BUTLER

Merritt
Remil
Barracks
W
Butler
Campus
City
Fairground
Private-Commercial
Atglen
Wren
Hilltop
Sullivan
Fern
Maharg
Penn
Dubois
Maryland
Carnegie
Rose
Mercer
Wick
Memorial
Miller
Wood
Pine
Watson
Sterling
Cleveland
Columbia
13th
11th
Shweppe
Red
Ridge
Polard
Whitmire
American
Goldwood
Knox
8th
McGeary
Gibson
Wylie
5th
4th
Ballpark
3rd
2nd
Fillmore
Pillow
Dumbaugh
Snyder
Hayes
New
Castle
Hansen
Geneva
Cecelia
CDC
Bantam
Olive
Mitchell
Stanford
State
Wilson
Broad
Federal
Brendin
McKinley
Dr
Bredin
Northside
Unknown
Alley
N
Haley
Bluff
Amy
Church
Walnut
Washington
Brady
Jackson
Main
Shore
Taft
Madison
Walsh
Race
Diamond
Ballpark SSO
Diamond St PS
6
General Tire SSO

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BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-9

REQUIRED SEWER UPGRADES IN SULLIVAN RUN WATERSHED

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Future Upgrades
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch = 500 feet

0 100 200 300 400 500 Feet

BUTLER COUNTY

PROJECT: 07-0555-MC-A T. 99
MAP: STOCK
DATE: 04/16/08
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Table VI-8

Estimated Costs for Conveyance System Upgrades

Watershed	Description	Estimated Quantity	Unit Cost	Total Cost
Butcher Run	12-inch gravity sewer	3,200 L.F.	100	320,000
	Manholes	10 EA	3,000	30,000
	Construction Subtotal			350,000
	Construction Contingency (25%)			88,000
	Project Costs (15%)			66,000
	Estimated Project Cost			504,000
Sullivan Run	18-inch gravity sewer	1,400 L.F.	125	175,000
	24-inch gravity sewer	3,500 L.F.	150	525,000
	30-inch gravity sewer	650 L.F.	200	130,000
	36-inch gravity sewer	2,400 L.F.	250	600,000
	Manholes	38 EA	4,000	152,000
	Construction Subtotal			1,582,000
	Construction Contingency (25%)			396,000
	Project Costs (15%)			297,000
	Estimated Project Cost			2,275,000
Total Estimated Project Cost for Conveyance System Upgrades				$2,779,000

$504,000 and the cost for the Sullivan Run sewer upgrades are estimated to be $2.28 million. The total estimated cost for sewer system upgrades is $2.78 million.

Service to Unsewered Areas With Existing Development

Cost estimates were prepared for extending public sewer service to areas with existing development when information on the location of unsewered areas was provided in the Special Study for a community. The Special Studies for the City of Butler and Butler Township did not identify specific locations for existing unsewered EDUs, so cost estimates were not developed for extending service to unsewered areas in these municipalities. Probable costs for extending service to identified areas in the other municipalities are presented below.

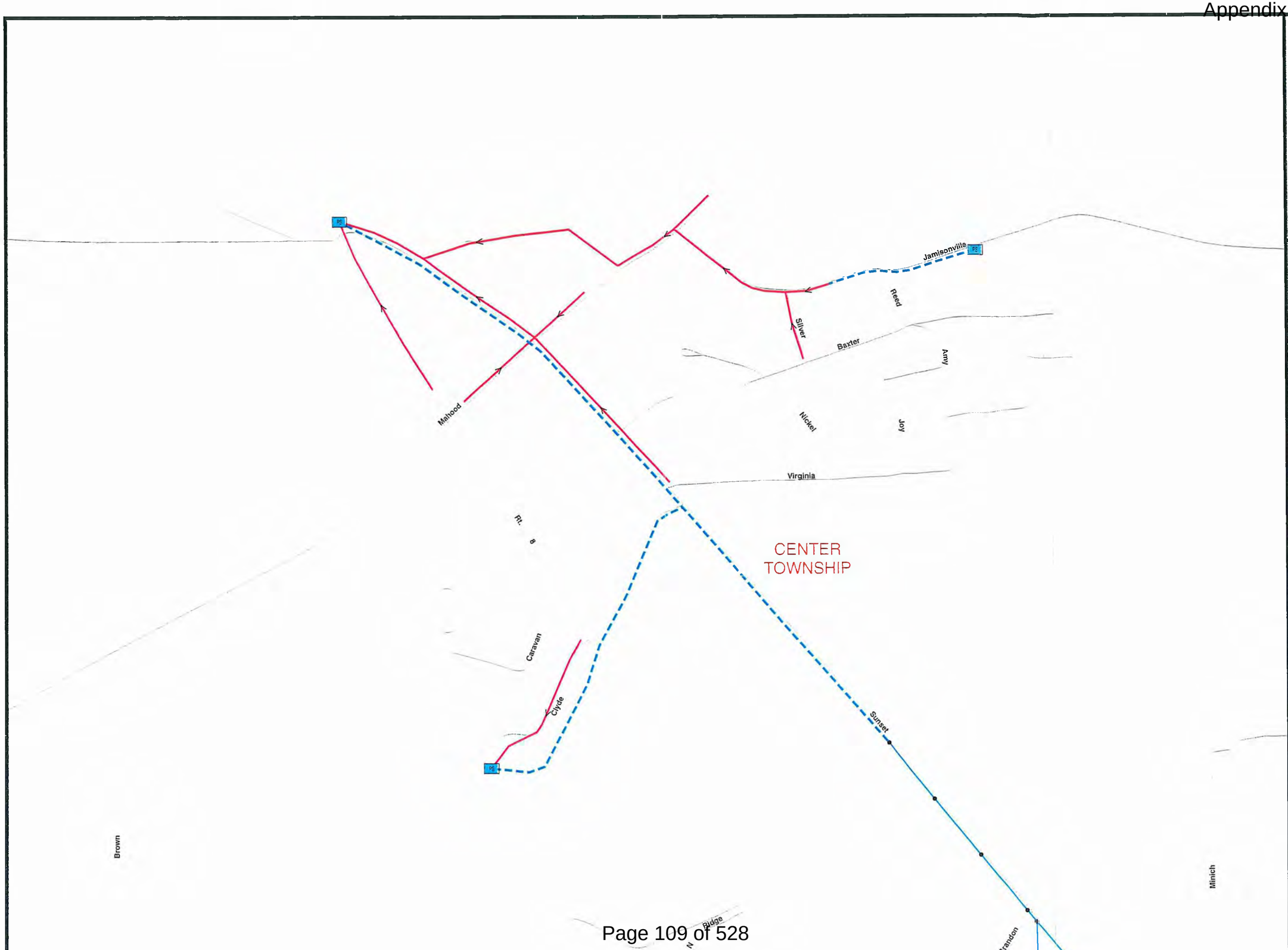
Unit installation costs for gravity sewer construction are based on average prices from the three lowest bidders for an April 2007 project in southwestern Pennsylvania. Estimated installation costs for submersible grinder pump stations and force mains are from a February 2004 project in northwestern Pennsylvania. Costs for individual grinder pump installations and pressure sewer lines are also from this project. Due to the time that has elapsed since the project was bid, costs for the components from this project were trended to April 2008 price levels using the Engineering New-Record Construction Cost Index.

All cost estimates include a 25 percent construction contingency to account for items not identified during the planning process that may be needed during construction. A 15 percent allowance was also included for project costs (engineering, legal, administration).

Center Township

The Special Study for Center Township identified five areas in the community with existing development that are not currently served by public sewers. Descriptions of each area and estimated costs for extending sewers to these areas are presented below.

Area 1 is situated at the juncture of the Swamp Run, Stone Run, Little Connoquenessing Creek, and Sullivan Run watersheds. Existing development includes the village of Uniondale as well as the Baxter Mobile Home Park and the Caravan Court Mobile Home Park. Both mobile home parks are currently served by privately owned and operated sewage treatment facilities. If public sewers were extended into this area, it is assumed that the sewage treatment plants at the mobile home parks would be abandoned, as required by Township ordinance. Multiple pump stations and force mains would be required to serve this area. New gravity collection sewers would also be needed to serve areas outside the mobile home parks. Figure VI-10 illustrates the sewerage facilities needed to serve Area 1 and Table VI-9 presents a cost estimate to serve the estimated 200 existing EDUs in this area. The total cost for extending public sewers to Area 1 is estimated at $2.396 million, an average cost of $11,980 per EDU. Assuming a 20-year



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BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-10

CENTER TOWNSHIP AREA 1

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Proposed PS
- Proposed Force
- Proposed Gravity Line
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch equals 500 feet

0 100 200 300 400 500 Feet

BUTLER COUNTY

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DATE: 04/16/08
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Table VI-9

Cost Estimate to Serve Existing Unsewered EDUs in Center Township
Area 1 - Gravity Sewers and Pump Stations

Area	Description	Quantity	Unit Cost	Total Cost
Baxter MHP	4-inch force main	900 LF	$60	$54,000
	Pump Station	1 LS	120,000	120,000
Caravan Court	8-inch gravity sewer	1,000 LF	70	70,000
	Manholes	3 EA	2,500	7,500
	6-inch service sewers	500 LF	55	27,500
	3-inch force main	1,800 LF	50	90,000
	Pump Station	1 LS	52,000	52,000
Unionville	8-inch gravity sewer	7,700 LF	70	539,000
	Manholes	22 EA	2,500	55,000
	6-inch service sewers	2,950 LF	55	162,250
	6-inch force main	4,200 LF	70	294,000
	Pump Station	1 LS	240,000	240,000
Total Estimated Construction Cost				1,711,250
Construction Contingency (25%)				427,750
Project Costs (15%)				257,000
Total Estimated Project Cost				2,396,000
Current Number of Unsewered EDUs				200
Average Cost per EDU				11,980
Monthly Cost for Loan Repayment *				$66.72

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate

PENNVEST loan at the current interest rate for Butler County, the monthly cost for repaying the loan amount would be about $67 per EDU.

Area 2 is situated along Mercer Road between Route 8 and Brewster Road and includes an estimated 10 unsewered EDUs. Because of the undulating topography along Mercer Road, this area could best be served by a pressure sewer system with individual grinder pump installations at each customer location. Table VI-10 presents a cost estimate for constructing a pressure sewer system to serve the Mercer Road area. Figure VI-11 shows the location of the potential facilities. The total cost for extending public sewers to Area 2 is estimated at $246,000, an average cost of $24,600 per unsewered EDU. Assuming a 20-year PENNVEST loan, the monthly cost of repaying the loan would be approximately $137 per EDU.

Area 3 along North Duffy Road contains approximately 50 unsewered EDUs. Table VI-11 presents a cost estimate for a pressure sewer system to serve Area 3 and Figure VI-12 illustrates the location of the potential pressure sewer system. The projected cost for extending service to Area 3 is $1.121 million. The average project cost of $22,420 per unsewered EDU would have as associated monthly cost of $125 per EDU to retire the loan, assuming a 20-year PENNVEST loan. Gravity sewers have been looked at in the past to serve this area.

Area 4 consists of the village of Onieda in the southeast portion of the Township. This area includes about 45 EDUs. Cost estimates were developed for two alternatives to serve the area. Alternative 1 is a pressure sewer system and Alternative 2 is a gravity sewer system with a pump station to transfer the wastewater to the existing BASA sewer system. Table VI-12 presents cost estimates for the two alternatives. Figure VI-13 shows the potential locations for these sewerage facilities. Costs for the two systems are comparable, with the estimated $917,000 cost for a pressure sewer system being about $30,000 higher than the other alternative. The monthly loan repayment cost for pressure sewers is estimated at $113 per EDU. The loan repayment for a gravity sewer system and pump station is slightly less at $110 per month per EDU.

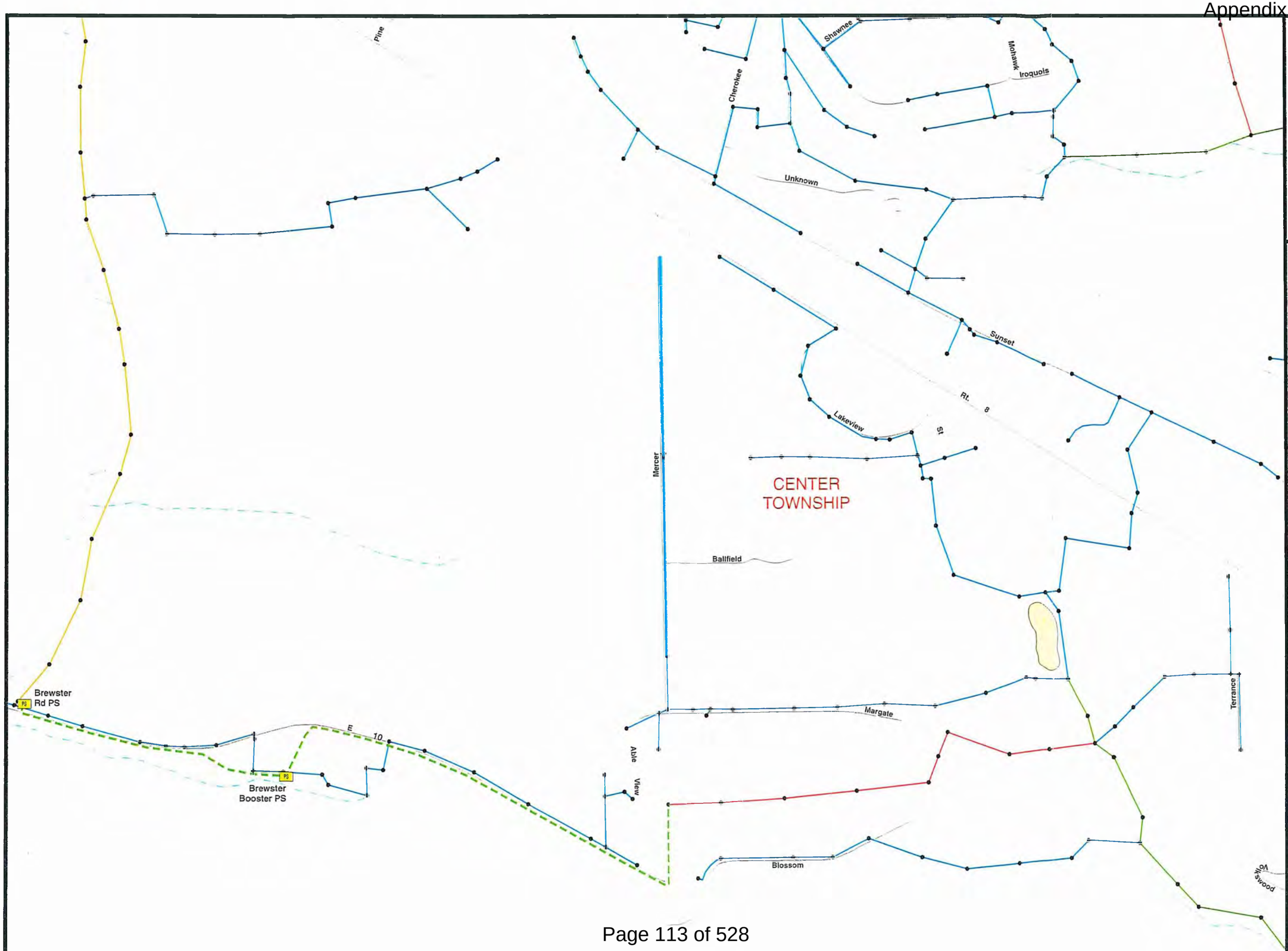
Area 5 includes about 10 unsewered EDUs in the vicinity of Morgan Road. This area could be served by a gravity sewer extension to the BASA Connoquenessing Creek interceptor. Table VI-13 presents a cost estimate to extend serve to this area and Figure VI-14 shows the location of the sewerage facilities needed to serve this area. The $163,000 total estimated project cost reduces to an average cost of $16,300 per EDU and a monthly loan repayment of $91 per EDU.

Table VI-10

Cost Estimate to Serve Existing Unsewered EDUs in Center Township
Area 2 (Mercer Road) - Pressure Sewers

Description	Quantity	Unit Cost	Total Cost
2-inch force main	2,000 LF	45	90,000
1.5-inch service sewer	500 LF	45	22,500
Grinder pump installations	10 EA	8,500	85,000
Total Estimated Construction Cost			197,500
Construction Contingency (25%)			48,500
Project Costs (15%)			30,000
Total Estimated Project Cost			246,000
Current Number of Unsewered EDUs			10
Average Cost per EDU			24,600
Monthly Cost for Loan Repayment *			$137.00

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate



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BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-11

CENTER TOWNSHIP AREA 2

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Proposed Pressure Sewer
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

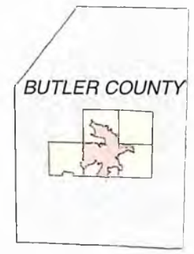
PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch equals 500 feet

0 100 200 300 400 500 Feet



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Table VI-11

Cost Estimate to Serve Existing Unsewered EDUs in Center Township
Area 3 (North Duffy Road) - Pressure Sewers

Description	Quantity	Unit Cost	Total Cost
3-inch force main	7,200 LF	$50	$360,000
1.5-inch service sewer	2,500 LF	45	112,500
Grinder pump installations	50 EA	8,500	425,000
Total Estimated Construction Cost			897,500
Construction Contingency (25%)			223,500
Project Costs (15%)			135,000
Total Estimated Project Cost			1,121,000
Current Number of Unsewered EDUs			50
Average Cost per EDU			22,420
Monthly Cost for Loan Repayment *			$124.86

* Assumes 20-year PENNVEST Loan 3.05% interest rate

BASA

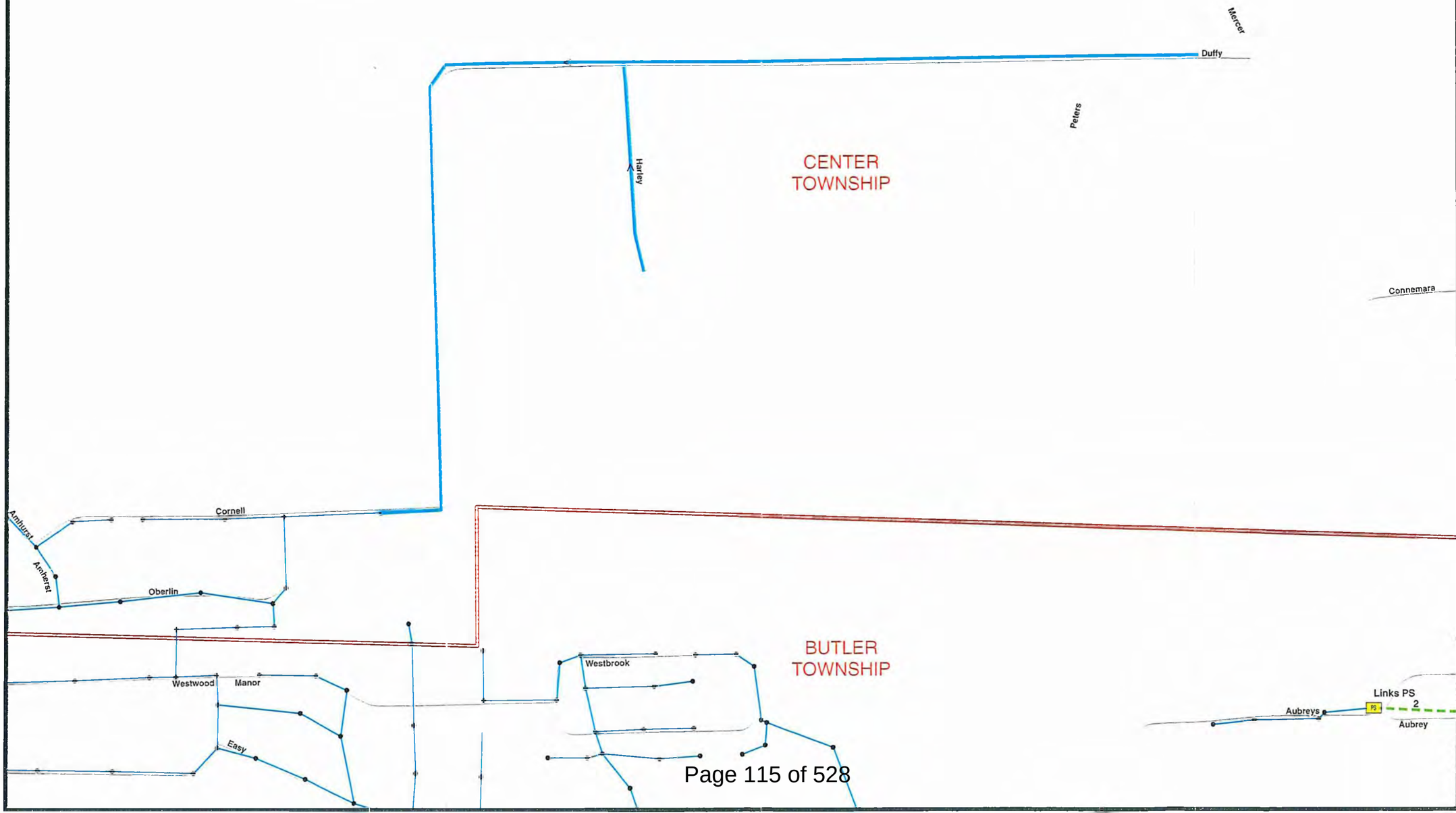
BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-12

CENTER TOWNSHIP AREA 3

APRIL 2008



- Sewer Structures
- Pump Stations
- SSO
- Proposed Pressure Sewers
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

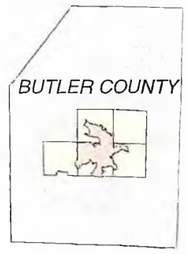
PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch equals 500 feet

0 100 200 300 400 500 Feet



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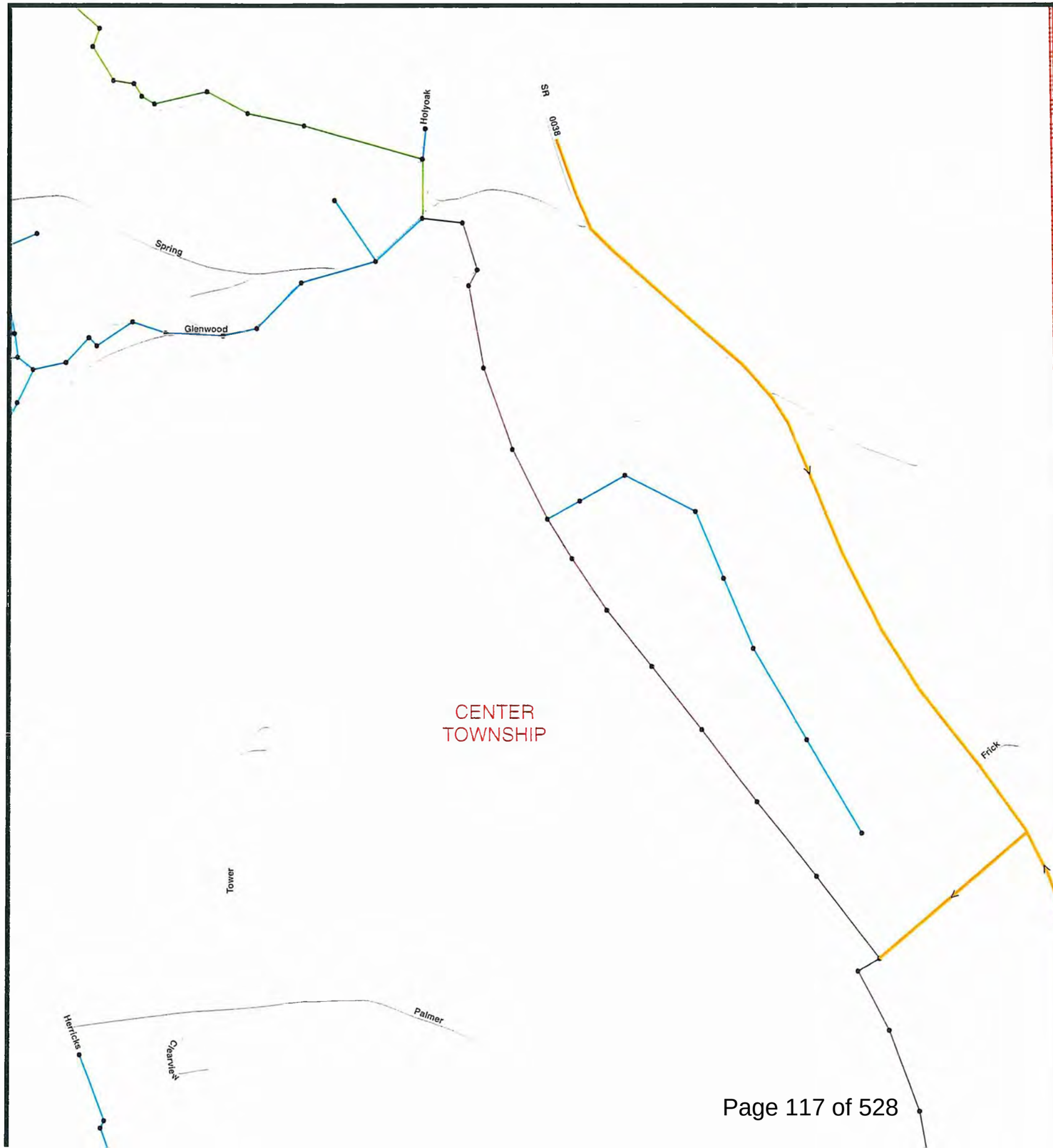
Table VI-12

Cost Estimate to Serve Existing Unsewered EDUs in Center Township
Area 4 (Oneida)

Alternative 1 - Pressure Sewers			
Description	Quantity	Unit Cost	Total Cost
3-inch force main	5,000 LF	$50	$250,000
1.5-inch service sewer	2,250 LF	45	101,250
Grinder pump installations	45 EA	8,500	382,500
Total Estimated Construction Cost			733,750
Construction Contingency (25%)			183,250
Project Costs (15%)			110,000
Total Estimated Project Cost			917,000
Current Number of Unsewered EDUs			45
Average Cost per EDU			20,378
Monthly Cost for Loan Repayment *			$113.48

Alternative 2 - Gravity Sewers and Pump Station			
Description	Quantity	Unit Cost	Total Cost
8-inch gravity sewer	4,200 LF	$70	$294,000
Manholes	12 EA	2,500	30,000
6-inch service sewers	2,250 LF	55	123,750
3-inch force main	4,200 LF	50	210,000
Pump Station	1 LS	52,000	52,000
Total Estimated Construction Cost			709,750
Construction Contingency (25%)			177,250
Project Costs (15%)			106,000
Total Estimated Project Cost			887,000
Current Number of Unsewered EDUs			45
Average Cost per EDU			19,711
Monthly Cost for Loan Repayment *			$109.77

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate



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BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-13

CENTER TOWNSHIP AREA 4

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Proposed Sewer Facilities
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	45"

N

1 inch equals 500 feet

0 120 240 360 480 600 Fe

BUTLER COUNTY

PROJECT: 07-0555-MC-A.T. 93
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DATE: 04/16/08
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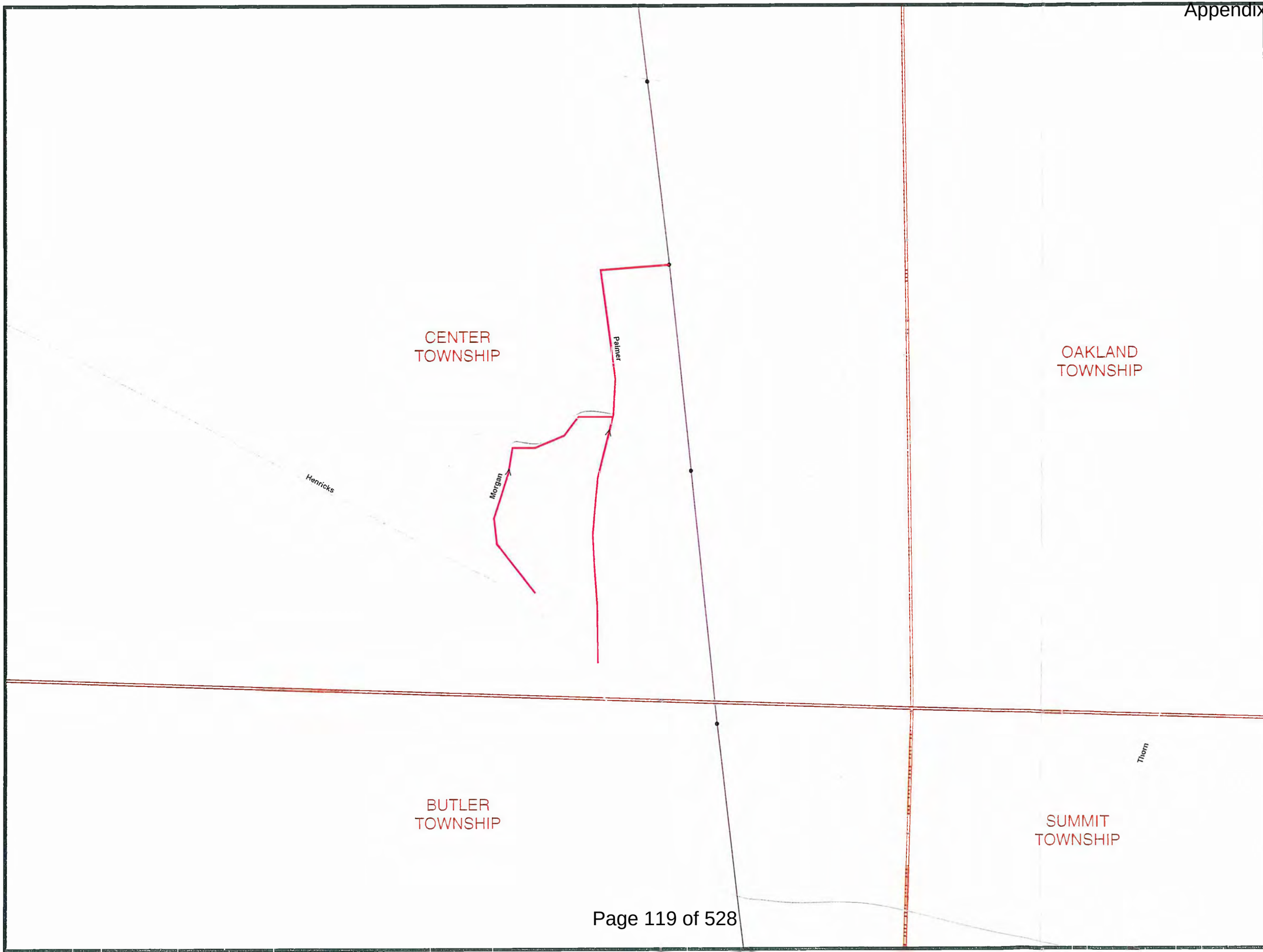
CHESTER ENGINEERS

Table VI-13

Cost Estimate to Serve Existing Unsewered EDUs in Center Township
Area 5 (Morgan Lane) - Gravity Sewers

Description	Quantity	Unit Cost	Total Cost
8-inch gravity sewer	1,250 LF	$70	$87,500
Manholes	6 EA	2,500	15,000
6-inch service sewers	500 LF	55	27,500
Total Estimated Construction Cost			130,000
Construction Contingency (25%)			33,000
Project Costs (15%)			20,000
Total Estimated Project Cost			163,000
Current Number of Unsewered EDUs			10
Average Cost per EDU			16,300
Monthly Cost for Loan Repayment *			$90.78

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate



BASA

BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-14

CENTER TOWNSHIP AREA 5

APRIL 2008

- Sewer Structures
- Pump Stations
- SSO
- Proposed Gravity Line
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch equals 200 feet

0 100 200 Feet

BUTLER COUNTY

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Connoquenessing Township

The Special Study for Connoquenessing Township provided information on three future service areas in the municipality. Numbers of existing and potential future sewer customers were provided for each area, but the locations of current and future EDUs were not provided for Area C. It was not possible to locate the EDUs in Area C based on the information provided. Therefore, no cost estimates were developed for extending service to Area C.

Future Service Area A, the Winterwood Drive area, contains 20 existing EDUs. The Special Study described the proposed sewerage facilities for the area as being a pressure sewer system with individual grinder pumps and a connection to the closest BASA manhole located to the east of the development. Connoquenessing Township has developed a project to provide service to Area A. Table VI-14 presents a cost estimate for constructing a pressure sewer system. The Township's consulting engineer prepared this estimate in July 2008. Tap fee revenue in the amount of $190,000 is to be deducted from the $444,558 estimated project cost. The outstanding project cost of $254,558 to be financed is equivalent to an average cost of $12,729. The monthly cost for repaying this amount, assuming a 20-year PENNVEST loan, would be about $71 per EDU.

Future Service Area B is located in the northeast part of the Township and includes the Golden L Mobile Home Park, with 32 existing EDUs. Half of the mobile home park is located in Connoquenessing Township and the other half is situated in Franklin Township. This area is located beyond the current BASA service area and the collected wastewater would have to be pumped to BASA. Table VI-15 presents cost estimates for two sewerage alternatives for Area B. Installation of gravity sewers and a pump station appears to be the low cost option for providing sewer service to Area B because the estimated $513,000 project cost is over $200,000 less than the cost of installing a pressure sewer system with individual grinder pumps. The average construction cost of $16,031 per EDU for gravity sewers and a pump station reduces to a monthly loan repayment of $89 per EDU.

Figure VI-15 illustrates potential locations for sewerage facilities to serve Future Service Areas A and B in Connoquenessing Township.

East Butler Borough

The Special Study for East Butler Borough identified three areas in the municipality with unsewered customers. An estimated six EDUs are located on Grant Avenue, another six EDUs are situated along Eyth Road, and one EDU is located on 6th Street. Figure VI-16 illustrates the locations of sewerage facilities needed to serve these areas and Table VI-16

Table VI-14

Cost Estimate to Serve Existing Unsewered EDUs in Connoquenessing Township
Area A (Winterwood Drive) - Pressure Sewers *

Description	Quantity	Unit Cost	Total Cost
Small Diameter Pressure Sewer	2,703 LF	$29	$78,387
8" PVC Sewer	58 LF	78	4,524
Grinder Pump System	20 EA	7,000	140,000
Pressure Sewer Service - Long	8 EA	1,300	10,400
Pressure Sewer Service - Short	15 EA	900	13,500
Concrete Encasement	35 LF	75	2,625
Small Diameter F.M. Testing	2,703 LF	1	2,703
Select Backfill	550 CY	32	17,600
Clean-out Manholes	6 EA	2,500	15,000
Manhole With PVC Liner	1 EA	5,000	5,000
Air Release Valve w/Manhole	1 EA	3,500	3,500
Tie-in Connection	1 EA	2,000	2,000
Township Road Restoration	430 LF	60	25,800
Concrete Driveway	28 SY	85	2,380
Asphalt Driveway	120 LF	55	6,600
Filter Fence/Straw Bale Barrier	2,050 LF	3	5,125
Exploratory Excavation	8 EA	500	4,000
Mobilization/Demobilization	1 LS	10,000	10,000
Subtotal			349,144
Construction Contingency (10%)			34,914
Project Costs (Engineering, Township, Legal)			60,500
Total Estimated Project Cost			444,558
Connoquenessing Tap Fee Revenue			190,000
Total Outstanding Project Cost			$254,558

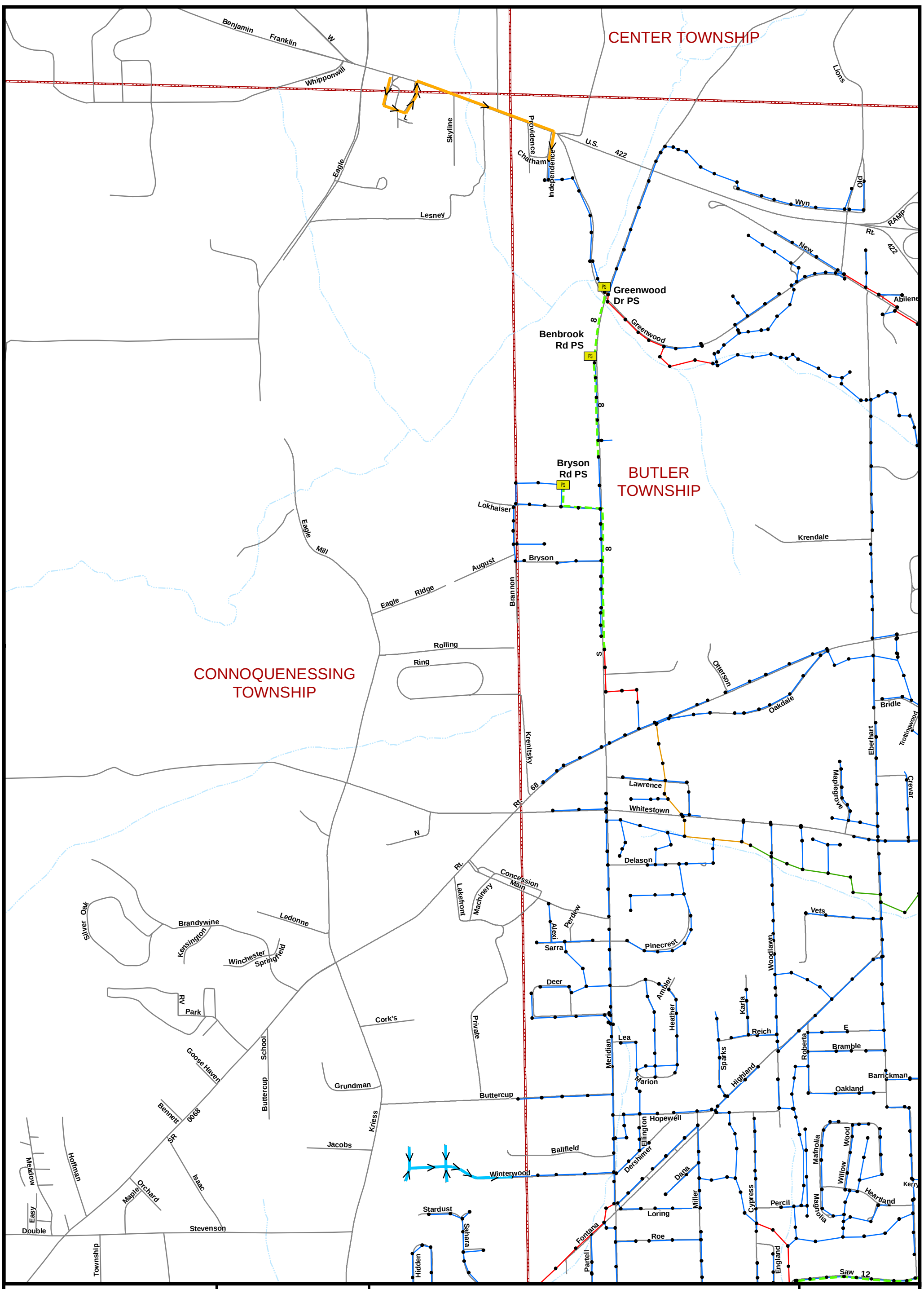
* Cost Information From July 2008 Estimate by KLH Engineers, Inc.

Table VI-15

Cost Estimate to Serve Existing Unsewered EDUs in Connoquenessing Township Area B (Golden L Mobile Home Park)

Alternative 1 - Gravity Sewers and Pump Station			
Description	Quantity	Unit Cost	Total Cost
8-inch gravity sewer	1,500 LF	$70	$105,000
Manholes	7 EA	2,500	17,500
6-inch service sewers	1,600 LF	55	88,000
2-inch force main	2,300 LF	45	103,500
Pump Station	1 LS	52,000	52,000
Total Estimated Construction Cost			366,000
Construction Contingency (25%)			92,000
Project Costs (15%)			55,000
Total Estimated Project Cost			513,000
Current Number of Unsewered EDUs			32
Average Cost per EDU			16,031
Monthly Cost for Loan Repayment *			$89.28
Alternative 2 - Pressure Sewers			
Description	Quantity	Unit Cost	Total Cost
2-inch force main	3,800 LF	$45	$171,000
1.5-inch service sewer	1,600 LF	45	72,000
Grinder pump installations	32 EA	8,500	272,000
Total Estimated Construction Cost			515,000
Construction Contingency (25%)			129,000
Project Costs (25%)			77,000
Total Estimated Project Cost			721,000
Current Number of Unsewered EDUs			32
Average Cost per EDU			22,531
Monthly Cost for Loan Repayment *			$125.48

* Assumes 20-year PENNVEST Loan 3.05% interest rate



BASA BUTLER AREA SEWER AUTHORITY
BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-15
CONNOQUENESSING TOWNSHIP AREAS A & B
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OAKLAND TOWNSHIP

SUMMIT TOWNSHIP

EAST BUTLER BOROUGH

Grant

Grant Ave

Water

Eyth

Old

Anderson

Valvoline

Lincoln

12th

11th

Madison

Alley

6th

Broadway

Oak

Colfax

8th

Sherman

7th

6th

5th

Randolph

4th

2nd

Railroad

E

BASA

BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-16

EAST BUTLER BOROUGH

APRIL 2008

- Sewer Structures
- PS Pump Stations
- SSO
- Proposed Gravity Line
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

N

1 inch equals 500 feet

0 100 200 300 400 500 Feet

BUTLER COUNTY

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Table VI-16

Cost Estimate to Serve Existing Unsewered EDUs in East Butler Borough

Area	Description	Quantity	Unit Cost	Total Cost
Grant Ave.	8-inch gravity sewer	1,550 LF	$70	$108,500
	6-inch service sewer	330 LF	55	18,150
	Manholes	5 EA	2,500	12,500
Eyth Road	8-inch gravity sewer	1,400 LF	70	98,000
	6-inch service sewer	330 LF	55	18,150
	Manholes	4 EA	2,500	10,000
6th Street	8-inch gravity sewer	400 LF	70	28,000
	6-inch service sewer	55 LF	55	3,025
	Manholes	1 EA	2,500	2,500
Total Estimated Construction Cost				298,825
Construction Contingency (25%)				75,175
Project Costs (15%)				45,000
Total Estimated Project Cost				419,000
Current Number of Unsewered EDUs				13
Average Cost per EDU				32,231
Monthly Cost for Loan Repayment *				$179.49

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate

presents estimated costs to install the required sewerage facilities. The estimated $419,000 cost for gravity sewer extensions to the BASA system is equivalent to an average cost of over $32,000 per EDU. With a 20-year PENNVEST loan, the cost to repay the loan would be almost $180 per month per EDU.

Oakland Township

The Special Study for Oakland Township provided information on the total number of existing and projected future EDUs by watershed. However, locations for current unsewered EDUs within the watershed areas were not identified. It was not possible to locate EDUs based on the information provided in the Special Study, so no attempt was made to estimate costs for constructing collector sewers to reach existing development within the watershed areas.

Table VI-17 presents estimated costs to extend gravity sewers from the BASA system to the base of the Pine Run, Thorn Creek, and Bonnie Brook watersheds in Oakland Township. The $2.912 million total estimated project cost for these sewer extensions translates to an average cost of $11,789 per EDU based on the current number of unsewered EDUs. The monthly cost for loan repayment would be about $66 per EDU.

Summit Township

The Special Study for Summit Township identified two areas in the western portion of the municipality that could be served by BASA in the future. The southwest area of the Township has 77 unsewered EDUs and the north central portion of the municipality has another 92 unsewered EDUs. Information on these areas is listed below.

The southwest area of the Township includes 70 unsewered lots along Freeport Road and Saxonburg Road, 5 lots on Stutz Road, and 2 lots on Green Manor Drive. These areas could be served by pressure sewers or by a combination of gravity sewers and pump stations. Table VI-18 presents a cost estimate for installing gravity sewers and pump stations, while Table VI-19 estimates costs for a pressure sewer system. Figure VI-17 illustrates locations for the potential sewerage facilities. The estimated $1.987 million cost for gravity sewers and pump stations is only about $21,000 more than the cost for pressure sewers, so costs are comparable for the two types of systems. The average monthly cost is $148 per EDU for a conventional sewer system versus $146 per EDU for a pressure sewer system. The two lots on Green Manor Drive were not included in this cost analysis because the lots are located at a considerable distance from other development and cannot be served in an economical fashion.

The north central area of Summit Township includes 69 unsewered lots along Portman Road, Valley View Drive, Protzman Road, and Mitchell Hill Road. Five more lots are located further west on Portman Road and 8 additional lots are situated in the vicinity of Wood Oak Lane and Brier Hill Lane. The final 10 lots are located along Ringneck Lane.

Table VI-17

Cost Estimate to Serve Existing Unsewered EDUs in Oakland Township

Area	Description	Quantity	Unit Cost	Total Cost
Pine Run	8-inch gravity sewer	8,500 LF	$70	$595,000
	Manholes	24 EA	2,500	60,000
Thorn Creek	8-inch gravity sewer	500 LF	70	35,000
	Manholes	1 EA	2,500	2,500
Bonnie Brook	8-inch gravity sewer	18,000 LF	70	1,260,000
	Manholes	51 EA	2,500	127,500
Total Estimated Construction Cost				2,080,000
Construction Contingency (25%)				520,000
Project Costs (15%)				312,000
Total Estimated Project Cost				2,912,000
Current Number of Unsewered EDUs				247
Average Cost per EDU				11,789
Monthly Cost for Loan Repayment *				$65.66

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate

Table VI-18

Cost Estimate to Serve Existing Unsewered EDUs in Summit Township
Southwest Area Alternative 1 - Gravity Sewers and Pump Stations

Area	Description	Quantity	Unit Cost	Total Cost
PS 1	8-inch gravity sewer	3,500 LF	$70	$245,000
	Manholes	10 EA	2,500	25,000
	6-inch service sewers	1,700 LF	55	93,500
	2-inch force main	1,900 LF	45	85,500
	Pump Station	1 LS	52,000	52,000
PS 2	8-inch gravity sewer	1,100 LF	70	77,000
	Manholes	3 EA	2,500	7,500
	6-inch service sewers	800 LF	55	44,000
	1.5-inch force main	600 LF	45	27,000
	Pump Station	1 LS	37,000	37,000
PS 3	8-inch gravity sewer	2,400 LF	70	168,000
	Manholes	7 EA	2,500	17,500
	6-inch service sewers	300 LF	55	16,500
	3-inch force main	950 LF	50	47,500
	Pump Station	1 LS	62,000	62,000
PS 4	8-inch gravity sewer	1,700 LF	70	119,000
	Manholes	5 EA	2,500	12,500
	6-inch service sewers	500 LF	55	27,500
	1.5-inch force main	1,800 LF	45	81,000
	Pump Station	1 LS	37,000	37,000
PS 5	8-inch gravity sewer	500 LF	70	35,000
	Manholes	2 EA	2,500	5,000
	6-inch service sewers	250 LF	55	13,750
	1.5-inch force main	1,500 LF	45	67,500
	Pump Station	1 LS	37,000	37,000
Gravity Line	8-inch gravity sewer	1,800 LF	70	126,000
	Manholes	5 EA	2,500	12,500
	6-inch service sewers	200 LF	55	11,000
Total Estimated Construction Cost				1,589,750
Construction Contingency (25%)				397,250
Project Costs (15%)				238,000
Total Estimated Project Cost				1,987,000
Current Number of Unsewered EDUs				75
Average Cost per EDU				26,493
Monthly Cost for Loan Repayment *				$147.54

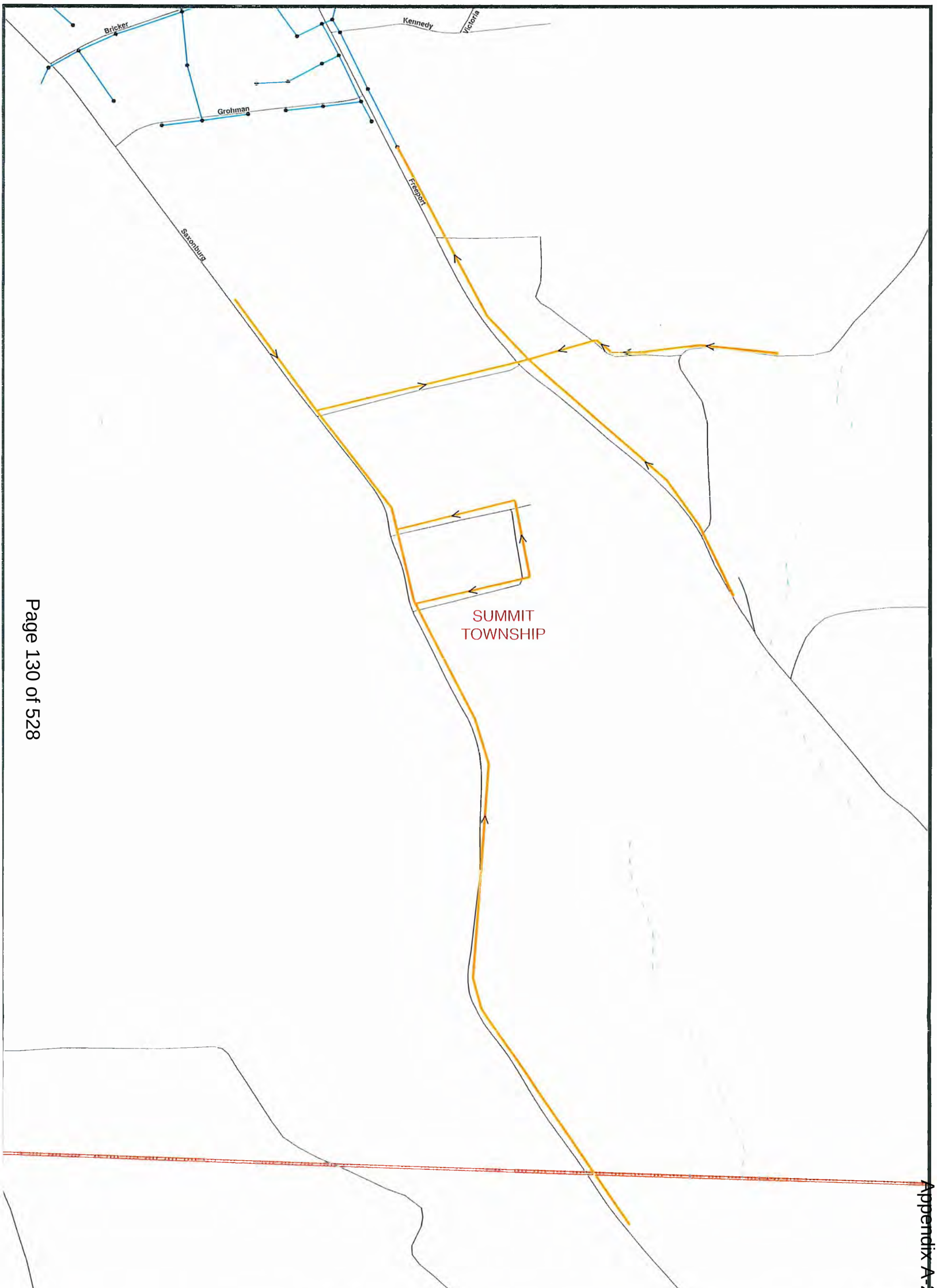
* Assumes 20-year PENNVEST Loan @ 3.05% interest rate

Table VI-19

Cost Estimate to Serve Existing Unsewered EDUs in Summit Township
Southwest Area Alternative 2 - Pressure Sewers

Description	Quantity	Unit Cost	Total Cost
2-inch force main	8,400 LF	$45	$378,000
3-inch force main	4,400 LF	50	220,000
1.5-inch service sewer	3,750 LF	45	168,750
Grinder pump installations	75 EA	8,500	637,500
Total Estimated Construction Cost			1,404,250
Construction Contingency (25%)			350,750
Project Costs (15%)			211,000
Total Estimated Project Cost			1,966,000
Current Number of Unsewered EDUs			75
Average Cost per EDU			26,213
Monthly Cost for Loan Repayment *			$145.98

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate



BASA
BUTLER AREA SEWER AUTHORITY
BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-17
SUMMIT TOWNSHIP
SOUTHWEST AREA
APRIL 2008

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1 inch equals 500 feet
0 100 200 300 400 500
Feet

Sewer Structures
Pump Stations
Proposed Sewer Facilities
Force Mains
Streams
Street Centerlines
Municipal Boundaries

PIPE DIAMETERS
1" - 8"
10"
12"
15"
18"
20"
24"
27" - 30"
36"
48"

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Table VI-20 presents estimated costs for providing public sewer service to the north central area of Summit Township. The upper portion of the table estimates costs for gravity sewers and a pump station. The lower portion estimates costs for the installation of pressure sewers with individual grinder pumps. Neither cost estimate includes providing service to the 10 lots along Ringneck Lane due to the high cost of boring a sewer under US Route 422 to connect to the existing BASA system. The cost estimate for gravity sewers does not include the 5 lots along Portman Road but service to this area is included in the pressure sewer estimate. Figure VI-18 shows the locations of potential sewerage facilities to serve the north central section of the Township. The average monthly cost of $192 per EDU for gravity sewers is slightly higher than the $188 per EDU cost for pressure sewers.

VI.E FUNDING AND COST-EFFECTIVE ANALYSIS

Potential financing methods and funding sources for sewage improvement projects are described in the following paragraphs.

Bonded Indebtedness

Municipalities or their operating authorities often find it necessary to issue bonds as a method of raising the money required for capital improvements. The three basic types of bonds issued for this purpose are general obligation bonds, special assessment bonds, and revenue bonds. General obligation bonds are issued through a municipality and are repaid through local taxes. Due to the secured backing of the municipality, these bonds typically have a lower interest rate than other bonds. A variation of general obligation bonds may be used when the revenues collected from the provision of wastewater disposal service are pledged to repayment of the bonds in addition to funds derived through local taxes.

A municipality may also issue special assessment bonds when certain properties are recipients of special benefits not available to all properties within the municipality. This method of financing is intended to apportion the project cost among the benefited property owners. Special assessment bonds are not backed by the municipality, so they are considered a greater risk and carry a higher interest rate than general obligation bonds. Special assessment bonds are predominantly used to finance local area sewers.

Revenue bonds are payable from fees and charges assessed for services provided by the organization that sold the bonds. No further backing is required other than the obligation that the borrower will operate the utility and collect revenues to buy back the bonds. Revenue bonds are most commonly used to finance capital costs for wastewater projects. Revenue bonds are also the predominant method used by municipal authorities to raise

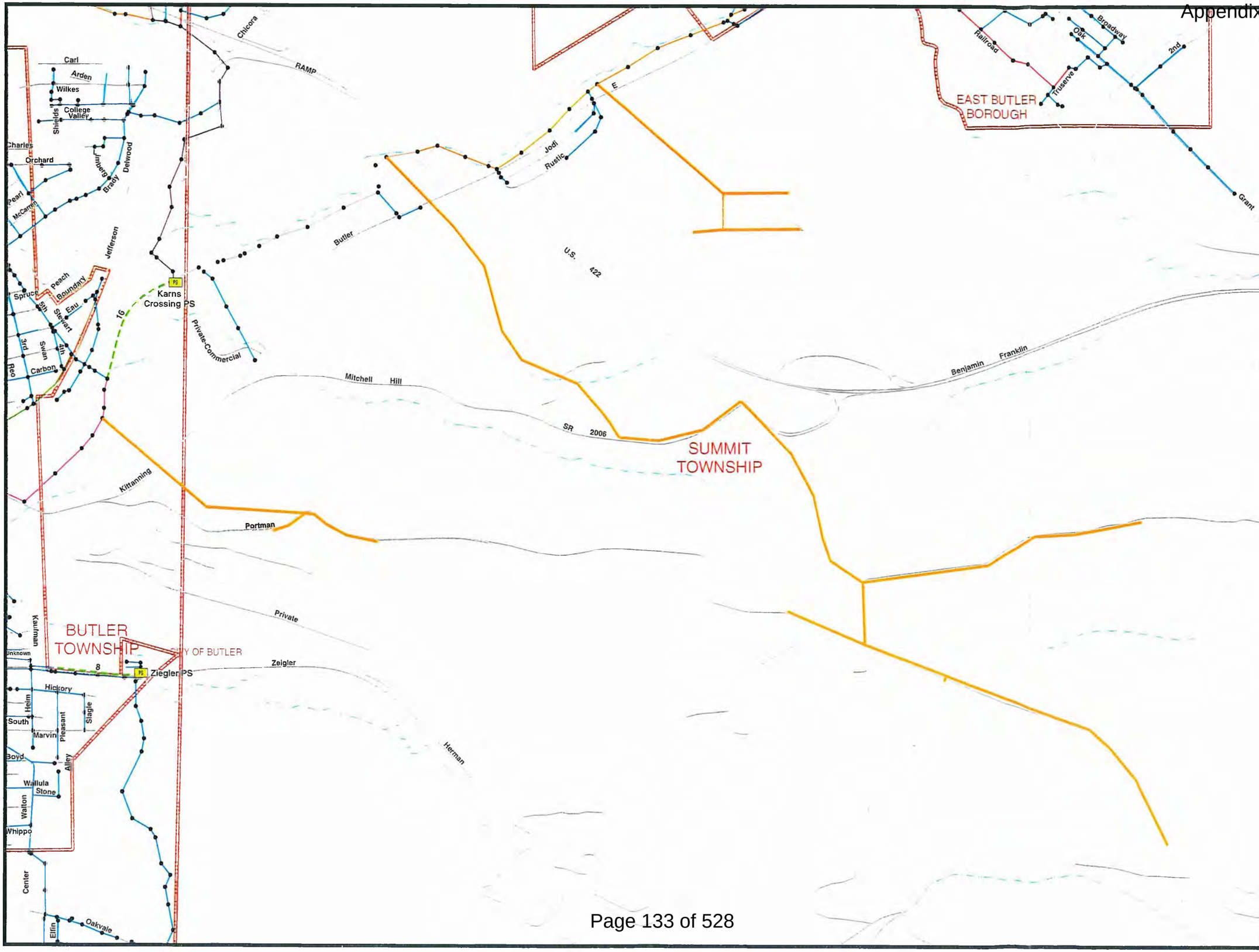
Table VI-20

Cost Estimate to Serve Existing Unsewered EDUs in Summit Township
North Central Area

Alternative 1 - Gravity Sewers and Pump Station				
Area	Description	Quantity	Unit Cost	Total Cost
PS	8-inch gravity sewer	9,000 LF	$70	$630,000
	Manholes	26 EA	2,500	65,000
	6-inch service sewers	2,450 LF	55	134,750
	3-inch force main	1,500 LF	50	75,000
	Pump Station	1 LS	62,000	62,000
Gravity	8-inch gravity sewer	3,000 LF	70	210,000
	Manholes	9 EA	2,500	22,500
	6-inch service sewers	1,000 LF	55	55,000
Connector	8-inch gravity sewer	4,200 LF	70	294,000
	Manholes	12 EA	2,500	30,000
8 lots	8-inch gravity sewer	3,900 LF	70	273,000
	Manholes	11 EA	2,500	27,500
	6-inch service sewers	400 LF	55	22,000
Total Estimated Construction Cost				1,900,750
Construction Contingency (25%)				475,250
Project Costs (15%)				285,000
Total Estimated Project Cost				2,661,000
Current Number of Unsewered EDUs				77
Average Cost per EDU				34,558
Monthly Cost for Loan Repayment *				$192.46

Alternative 2 - Pressure Sewers			
Description	Quantity	Unit Cost	Total Cost
2-inch force main	15,100 LF	$45	$679,500
3-inch force main	8,300 LF	50	415,000
1.5-inch service sewer	4,100 LF	45	184,500
Grinder pump installations	82 EA	8,500	697,000
Total Estimated Construction Cost			1,976,000
Construction Contingency (25%)			494,000
Project Costs (15%)			296,000
Total Estimated Project Cost			2,766,000
Current Number of Unsewered EDUs			82
Average Cost per EDU			33,732
Monthly Cost for Loan Repayment *			$187.85

* Assumes 20-year PENNVEST Loan @ 3.05% interest rate



BASA

BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

FIGURE VI-18

SUMMIT TOWNSHIP NORTH CENTRAL AREA

APRIL 2008

- Sewer Structures
- SSO
- Pump Stations
- Proposed Sewer Facilities
- Force Mains
- Streams
- Street Centerlines
- WWTP
- Municipal Boundaries

PIPE DIAMETERS

1" - 8"	20"
10"	24"
12"	27" - 30"
15"	36"
18"	48"

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1 inch equals 1,000 feet

0 500 1,000 Feet

BUTLER COUNTY

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funds. Unlike general obligation bonds, which are limited by statutes regarding total indebtedness of the municipality, revenue bonds are not considered debts against the community and do not affect a municipality's ability to borrow money for other purposes.

Long-Term Bank Financing

A municipality or operating authority can also borrow from banks in the form of long-term bank notes. The notes may be issued for periods of up to 20 years, but a 5- to 10-year period is more common. Municipal interest rates typically run less than the prime rate. This type of financing may be attractive to smaller municipalities because the debt is paid off in a shorter period than with a bond issue. However, this type of financing is subject to the municipal borrowing limit and decreases the amount available for other capital projects.

Available Funding Sources

A number of programs that are available for construction of sanitary sewers and/or treatment systems are described in the following paragraphs.

PENNVEST (Act 16-1988)

Act 16 of 1988 established the Pennsylvania Infrastructure Investment Authority (PENNVEST) to assist local governments in financing sewer and water projects. The PENNVEST program provides loans and grants for acquisition, construction, improvement, expansion, extension, repair, and/or rehabilitation of all or part of any water or sewage system, whether publicly or privately owned. The PENNVEST program operates a number of different funds and accounts from which it is authorized to make loans and/or grants to qualified applicants. However, some sewerage projects are funded with moneys from the Water Pollution Control Revolving Fund and are thus subject to federal requirements established by the EPA for the administration of federal funds.

Funding under the PENNVEST program is primarily in the form of low-interest, twenty-year loans. The PENNVEST Board has the power to set loan terms and may provide deferment of principal payments for up to five years. The minimum interest rate on any loan is 1.0 percent, and the maximum rate varies depending on the unemployment rate in the county or municipality being served by the project. The current interest rate set by PENNVEST for Butler County is 2.27 percent for the first five years and 3.046 percent for the remaining fifteen years of the loan. The PENNVEST Board may provide grant funds if it determines that the recipient is unable to proceed without a grant or will be unable to repay the loan. Currently, the amount of funds available for grants is limited to the amount of

interest earnings on PENNVEST loans or additional amounts specifically designated for this purpose.

The maximum assistance for any single project under the PENNVEST program is limited to $11,000,000. However, projects serving two or three municipalities may receive up to $20,000,000, and projects serving four or more municipalities may obtain funding in excess of $20,000,000 if approved by at least nine of the thirteen PENNVEST Board members.

In determining eligibility for PENNVEST assistance, the following criteria are considered:

- Does the project improve the health, safety, welfare, or economic well being of the people?
- Will the project provide a cost-efficient and effective or complete solution to the problem?
- Is the project consistent with state and regional plans?
- Has the applicant demonstrated the ability to operate and/or maintain the project?
- Does the project encourage consolidation of existing systems?
- What is the availability of other project funding mechanisms to the applicant?

Community Development Block Grant (CDBG)

This federally funded program is designed to assist communities in solving community and economic development problems. Community Development Block Grant funds can be used to develop a wide range of projects and are not limited specifically to water or sewer projects. The objectives of the CDBG program are to principally benefit low-to-moderate income persons, to aid in the prevention or elimination of slums and blight, or to meet other community development needs or a particular urgency.

Infrastructure Development Program (IDP)

This state funded program has been established to make grants and loans to eligible applicants for specific infrastructure improvements necessary to complement eligible capital investment by private companies and private developers. To be eligible, all infrastructure improvement projects must be necessary for the operation of an eligible private company or companies at a specific site. The company site and the site of the related infrastructure

improvement do not have to be the same, as the improvement could be made at a central sewage treatment site.

Matching funds from private companies are required by participants of the program. The amount of matching funds required is at least $2 for every $1 of the IDP award. In addition, a minimum of one new full-time equivalent job must be created for every $25,000 of assistance received, or ten new full-time jobs must be created at the site of the facility affected by the infrastructure improvements within five years after the assistance is awarded. Individual grant allocations under this program may not exceed $1.25 million.

United States Department of Agriculture (USDA) Rural Development Water and Environment Program

The USDA Rural Development Water and Environmental Program (WEP) provide loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies, non-profit organizations and recognized Indian tribes may qualify for assistance. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems. The City of Butler and Butler Township are not eligible for funding through this program because their populations exceed 10,000 persons.

Rural Development is primarily a loan agency with supplemental grant money available at the discretion of the agency to maintain sewer rates charged to the system users at reasonable levels. The maximum term of a WEP loan is 40 years and the interest rate is based on the income level of the individuals served by a project. There are three possible interest rates for a project – poverty line, intermediate, and market rate. As of April 1, 2008, the interest rates are 4.50 percent for poverty, 4.625 percent for intermediate, and 4.75 percent for market rate loans. Grant eligibility is determined by the median household income for the service area per the 2000 US Census. Projects that will serve areas having an income level greater than the state median household income of $42,291 are not grant eligible. However, a maximum 75 percent grant funding is available for projects in areas where income levels are at or below the "Poverty Line".

Cost-Effective Alternative and Financing Scheme

Flow diversion, pumping, and storage facilities need to be constructed to address sanitary sewer overflow problems in the BASA system. The estimated cost of facilities sized for existing conditions is $21.6 million and facilities sized for future conditions have a projected cost of $27.6 million. The incremental cost of constructing larger facilities to

meet future conditions is about $6.0 million or 28 percent more than the total estimated cost for existing conditions. The identified conveyance system upgrades have a total estimated cost of $2.78 million

The estimates in Section VI.D indicate that it is not cost effective to extend public sewers into the unsewered areas identified in the Special Studies. Calculated monthly debt service payments for sewer extensions can best be described as unaffordable, ranging from $66 to $190 per EDU. This amount does not include the current monthly base sewer service charge of $25 per EDU, which would raise the minimum payment to over $90 per month. The base sewer service charge is expected to increase to finance the upcoming system-wide structural improvements. Further, new BASA customers are required to pay a one-time tapping fee of $2,695 per EDU and a connection fee of up to $300 per EDU when they connect to the system. It does not appear that sewer extensions to these areas will be economically feasible unless significant amounts of grant funds can be obtained for individual projects.

BASA intends to apply for PENNVEST funding to construct the wet weather flow control facilities. It is anticipated that project costs not covered by PENNVEST will be financed through a bond issue.

VI.F IMPLEMENTATION OF PLAN ALTERNATIVES

Flow equalization tanks and related appurtenances will be the first facilities to be designed, permitted, and constructed so the ongoing SSO problem can be addressed as soon as possible. The identified conveyance system improvements will be constructed following the flow equalization tanks. System extensions to serve unsewered areas with existing development may be undertaken after the storage and conveyance improvements are implemented, if grant funds can be found to make the sewer extensions affordable to the users. Potential projects to serve unsewered areas should be discussed with local residents to gauge their level of interest in obtaining public sewer service.

VI.G NECESSARY ADMINISTRATIVE ORGANIZATIONS AND LEGAL AUTHORITY FOR PLAN IMPLEMENTATION

The Butler Area Sewer Authority has the necessary administrative organization and legal authority for plan implementation. The Authority has successfully administered numerous capital improvement projects in the past, most recently under the previous COA dated February 20, 2001.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION VII
INSTITUTIONAL EVALUATION

VII.A ANALYSIS OF EXISTING WASTEWATER TREATMENT AUTHORITIES

The Butler Area Sewer Authority was incorporated by the City of Butler and the Township of Butler on November 13, 1962. The Authority was created for the purpose of financing the 1963 improvements to the existing treatment plant and expansion of the sewer system. The Authority also assumed operation and maintenance responsibilities for the collection and treatment facilities. The Authority, five service area municipalities, and four smaller area authorities entered into the Water Pollution Control Agreement on February 20, 1974. Under this agreement, the Authority assumed ownership and the operation and maintenance responsibility for all existing and to be constructed sewage facilities in these service areas. The Authority was also given responsibility for design, construction, and financing of the 1978 construction project that extended sewer service to new areas and expanded the existing wastewater treatment plant to its present capacity.

The Authority currently employs 40 individuals who are responsible for the day-to-day operation and maintenance of the system, customer relations, billing, and other necessary activities. The Authority has sufficient staff and resources available to implement the proposed capital improvement projects.

The Authority is legally capable of implementing the wastewater planning recommendations. BASA has a 45-year history of carrying out system-wide operation and maintenance activities, setting user fees, purchasing equipment and supplies, enforcing sewer ordinances, negotiating agreements with other parties, and raising capital for normal system operations and periodic improvement projects. The Authority can finance the improvements and pay off the debt using tapping fee revenue from new sewer customers, as well as sewer service charge revenues from new and existing system users.

Rates charged by the Authority currently generate sufficient revenue to cover operating expenses, other expenses, and budgeted capital expenditures. During the 2008-2009 fiscal year, BASA will pay $1.20 million for debt service on bonds and $323,000 in principal and interest for existing PENNVEST loans. The annual base sewer service rate for all BASA customers is $300 per EDU, or $25 per EDU per month. This rate reflects a monthly increase of $1 per EDU effective January 1, 2009.

VII.D PROPOSED INSTITUTIONAL ALTERNATIVE FOR IMPLEMENTING THE PROPOSED ALTERNATIVE

The Butler Area Sewer Authority will implement the selected alternative. The Authority was established for the purpose of constructing, operating, and maintaining a wastewater collection and treatment system for the existing service area. Constructing flow diversion, pumping, and equalization facilities to eliminate sanitary sewer overflows is a logical extension of the original function for the Authority.

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION VIII
IMPLEMENTATION SCHEDULE AND JUSTIFICATION FOR SELECTED ALTERNATIVE

VIII.A SELECTED WASTEWATER MANAGEMENT ALTERNATIVE

The selected alternative will construct the following wet weather flow control facilities to eliminate SSOs in the BASA system:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO.
- Diversion and pumping facilities at the Ballpark/General Tire SSO.
- Diversion and pumping facilities on the Connoquenessing Creek interceptor.
- A central storage facility to store wastewater that is pumped from the Ballpark and Connoquenessing diversion pump stations.
- Conveyance system upgrades.

The October 13, 2006 COA requires BASA to eliminate unpermitted discharges from the Ballpark, General Tire, and Deshon structures by July 31, 2012. Given the short time frame to comply with the COA and the lack of previous success in reducing wet weather flows through sewer rehabilitation work, the Authority proposes to construct flow equalization facilities and related conveyance system upgrades to address the SSO problem. The selected alternative is environmentally sound because the proposed facilities will capture and store wet weather overflows for treatment. There is no guarantee that other more costly options, such as system-wide sewer rehabilitation, would eliminate SSOs. In addition, there is not sufficient time to complete system-wide rehabilitation projects before the end date for the COA. The Authority will have to operate and maintain the new diversion, pumping, and storage facilities, but the facilities will only be needed during wet weather and will not be in continuous use. In addition to maintenance of the diversion pump stations, the equalization tanks will have to be washed down after wet weather events.

It is recommended that the facilities sized for future conditions be constructed in order to eliminate SSOs to the maximum extent possible. The facilities sized for future conditions have higher diversion pumping rates and larger storage volumes than the facilities sized for existing conditions. The estimated $27.6 million cost for the larger facilities is about $6.0 million more than the facilities sized for existing conditions. However, the larger

facilities will have sufficient storage capacity to capture all the historic overflow events that have ever been recorded in the BASA system, except for a 7.374 million gallon overflow that was measured at the Deshon pump station in January 2005. The cost for conveyance system upgrades is estimated at $2.78 million, bringing the total cost for the recommended improvements to approximately $30.4 million. Estimated costs for the recommended improvements are summarized below.

Description	Estimated Cost
Deshon Diversion, Pumping, and Storage Facilities	$ 6,727,000
Monroe Diversion, Pumping, and Storage Facilities	3,521,000
Ballpark/General Tire Diversion and Pumping Facilities	3,591,000
Connoquenessing Diversion and Pumping Facilities	3,671,000
Central Storage Facilities	10,104,000
Conveyance System Upgrades	2,779,000
Total	$30,393,000

The cost estimates presented in Section VI show that it is not economically feasible at this time to extend public sewer service to unsewered areas with existing development. The rates required to cover the debt service on sewer extensions would not be affordable for the new users unless significant amounts of grant money become available to reduce the cost of the projects.

VIII.B DESIGNATED CAPITAL FINANCING PLAN

The preferred capital financing plan for the proposed system improvements is a low-interest loan from PENNVEST. The alternative capital financing plan is a conventional sewer revenue bond. BASA will also apply for H2O and other grants to help finance the proposed facilities.

PENNVEST loans typically have a 20-year term. Current interest rates for PENNVEST projects in Butler County are 2.27 percent for the first five years and 3.046 percent for the remaining 15 years. If the entire proposed $30.393 million project were financed with a PENNVEST loan, the annual debt service would be $1,892,036 for the first five years and $1,998,113 for the final fifteen years. The monthly debt service on the loan would calculate to an average cost of $6.97 per EDU based on the 23,905 EDUs in the BASA system during 2007. Relative to the $25 per EDU base sewer service fee, a 28 percent rate increase would be needed to cover the additional debt service.

Interest rates for municipal bonds are higher than the PENNVEST rates. AAA rated bonds with 20-year maturity currently offer yields of about 4.70 percent, up from 4.10 percent a year ago. This trend suggests that interest rates may increase to 5.20 percent by

this time next year. If a sewer revenue bond were used to finance all of the proposed system improvements, the annual debt service would amount to about $2,447,441. The monthly debt service would calculate to $8.53 per EDU and a 34 percent rate increase would be needed to cover the additional debt service.

VIII.C DESIGNATED IMPLEMENTATION SCHEDULE

Table VIII-1 presents an implementation schedule for the recommended plan and represents an estimate of how the project should proceed barring unforeseen circumstances.

Table VIII-1
Implementation Schedule

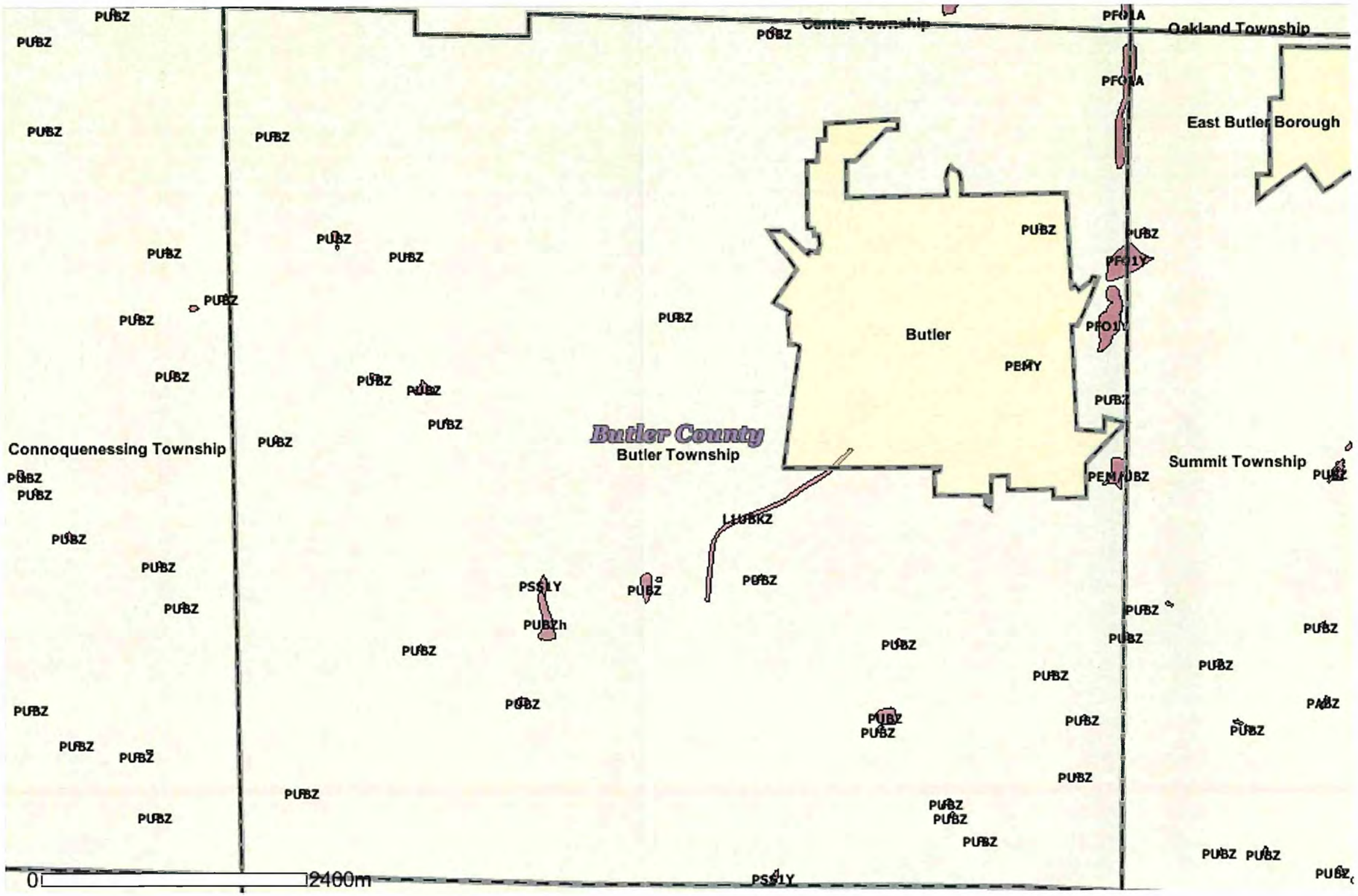
Project Element	Date
Submit Draft Act 537 Plan Update to DEP and Municipalities	June 3, 2008
Receive Comments on Draft Plan From DEP and Municipalities	September & October 2008
Submit Final Act 537 Plan Update to DEP and Municipalities	March 2009
Begin Design of Recommended Facilities	May 2009
Receive DEP Approval of Act 537 Plan Update	August 27, 2009
Complete Construction of Facilities and Seal Overflows	July 31, 2012

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE
SECTION IX
ENVIRONMENTAL REPORT

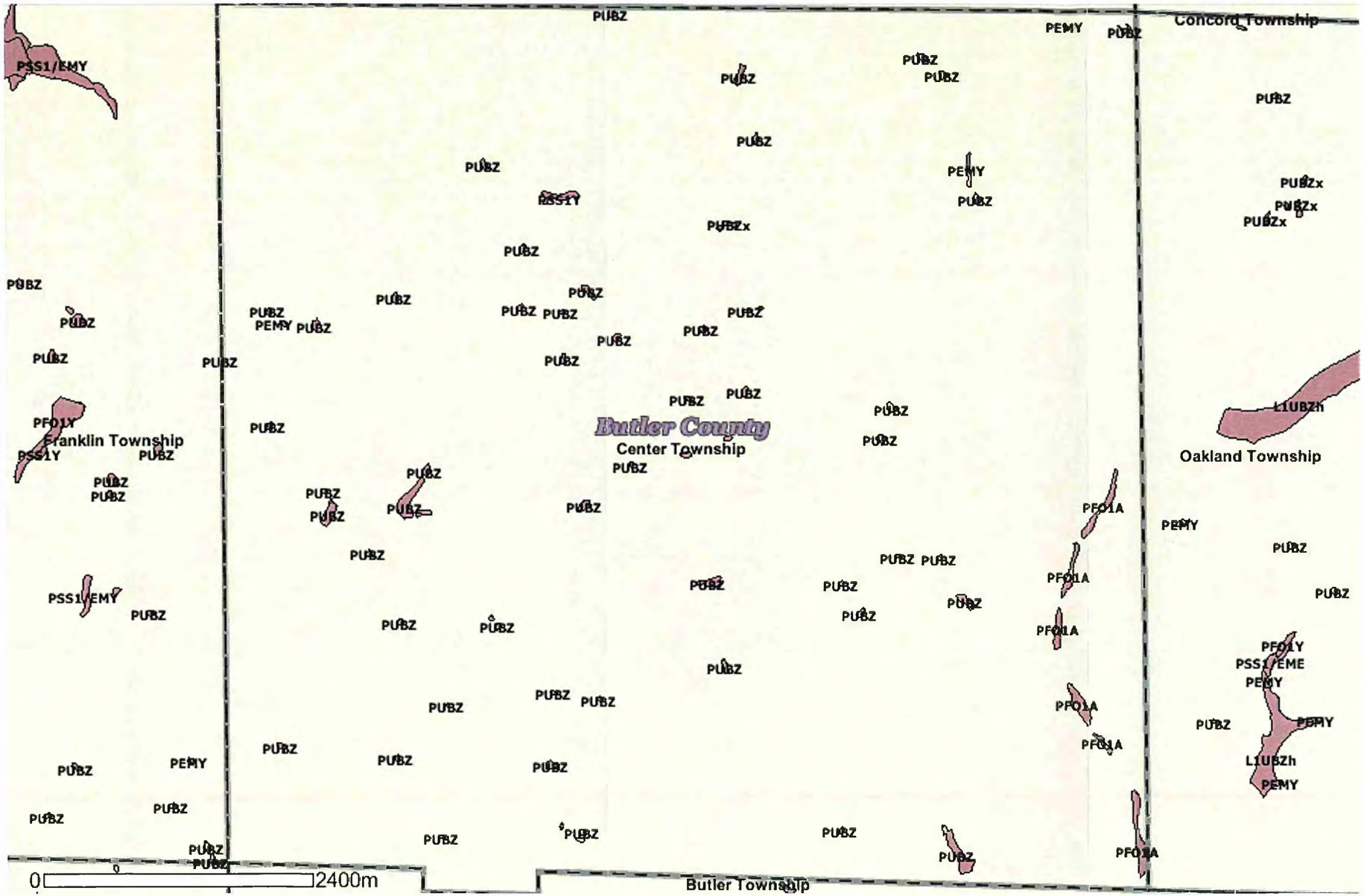
IX.A ENVIRONMENTAL REPORT GENERATED FROM THE UNIFORM ENVIRONMENTAL REVIEW PROCESS

The Environmental Report required by the Uniform Environmental Review Process is included as Appendix N to this study.

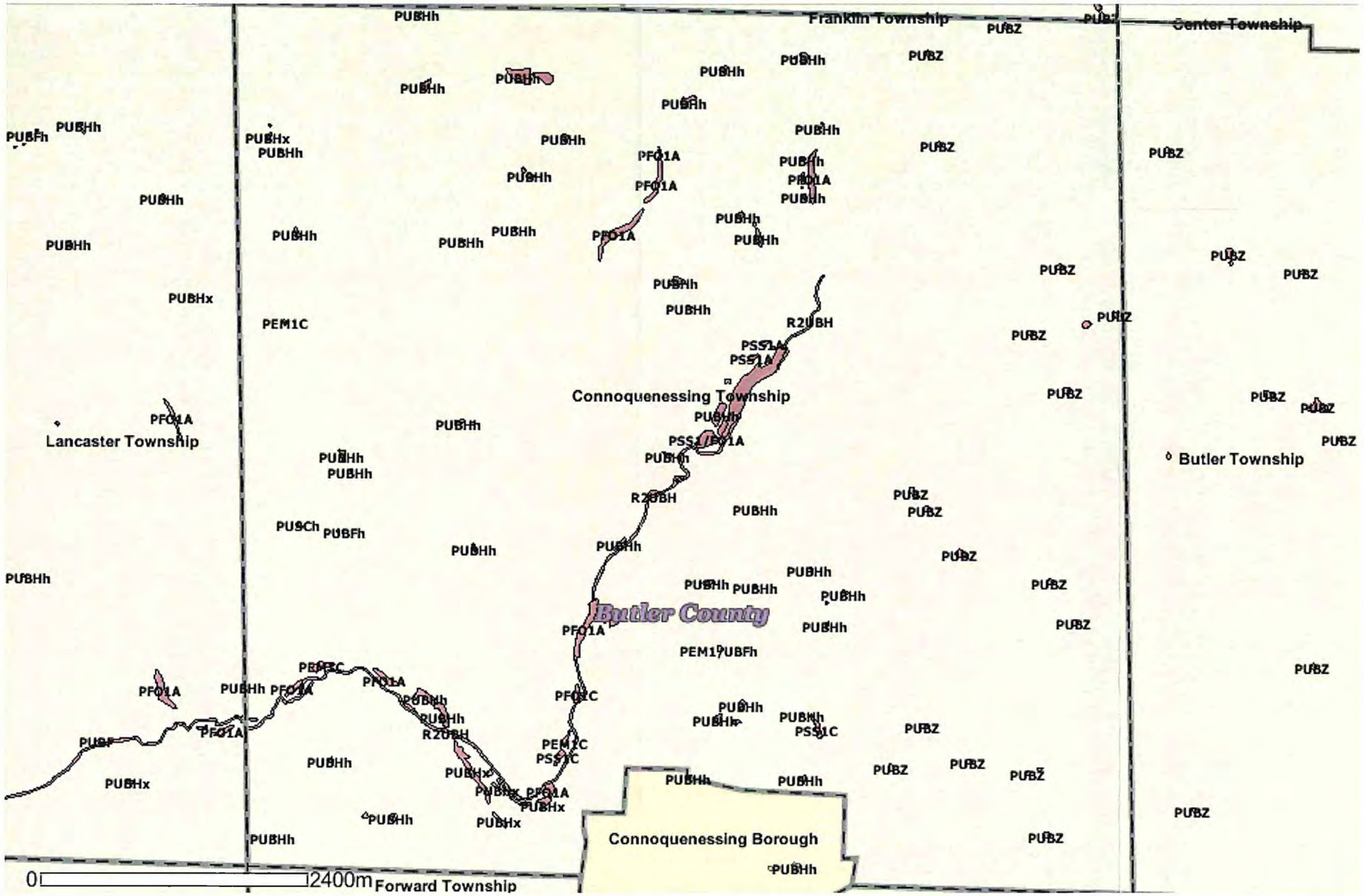
APPENDIX A
WETLANDS MAPS



DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Butler Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 2,8			



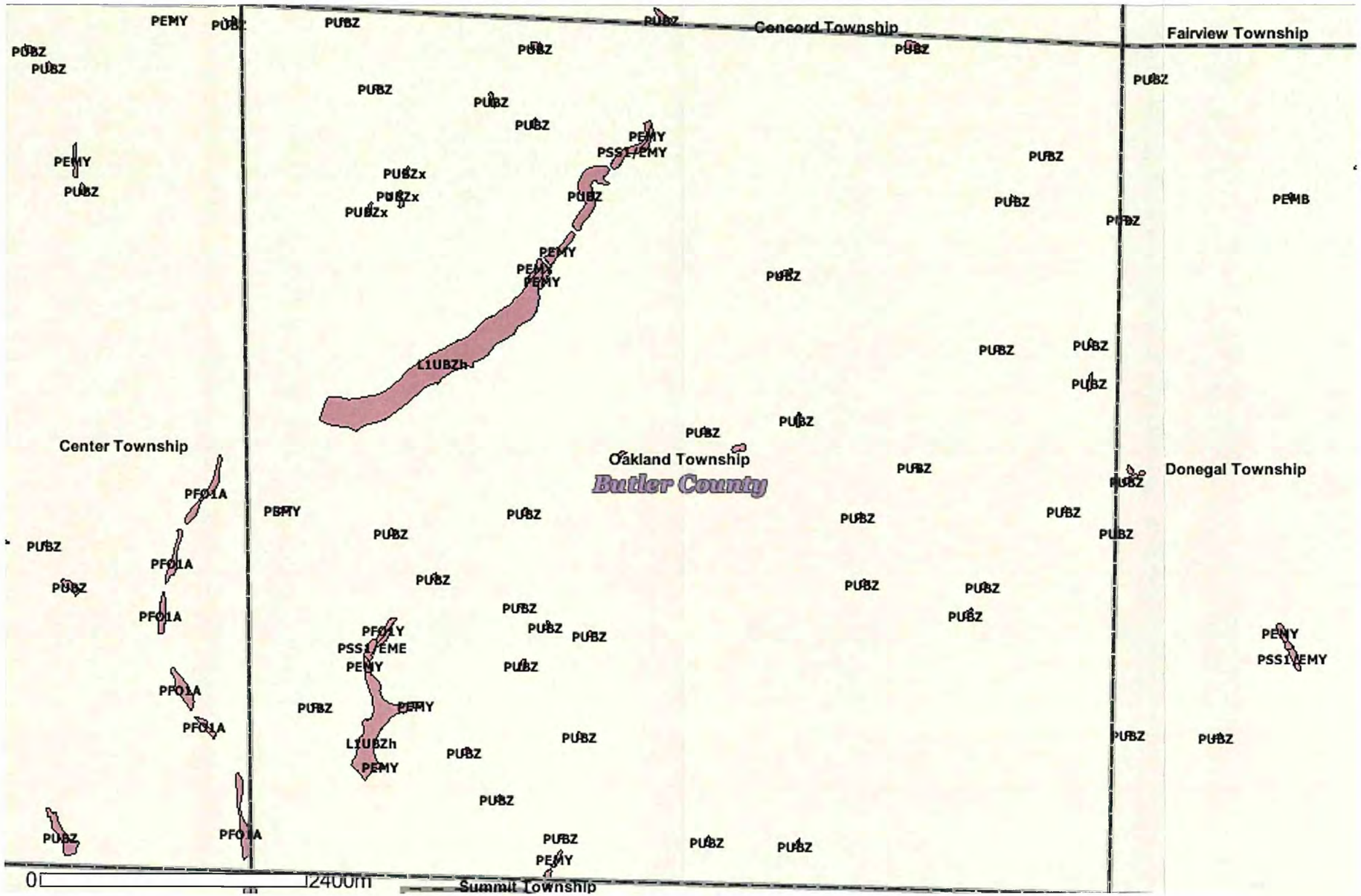
DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Center Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 3,8			



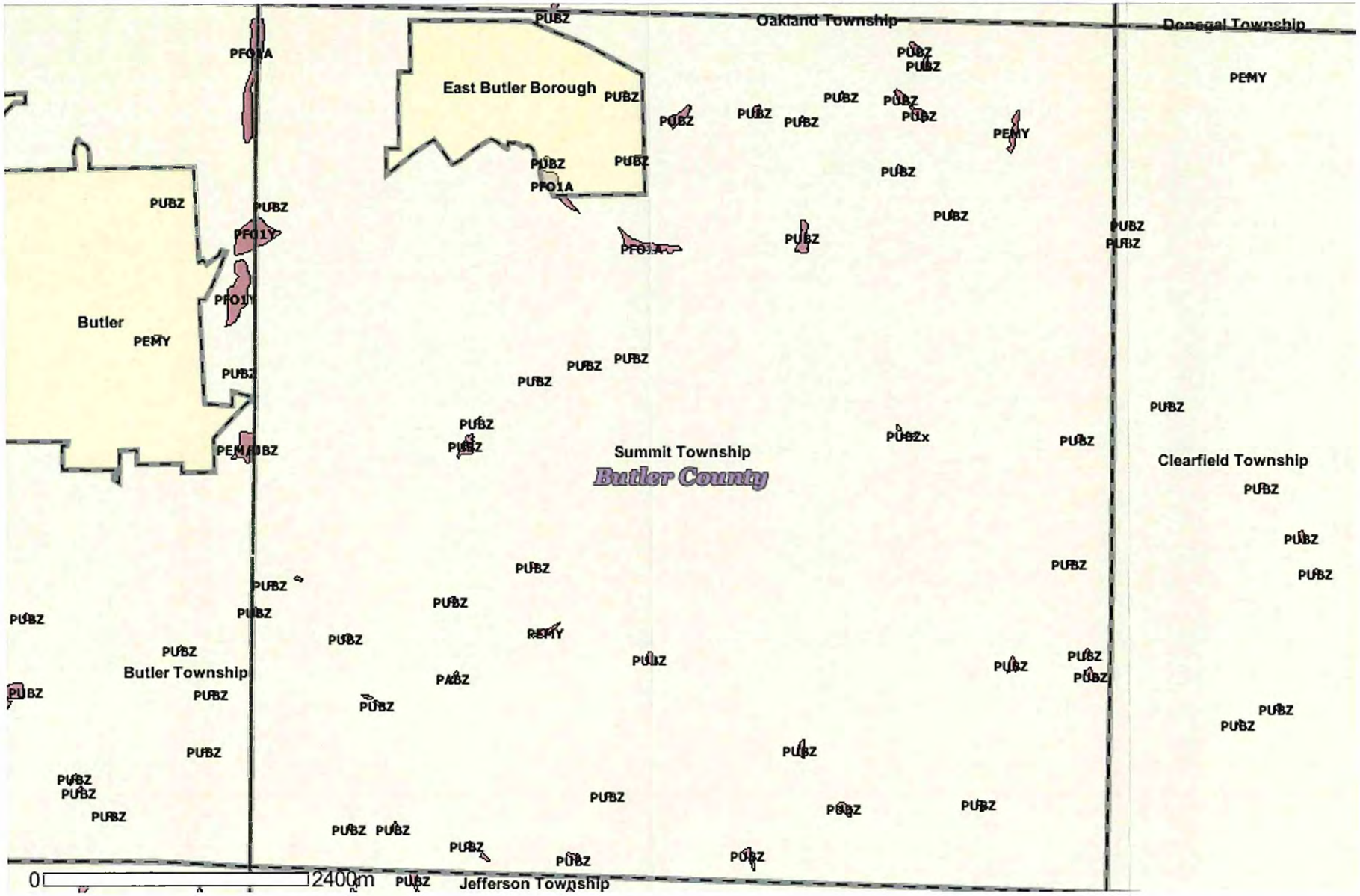
DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Connoquenessing Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 4,8			



DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** East Butler Borough Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 5,8			



DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Oakland Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 6,8			



DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Summit Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 7,8			

APPENDIX B
WWTP DESIGN CRITERIA

BUTLER AREA SEWER AUTHORITY
WATER POLLUTION CONTROL FACILITIES
TREATMENT PROCESS DESIGN CRITERIA

GENERAL

1.	Population	70,000
2.	Design Year	2,000

HYDRAULIC LOADING

3.	Average Day Weather Flow (mgd)	10.0
4.	Peak Wet Weather Flow (mgd)	25.0

ORGANIC LOADING

5.	Biochemical Oxygen Demand, BOD_5 (mg/l)	153
6.	Biochemical Oxygen Demand, BOD_5 (lb/day)	12,750
7.	Suspended Solids, SS (mg/l)	180
8.	Suspended Solids, SS (lb/day)	15,000
9.	Ammonia Nitrogen (mg/l)	15
10.	Ammonia Nitrogen (lb/day)	1,251
11.	Total Phosphorus (mg/l)	30.7
12.	Total Phosphorus (lb/day)	2,560

SCREENING FACILITIES

13.	Number of Units	2
14.	Type	Mechanically Cleaned Bar Screens
15.	Channel Width (ft)	2.5
16.	Bar Size (in)	2 x 3/8
17.	Clear Opening (in)	1.0
18.	Depth of Flow (ft)	
	Average Flow	3.4
	Peak Flow	4.1
19.	Screenings Storage Capacity (cu ft)	20
20.	Screenings Grinder Capacity	
	cu ft/hr	38
	lb/hr	2,500
21.	Minimum Wash Water Requirement (gpm)	20

AERATED GRIT REMOVAL

22.	Number of Tanks	2
23.	Tank Length, Width, and Average Depth (ft)	32.5 x 15 x 10

24.	Surface Area (sq ft)	
	Per Tank	488
	Total	975
25.	Volume (gal)	
	Per Tank	36,500
	Total	73,000
26.	Surface Settling Rate (gpd/sq ft)	
	Average Flow	10,250
	Peak Flow	25,600
27.	Detention Time (min)	
	Average Flow	10.5
	Peak Flow	4.2
28.	Particle Size Removed w/Specific Gravity = 1.5 (diam. in mm)	
	Average Flow	0.18
	Peak Flow	0.42

PRIMARY SEDIMENTATION

29.	Number of Tanks	5
30.	Tank Length, Width, and Average Depth (ft)	
	Two Existing Tanks	100 x 39 x 9
	Three New Tanks	100 x 26 x 9
31.	Surface Area (sq ft)	
	Each Existing Tank	3,900
	Each New Tank	2,600
	Total	15,600
32.	Volume (gal)	
	Each Existing Tank	262,000
	Each New Tank	175,000
	Total	1,048,000
33.	Weir Length (ft), total	1,075
34.	Surface Settling Rate (gpd/sq ft)	
	Average Flow	640
	Peak Flow	1,600
35.	Detention Time (hrs)	
	Average Flow	2.52
	Peak Flow	1.01
36.	Weir Overflow Rate (gpd/ft)	
	Average Flow	9,300
	Peak Flow	23,270
37.	Estimated SS Removal (%)	60
38.	SS Removed (lb/day)	9,000
39.	Estimated BOD_5 Removal (%)	40
40.	BOD_5 Removed (lb/day)	5,100
41.	BOD_5 in Primary Effluent (mg/l)	92
42.	SS in Primry Effluent (mg/l)	72

PRIMARY EFFLUENT/RECIRCULATION PUMPS

43.	Number of Pumps	3
44.	Type	Variable Speed, Centrifugal
45.	Capacity of Each Pump (gpm)	8,700
46.	Capacity of Each Pump (mgd)	12.5
47.	Number of Pumps Operating	2
48.	Pump Control	Lead/Lag Cycle

TRICKLING FILTERS

49.	Number of Units	2
50.	Type	High-Rate
51.	Diameter (ft)	158
52.	Average Depth of Media (ft)	8.5
53.	Surface Area (sq ft)	
	Per Filter	19,610
	Total	39,220
54.	Volume (cu ft)	
	Per Filter	166,650
	Total	333,300
55.	Minimum Flow to Each Filter (gpm)	3,470
56.	Maximum Flow to Each Filter (gpm)	8,670
57.	Organic Loading (lb/day/1,000 cu ft)	
	Without Recycle	23
	With 1:1 Recycle	28
58.	Hydraulic Loading (gpd/sq ft)	
	Without Recycle	255
	With 1:1 Recycle	510
	Peak Flow without Recycle	637
59.	Design Average BOD_5 Removal (%)	70
60.	Average BOD_5 in Filter Effluent	
	a. mg/l	28
	b. lb/day	2,300

SECOND STAGE AERATION (NITRIFICATION)

61.	Number of Aeration Tanks	8
62.	Tank Length, Width, and Average Depth (ft)	43 x 43 x 15.4
63.	Volume (cu ft)	
	Each Tank	28,475
	Total	227,800
64.	Volume (gal)	
	Each Tank	212,500
	Total	1,700,000

65.	BOD_5 Applied (lb/day)	2,300
66.	BOD_5 Loading (lb/day/1,000 cu ft)	10.1
67.	Ammonia Nitrogen Applied (lb/day)	1,250
68.	Ammonia Nitrogen Loading (lb/day/1,000 cu ft)	5.5
69.	Ammonia Nitrogen Removed (lb/day)	1,085
70.	Percent Ammonia Nitrogen Removal (%)	87
71.	MLSS Concentration (mg/l)	1,500
72.	Return Sludge Solids Concentration (mg/l)	5,000
73.	Design Rate of Return Sludge Flow (%)	60
74.	Design Rate of Return Sludge Flow (mgd)	6.4

FINAL SEDIMENTATION

75.	Number of Tanks	4
76.	Tank Length, Width, and Average Depth (ft)	143 x 35 x 12
77.	Surface Area (sq ft)	
	Per Tank	5,000
	Total	20,000
78.	Volume (gal)	
	Per Tank	450,000
	Total	1,800,000
79.	Weir Length (ft)	
	Per Tank	306
	Total	1,222
80.	Surface Overflow Rate (gpd/sq ft)	
	Average Dry Weather Flow	500
	Peak Wet Weather Flow	1,250
81.	Detention Time (hr)	
	Average Dry Weather Flow	4.32
82.	Weir Overflow Rate (gpd/ft)	
	Average Dry Weather Flow	8,200

FLASH MIX TANK

83.	Number of Tanks	1
84.	Tank Length, Width, and Average Depth (ft)	15 x 11.75 x 15.6
85.	Effective Volume (gal)	19,960
86.	Detention Time (min)	
	Average Flow	2.9
	Peak Flow	1.2

REACTOR CLARIFIERS

87.	Number of Tanks	3
88.	Tank Length, Width, and Average Depth (ft)	67 x 67 x 15
89.	Surface Area (sq ft)	
	Per Tank	4,126
	Total	13,378

BUTLER AREA SEWER AUTHORITY
WATER POLLUTION CONTROL FACILITIES
SOLIDS HANDLING DESIGN CRITERIA

SOLIDS PRODUCTION

1.	Total SS in Raw Sewage (lb/day)	15,000
2.	Total BOD_5 in Raw Sewage (lb/day)	12,750
3.	Volatile SS in Raw Sewage (lb/day)	11,250
4.	Mineral SS in Raw Sewage (lb/day)	3,750
5.	BOD_5 Removed in Primary Tanks (lb/day)	5,100
6.	Total SS Removed in Primary Tanks (lb/day)	9,000
7.	Volatile SS Removed in Primary Tanks (lb/day)	6,750
8.	Mineral SS Removed in Primary Tanks (lb/day)	2,250
9.	Volatile SS Removed in Secondary Clarifiers (lb/day)	3,930
10.	Mineral SS Removed in Secondary Clarifiers (lb/day)	1,690
11.	Total Biological Sludge Removed in Secondary Clarifiers [9+10] (lb/day)	5,620
12.	Inorganic Lime Sludge (lb/day)	
	a. $Ca(OH)(PO_4)$	5,000
	b. $CaCO_3$	23,700
	c. $Mg(OH)_2$	4,670
13.	Total Solids to Thickener [6+9+10] (lb/day)	47,990
14.	Total Volatile Solids to Thickener (lb/day)	10,680

GRAVITY SLUDGE THICKENER

15.	Number of Units	1
16.	Tank Length, Width, and Average Depth (ft)	58 x 58 x 10
17.	Total Surface Area (sq ft)	3,364
18.	Total Volume (gal)	290,500
19.	Clear Overflow Depth (ft)	4
20.	Sludge Storage Available (gal)	190,300
21.	Sludge Storage Available (lbs)	1,591,200
22.	Probable Solids Concentration (%)	6
23.	Solids in Storage at 6% Solids (lbs)	95,500
24.	Solids Storage Time (days)	2.0
25.	Average Solids Loading (lb dry solids/sq ft/day)	14.3
26.	Design Hydraulic Loading (gpd/sq ft)	800
27.	Design Feed to Thickener (gpd)	2,691,200

LIME STABILIZATION

28.	Number of Tanks	2
29.	Top Dimensions; L x W (ft)	31.25 x 26.5
30.	Bottom Dimensions; L x W (ft)	31.25 x 5.0

31.	Tank Depth (ft)	21.5
32.	Volume (gal)	
	Per Tank	79,150
	Total	158,300
33.	Solids Applied	
	Thickened Sludge Dry Solids (lb/day)	47,990
	Thickened Sludge @ 6% (gpd)	92,870
34.	Storage Time in Each Tank (days)	0.85
35.	Total Storage Time (days)	1.70

FILTER PRESSES

36.	Number of Units	2
37.	Plates per Unit	80
38.	Number of Cakes Produced per Unit	79
39.	Cake Thickness (in)	1.25
40.	Volume per Unit (cu ft)	221
41.	Filtration Area per Unit (sq ft)	4,195
42.	Total Filter Area (sq ft)	8,390
43.	Filter Operation (hr/day)	16
44.	Filter Operation (days/wk)	5
45.	Minimum Solids Content in Cake (%)	43
46.	Maximum SS in Filtrate (mg/l)	50
47.	Sludge Production at Average Flow of 5.0 mgd	
	A. Total Weekly (lbs dry solids/wk)	167,965
	B. Total Daily (lbs dry solids/day)	23,995
	1. Primary Sludge	4,500
	2. Biological Sludge	2,810
	3. Lime Sludge	
	a. $Ca(OH)(PO_4)$	2,500
	b. $CaCO_3$	11,850
	c. $Mg(OH)_2$	2,335
	C. Daily Sludge Dewatered (5 day/wk), lb/day	35,593
	1. Primary Sludge	6,300
	2. Biological Sludge	3,934
	3. Lime Sludge	
	a. $Ca(OH)(PO_4)$	3,500
	b. $CaCO_3$	16,590
	c. $Mg(OH)_2$	3,269
48.	Sludge Production at Design Average Flow of 10.0 mgd	
	A. Total Weekly (lb dry solids/wk)	335,930
	B. Total Daily (lb dry solids/day)	47,990
	1. Primary Sludge	9,000
	2. Biological Sludge	5,620

3. Lime Sludge	
a. $Ca(OH)(PO_4)$	5,000
b. $CaCO_3$	23,700
c. $Mg(OH)_2$	4,670
C. Daily Sludge Dewatered (5 day/wk), lb/day	67,186
1. Primary Sludge	12,600
2. Biological Sludge	7,868
3. Lime Sludge	
a. $Ca(OH)(PO_4)$	7,000
b. $CaCO_3$	33,180
c. $Mg(OH)_2$	6,538

APPENDIX C
HIGH FLOW EFFLUENT ANALYSIS

BASA WWTP
2003 to 2007 Analysis of Effluent Concentrations on Days With Flows > 10 mgd

Date	Daily Flow (mgd)	Effluent CBOD-5 (mg/L)	Effluent TSS (mg/L)	Effluent NH3-N (mg/L)	Effluent P (mg/L)	Effluent D.O. (mg/L)	Effluent pH (Std. Units)
1/6/2005	29.506	14	34	1.31	0.89	6.8	7
9/17/2004	28.4	8	40	1.87	0.91	7.8	7.1
1/5/2005	27.968	12	25	1.45	0.88	7.6	6.8
1/4/2004	27.092	6	17	1.2	0.78	8.5	6.8
1/15/2007	27.037	7	19	0.91	0.67	7.9	6.8
9/9/2004	26.991	10	25	0.87	0.78	6.1	7
9/18/2004	26.733	8	14	1.21	0.49	5.9	6.8
3/2/2007	26.496	9	19	1.64	0.89	8.8	6.8
2/6/2004	26.495	4	19	1.33	0.65	8.2	6.8
1/1/2003	25.986	9	7	1.43	0.69	8.4	6.7
12/13/2007	25.897	9	17	1.28	0.66		
11/19/2003	25.353	5	22	0.85	1.29	8.4	7.1
10/20/2006	24.64	3	13	0.6	0.43	7.5	6.9
1/5/2004	24.32	4	12	0.61	0.52	7.2	6.9
3/1/2007	24.269	13	22	2.12	0.79	9.3	7
1/12/2005	24.231	14	17	1.31	0.69	8.9	6.9
9/8/2004	23.604	10	47	1.13	1.56	7.5	7
10/17/2006	23.308	7	20	1.57	1.08	8.8	7.1
8/21/2004	23.243	3	4	0.61	0.75	5.9	6.9
4/2/2005	23.041	14	12	4.64	0.96	4.7	6.9
1/5/2007	22.537	10	21	1.92	1.31	8.3	6.8
6/15/2004	22.326	4	8	0.68	0.48	5.5	7
1/11/2005	22.199	24	24	1.86	0.93	9.3	6.9
3/20/2004	22.143	9	18	3.08	0.97	9.3	7
4/13/2004	22.02	7	21	2.52	1.01	7.2	7
5/18/2006	21.876	8	17	1.44	0.76	5.8	6.9
4/3/2005	21.576	15	15	3.27	0.75	8.1	6.9
1/14/2007	21.573	8	14	1.23	0.76	7.6	6.9
2/14/2005	21.229	19	29	2.34	1.11	10.2	7
1/7/2005	21.109	15	16	1.9	0.6	9.5	7.3
11/26/2007	21.105	7	17	1.93	1.02		
1/3/2005	20.809	8	14	1.71	1.12	8.2	6.9
1/13/2005	20.723	13	19	1.48	0.72	9.3	6.9
8/21/2007	20.689	6	8	1.06	0.56	6.8	6.9
3/23/2007	20.667	11	15	2.57	0.77	9	6.9
8/20/2004	20.371	7	13	0.85	0.59	6.7	7
7/26/2004	20.35	6	14	1.77	0.98	5.8	6.9
12/11/2003	20.335	5	11	0.44	0.58	7.6	7.2
3/20/2007	20.049	14	20	2.03	0.77	10.5	7.2
6/14/2004	19.975	4	21	1.09	0.69	3.9	7
6/13/2003	19.953	3	8	0.55	0.6	5.9	7
5/22/2004	19.738	5	11	1.67	2.45	6.1	6.8
10/19/2006	19.731	4	11	0.66	0.64	7.8	7
11/16/2006	19.632	5	14	1.19	0.96	7.5	6.9
10/28/2006	19.533	5	11	1.38	0.71	7.4	6.8

1/8/2005	19.327	15	16	2.01	0.68	9	6.8
3/13/2006	19.322	7	11	1.29	1	8.1	6.7
1/16/2007	19.312	10	17	1.63	0.76	9.1	6.9
12/16/2007	19.173	13	19	1.52	0.73		
1/14/2005	19.144	17	18	1.83	0.72	9.2	7
3/21/2004	18.831	6	15	1.89	0.48	8.6	7
11/29/2005	18.463	7	16	1.58	1.11	8.4	7
3/19/2007	18.454	12	20	2.4	0.94	10.2	6.9
2/22/2003	18.441	10	17	3.2	1.29	9.4	7.1
4/4/2005	18.372	19	16	3.48	0.73	8.9	6.9
12/12/2007	18.264	11	10	1.73	0.7		
1/13/2007	18.226	8	15	1.55	0.97	7.6	6.8
12/10/2003	18.218	5	20	1.07	1.04	8.8	6.9
3/1/2007	18.163	6	14	2.08	1.07	8.9	6.9
1/4/2005	18.061	9	14	1.59	0.74	7.2	7
5/21/2004	18.017	4	8	1	0.93	6.8	6.9
3/3/2007	17.917	13	20	2.29	0.92	10	6.8
5/15/2006	17.758	8	16	1.71	0.95	6.2	6.8
5/17/2006	17.749	7	13	1.47	0.79	6.1	6.9
3/13/2003	17.523	6	9	2.39	0.74	8.3	6.9
3/14/2006	17.476	6	10	1.03	0.64	7.6	6.8
12/1/2004	17.422	7	13	1.04	0.79	6.3	6.9
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9/19/2004	17.006	8	8	0.86	0.49	7.5	6.9
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12/14/2007	16.945	11	13	1.75	0.65		
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4/14/2004	16.68	5	11	1.81	0.56	7.2	6.9
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3/16/2007	16.534	13	20	2.4	0.8	10.5	6.9
1/7/2007	16.454	7	10	0.99	0.71	8.2	6.8
10/25/2005	16.436	6	19	1.49	0.99	7.8	7.2
2/9/2005	16.408	19	21	2.01	1.01	9.7	7
1/8/2007	16.384	8	11	1.28	0.61	7.6	6.9
9/3/2003	16.331	6	10	0.76	0.65	6.9	7
2/15/2005	16.27	16	17	1.89	0.86	10.2	6.8
11/20/2003	16.25	3	10	0.33	0.61	8.2	7
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2/21/2004	15.874	7	7	2.75	0.64	8.3	6.8
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12/9/2007	15.638	8	17	1.72	1.09		
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12/23/2007	15.466	13	16	2.16	0.97		
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3/21/2007	15.348	13	16	2.45	0.92	10.5	6.9
2/23/2003	15.3	5	9	1.64	0.64	7.5	7
7/10/2003	15.264	2	8	0.35	0.36	7	7

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7/22/2006	15.217	4	7	1.62	0.91	5.1	6.8
1/6/2007	15.206	9	13	1.38	0.77	7.9	7
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9/1/2003	14.978	3	4	0.57	0.58	7.3	7
10/21/2006	14.809	4	10	0.74	0.48	7.9	7
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1/3/2004	14.627	3	8	1.23	0.72	8.1	6.9
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4/23/2006	14.485	3	5	0.68	1.12	6.6	6.9
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6/16/2004	14.361	2	4	0.34	0.47	6.3	7
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5/11/2006	14.239	8	13	2.09	1.33	7.9	7
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4/23/2005	13.495	9	9	6.8	1.02	5	7
1/18/2006	13.48	3	10	1.21	1.22	8.1	6.9
4/26/2004	13.446	3	5	1.22	0.73	6.2	7
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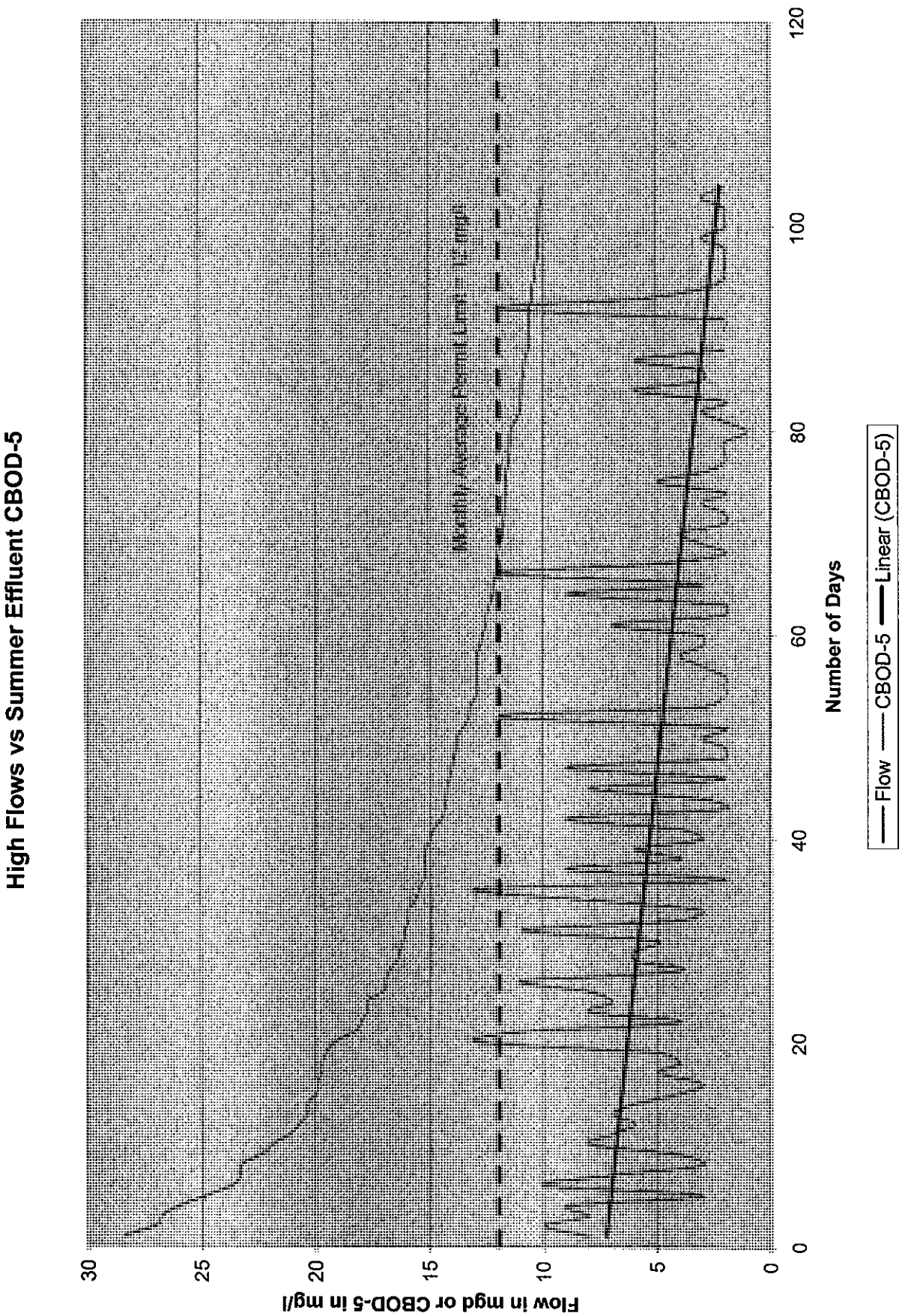
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2/10/2005	12.689	12	19	1.52	0.93	10	7
11/30/2004	12.672	3	10	0.54	1.23	8.9	6.9
3/22/2004	12.668	4	15	1.91	0.46	8.3	6.9
7/22/2003	12.667	3	9	0.86	0.68	5	6.9
4/16/2007	12.667	10	23	1.82	1.24	9.4	7
2/5/2004	12.653	6	12	2.96	0.92	10.1	7.2
4/15/2007	12.638	15	18	2.54	1.35	8.8	6.5
8/27/2006	12.511	7	13	1.63	1.03	7.3	7
12/24/2003	12.503	2	4	1.12	0.66	7.9	6.9
1/2/2004	12.476	2	6	1.37	0.86	8.3	6.9
6/14/2003	12.473	2	9	0.4	0.38	7.1	6.9
1/9/2007	12.364	3	7	0.34	0.55	8.5	7
3/4/2004	12.36	2	7	2.46	0.68	8.7	6.9
3/5/2004	12.345	2	10	2.69	0.63	8.8	6.8
8/22/2004	12.334	2	5	0.24	0.42	7.5	6.9
3/3/2004	12.28	3	8	2.31	0.65	8.8	7
11/15/2005	12.254	6	10	0.92	0.93	6.8	6.9
12/15/2007	12.207	9	15	1.54	0.77		
8/30/2005	12.202	4	11	3.56	1.01	6.6	7.1
3/25/2007	12.188	9	16	2.46	0.77	8.6	6.8
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1/4/2003	12.081	3	2	0.4	0.51	9.1	7
12/24/2007	12.057	12	13	2	0.87		
9/20/2004	12.023	5	9	0.77	0.41	7	6.9
9/12/2006	11.97	2	10	0.58	0.98	7.9	7.2
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3/18/2007	11.653	10	21	2.07	0.97	10	7
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2/8/2004	11.614	3	12	1.57	0.61	9.8	6.9
6/17/2003	11.605	3	5	0.54	0.54	7.4	7
3/7/2004	11.582	2	7	2.45	0.67	8.9	6.9
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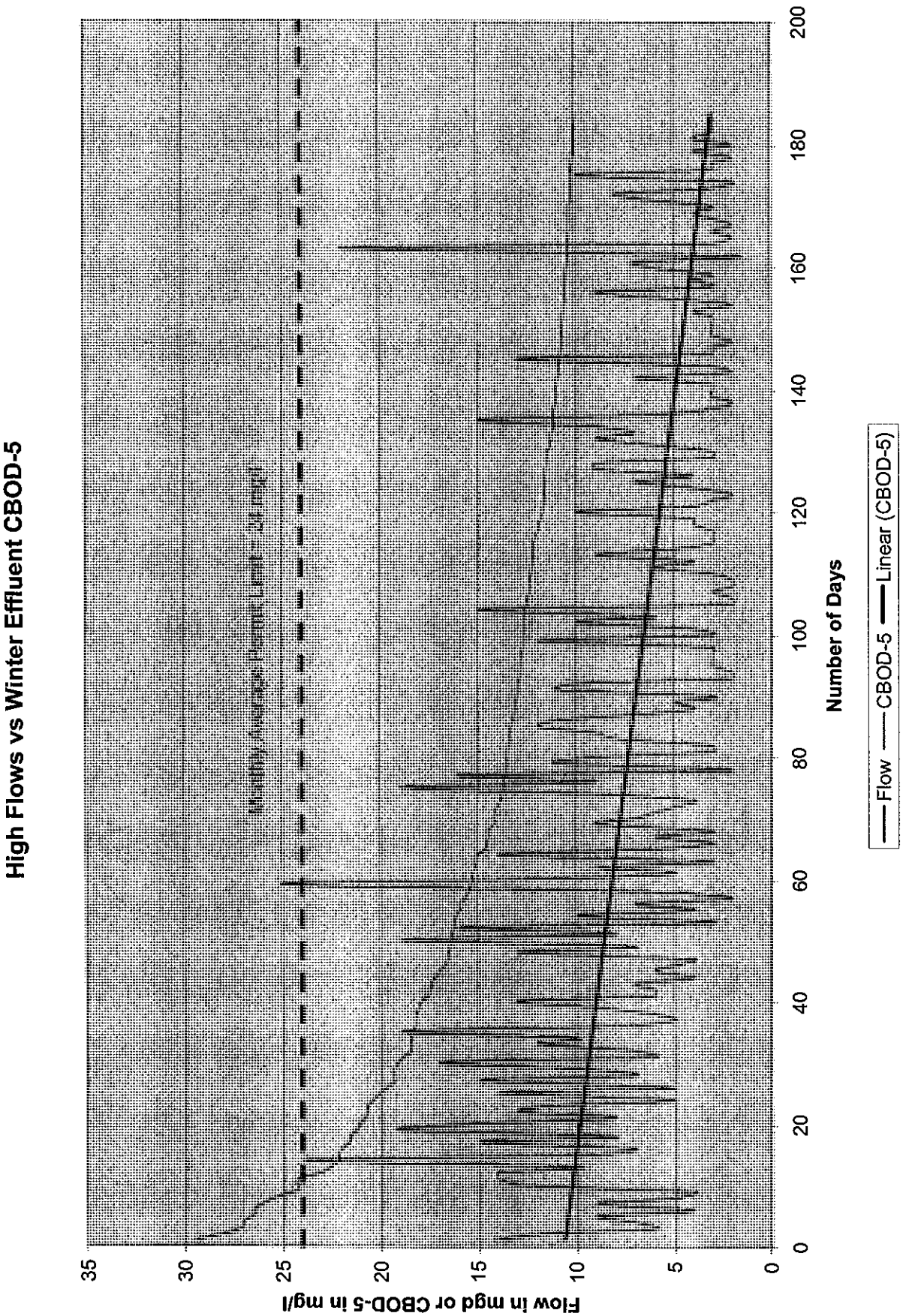
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7/31/2006	11.434	2	6	0.95	0.77	5.2	6.9
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2/22/2004	11.402	3	7	1.95	0.53	8.8	7
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1/10/2005	11.235	9	15	1.16	0.74	9.2	6.9
4/24/2005	11.203	7	6	5.8	0.93	7.1	7
10/22/2006	11.195	2	6	0.31	0.44	7.5	6.9
1/16/2005	11.14	9	13	1.01	0.69	9.9	6.7
4/6/2005	11.131	15	19	5.36	0.99	7.8	6.9
12/22/2006	11.123	6	15	1.78	1.59		
3/16/2003	11.084	3	7	2.5	0.63	8.8	6.9
11/21/2003	11.007	2	16	0.39	0.56	8.6	7.1
11/29/2003	11.007	3	18	0.48	0.7	8.5	7
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5/24/2003	10.975	3	5	0.44	0.75	7.2	6.6
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2/17/2005	10.785	13	23	1.78	1.03	10.7	6.9
8/20/2007	10.776	6	23	1.27	0.96	7.3	6.9
3/31/2004	10.761	3	8	4.54	0.94	8.5	7
3/10/2003	10.726	3	6	1.97	0.58	9.4	6.9
2/24/2004	10.716	2	7	2.67	0.63	9	7
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3/6/2003	10.656	3	6	1.83	0.71	8.8	7
5/9/2003	10.636	2	5	1.35	0.89	8	7
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1/5/2003	10.591	2	3	0.33	0.56	9.4	6.9
2/21/2007	10.534	5	15	3.04	1.33	9.4	7
3/24/2005	10.521	9	10	6.65	0.77	6.8	7
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4/25/2005	10.496	4	8	5.81	0.78	7.1	7
12/30/2003	10.494	3	9	2.08	2.38	8	7.1
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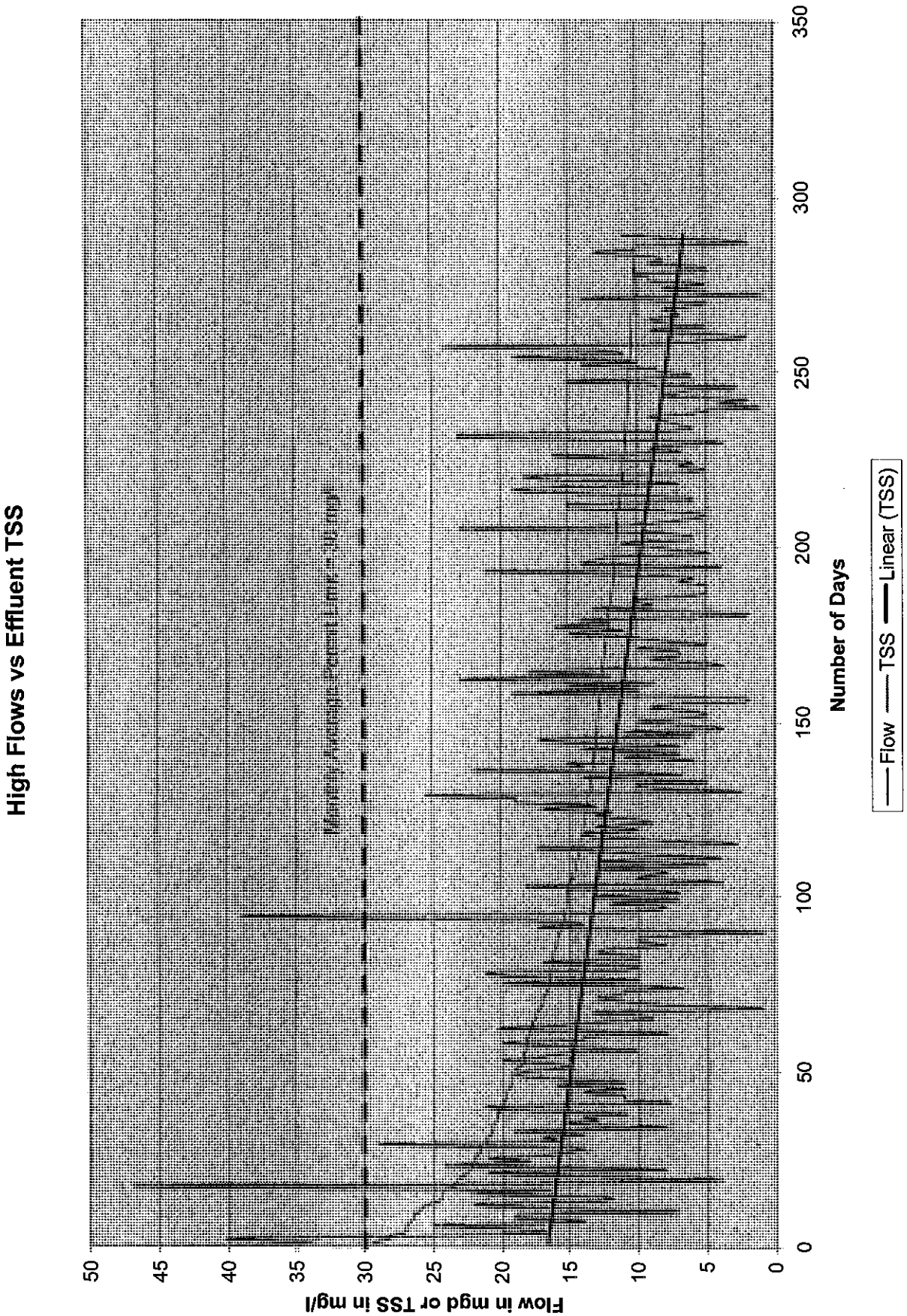
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1/4/2006	10.054	3	13	1.32	0.96	8.8	7
3/2/2003	10.05	3	10	2.25	0.9	8.8	7
12/24/2004	10.032	3	10	0.55	0.66	9	6.9
10/15/2003	10.017	3	2	0.45	0.61	7.6	7
7/23/2003	10.006	2	6	0.37	0.54	6.4	6.9
4/27/2004	10.004	3	11	0.82	0.71	7.9	6.9
Max.	29.506	25	47	8.32	2.45	10.8	7.3
Min.	10.004	1	1	0.24	0.36	3.9	6.5

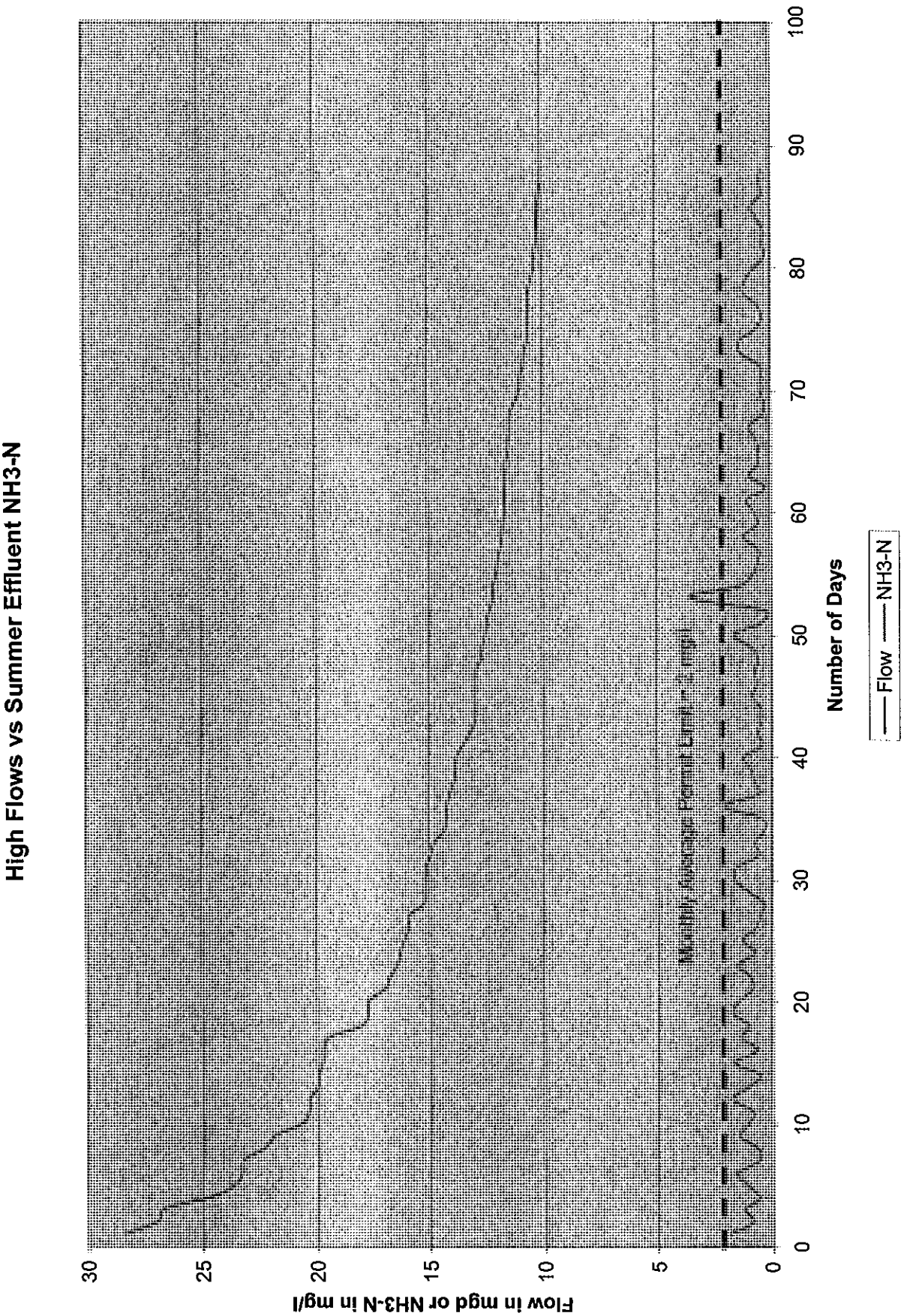
Average Effluent Concentrations

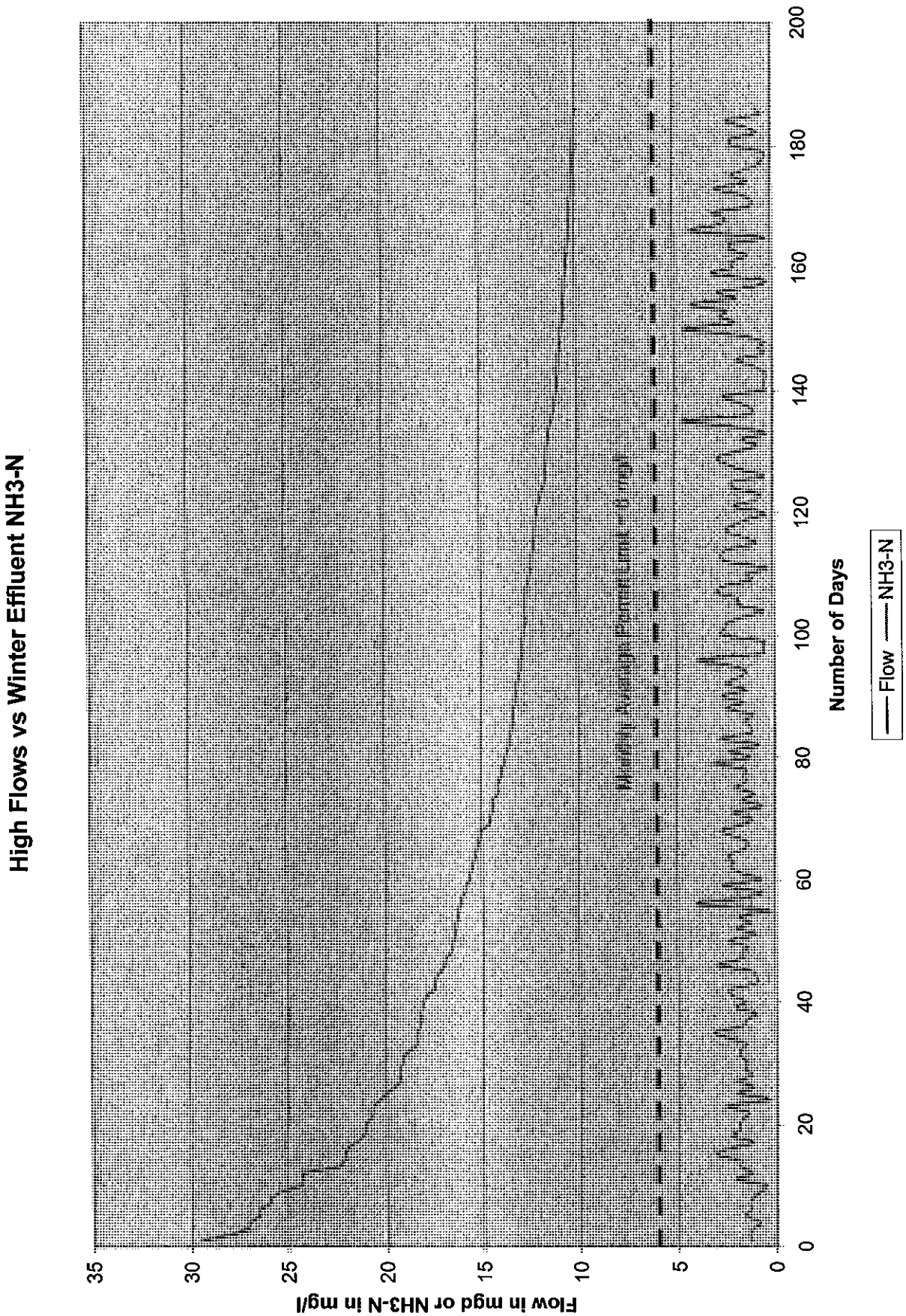
Flow Range	Effluent CBOD-5 (mg/L)	Effluent TSS (mg/L)	Effluent NH3-N (mg/L)	Effluent P (mg/L)	Effluent D.O. (mg/L)	Effluent pH
0 to 10 mgd	2.8	6.3	1.15	1.06	9.4	7.0
10 to 15 mgd	4.7	9.6	1.65	0.81	8.2	7.0
15 to 20 mgd	8.0	13.2	1.66	0.80	7.9	6.9
20 to 25 mgd	9.8	17.1	1.73	0.84	7.9	7.0
Over 25 mgd	8.4	21.5	1.28	0.80	7.7	6.9

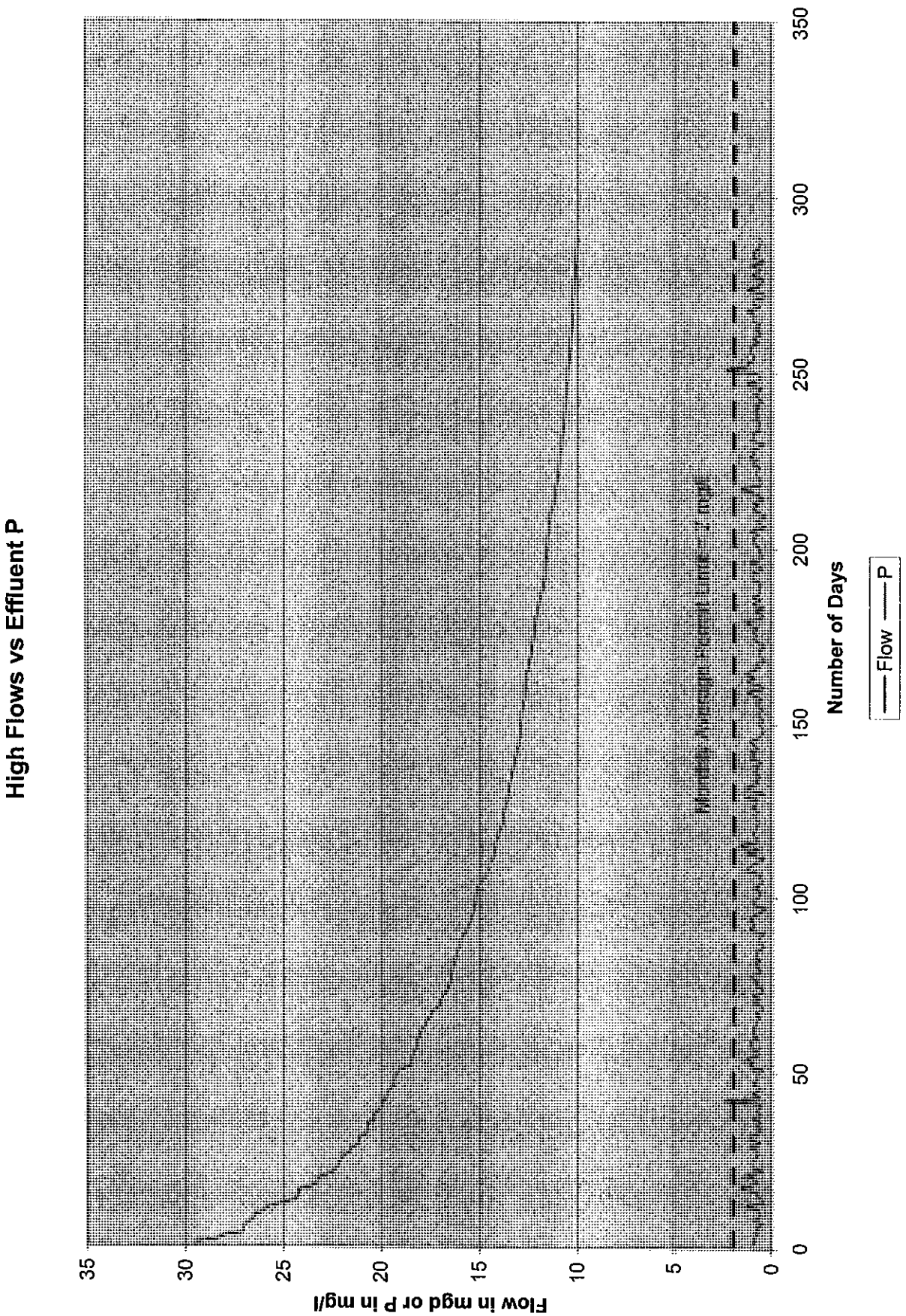

High Flows vs Summer Effluent CBOD-5
Flow in mgd or CBOD-5 in mg/l
Number of Days
Flow
CBOD-5
Linear (CBOD-5)
0
5
10
15
20
25
30
0
20
40
60
80
100
120

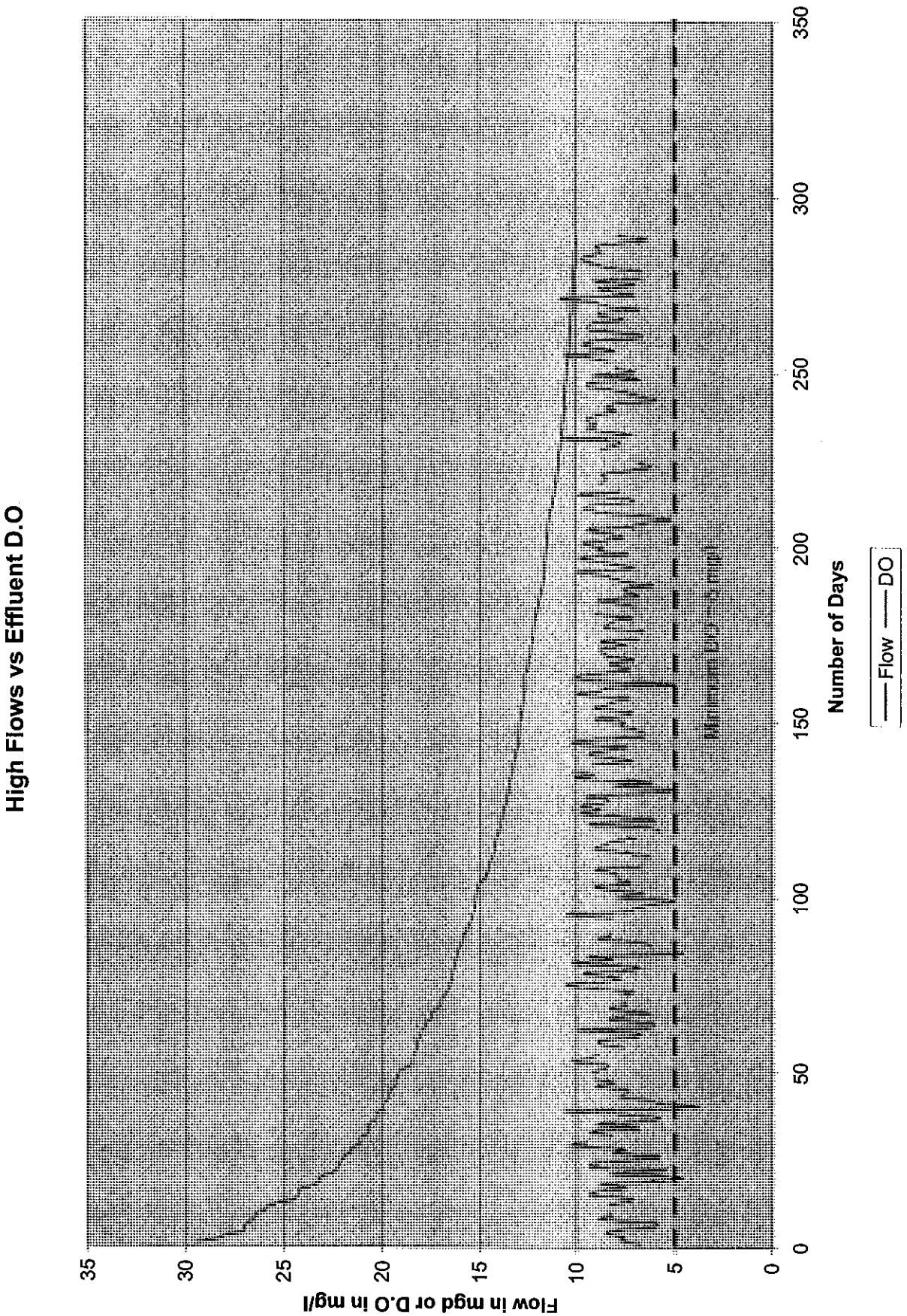

High Flows vs Winter Effluent CBOD-5
Flow in mgd or CBOD-5 in mg/l
Number of Days
Flow
CBOD-5
Linear (CBOD-5)
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200

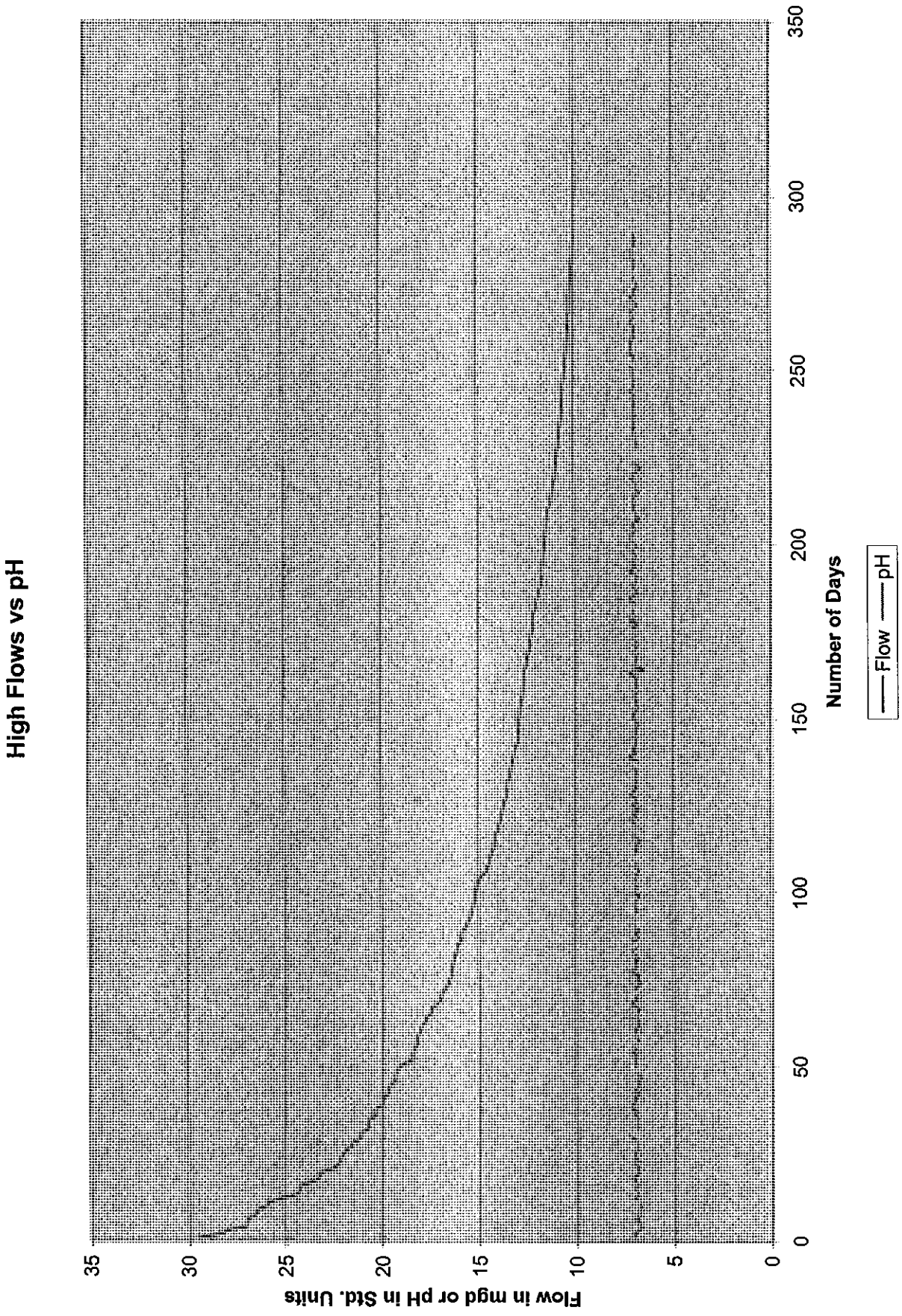

High Flows vs Effluent TSS
Flow in mgd or TSS in mg/l
Number of Days
Flow
TSS
Linear (TSS)
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350


High Flows vs Summer Effluent NH3-N
Flow in mgd or NH3-N in mg/l
Number of Days
Flow
NH3-N
Monthly Average Permit Limit = 1 mg/l
0
5
10
15
20
25
30
0
10
20
30
40
50
60
70
80
90
100


High Flows vs Winter Effluent NH3-N
Flow in mgd or NH3-N in mg/l
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200
Number of Days
Flow
NH3-N


High Flows vs Effluent P
Flow in mgd or P in mg/l
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350
Number of Days
Flow
P


High Flows vs Effluent D.O
Flow in mgd or D.O in mg/l
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350
Number of Days
Flow
DO


High Flows vs pH
Flow in mgd or pH in Std. Units
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350
Number of Days
Flow
pH

APPENDIX D
SSO SUMMARY
1998 - 2007

Butler Area Sewer Authority
Analysis of Sanitary Sewer Overflows, 1998 to 2007

General Tire Overflow - Outfall No. 009

Year	No. of Overflow Events	Total Duration (hours)	Total Volume (gallons)	Average Duration (hours)	Average Volume (gallons)
1998	9	106.5	4,826,600	11.8	536,289
1999	10	132.0	13,353,404	13.2	1,335,340
2000	8	61.0	1,420,100	7.6	177,513
2001	10	64.8	3,542,700	6.5	354,270
2002	8	63.5	3,516,500	7.9	439,563
2003	16	76.8	4,447,700	4.8	277,981
2004	18	253.8	14,223,600	14.1	790,200
2005	12	157.3	6,879,000	13.1	573,250
2006	17	79.0	2,680,400	4.6	157,671
2007	18	188.8	9,288,400	10.5	516,022
Totals	126	1,183	64,178,404		
Averages	15.8	147.9	8,022,300.5	9.4	515,810

Butler Area Sewer Authority
Analysis of Sanitary Sewer Overflows, 1998 to 2007

Ball Park Overflow - Outfall No. 010

Year	No. of Overflow Events	Total Duration (hours)	Total Volume (gallons)	Average Duration (hours)	Average Volume (gallons)
1998	9	110.8	4,966,500	12.3	551,833
1999	10	126.5	5,694,469	12.7	569,447
2000	8	66.7	2,361,700	8.3	295,213
2001	10	71.1	3,174,600	7.1	317,460
2002	8	67.3	2,470,900	8.4	308,863
2003	16	80.8	3,843,400	5.0	240,213
2004	19	272.5	25,742,800	14.3	1,354,884
2005	14	172.3	10,577,600	12.3	755,543
2006	18	110.5	6,151,200	6.1	341,733
2007	18	211.5	15,928,300	11.8	884,906
Totals	130	1,290	80,911,469		
Averages	16.3	161.2	10,113,933.6	9.8	562,009

Butler Area Sewer Authority
Analysis of Sanitary Sewer Overflows, 1998 to 2007

Deshon Pump Station Overflow - Outfall No. 015

Year	No. of Overflow Events	Total Duration (hours)	Total Volume (gallons)	Average Duration (hours)	Average Volume (gallons)
1998	5	62.3	1,552,500	12.5	310,500
1999	6	76.3	6,189,897	12.7	1,031,650
2000	7	49.0	4,299,234	7.0	614,176
2001	10	61.8	4,237,300	6.2	423,730
2002	6	49.8	2,788,100	8.3	464,683
2003	10	45.8	3,073,200	4.6	307,320
2004	16	262.3	27,411,100	16.4	1,713,194
2005	12	153.0	12,617,000	12.8	1,051,417
2006	8	64.5	4,528,200	8.1	566,025
2007	13	179.3	13,358,098	13.8	1,027,546
Totals	93	1,003.8	80,054,629		
Averages	11.6	125.5	10,006,828.6	10.2	751,024

Butler Area Sewer Authority
Analysis of Sanitary Sewer Overflows, 1998 to 2007

Monroe Street Pump Station Overflow - Outfall No. 003

Year	No. of Overflow Events	Total Duration (hours)	Total Volume (gallons)	Average Duration (hours)	Average Volume (gallons)
1998	2	9.9	69,900	5.0	34,950
1999	4	9.8	382,805	2.4	95,701
2000	1	12.3	158,300	12.3	158,300
2001	3	11.3	212,700	3.8	70,900
2002	2	13.0	148,500	6.5	74,250
2003	5	35.3	1,809,300	7.1	361,860
2004	5	90.8	4,506,300	18.2	901,260
2005	1	19.8	1,477,500	19.8	1,477,500
2006	2	13.8	673,800	6.9	336,900
2007	6	55.8	2,451,200	9.3	408,533
Totals	31	271.4	11,890,305		
Averages	3.9	33.9	1,486,288.1	9.1	392,015

APPENDIX E
EQUALIZATION TANK SIZING ANALYSIS

BUTLER AREA SEWER AUTHORITY 537 PLAN TECHNICAL MEMORANDUM ON SSO DATA REVIEW AND EQUALIZATION TANK SIZING ANALYSIS DECEMBER 7, 2007

METHODOLOGY

A review of sanitary sewer overflow (SSO) data and an equalization tank sizing analysis has been completed using the method described below for the four SSO locations in the Butler Area Sewer Authority (BASA) system.

1 Measured SSOs were ordered from high to low to determine the extent of overflows and to calculate equalization volumes required to capture historic SSOs (see first chart)

2. Overflow volumes were then plotted against measured rainfall to define relationships between precipitation amounts and overflow volumes (see second chart) Each graph exhibited a linear relationship between rainfall and overflow volumes, defined on the upper end of the scale by the SSO events produced by the remnants of Hurricane Ivan and Hurricane Francis. Each SSO location also had 3 to 4 events where overflow volumes were greater than what would be expected based on the corresponding rainfall amounts.

3 The next step was to select data points for a regression analysis to define a best-fit line relationship for each SSO location (see third chart). Data points outside the selected range were not chosen because use of all the data points would result in a low R squared value in the linear regression analysis (poor linear relationship) Using all of the data points would also cause the best-fit line to be flatter, resulting in smaller storage volumes.

4. The final step was to plot the best-fit line from the linear regression on a graph showing all of the data points (see fourth chart) As part of this analysis, measured precipitation events were compared to design rainfall amounts for Butler and return frequencies were determined for some of the larger storms. The storm frequency information was added to the graph In addition, the storage volumes required to contain 90% and 95% of the historic overflows were added to the graph Due to the limited number of SSO events at the Monroe pump station, the graph for this location also shows storage volumes to capture 75% and 80% of historic overflow volumes

ANALYSIS

As discussed at a December 5, 2007 meeting at the Department of Environmental Protection (DEP) Meadville office, Chester Engineers has designed 19 flow equalization tanks for clients in Pennsylvania One facility was designed to capture overflows from a combined sewer system. The remaining tanks were all designed to capture SSOs resulting from 2-year, 24-hour design storms as required by the regional DEP offices.

The attached precipitation frequency estimates from the National Oceanic and Atmospheric Administration (NOAA) show that a 2-year, 24-hour storm in Butler produces 2 40 inches of total precipitation. The best-fit linear regression lines for each SSO location in the BASA system were used in conjunction with this design rainfall amount to estimate the sizes of flow equalization tanks required to contain historic SSOs resulting from a 2-year, 24 hour design storm. The following procedure was used to estimate tank volumes.

1. Start on the x-axis at 2.40 inches of precipitation (see arrow marked "2 yr")
2. Move vertically from this point up to the best-fit linear regression line
3. Move horizontally from this point over to the y-axis
4. Identify the required tank volume using the point of intersection with the y-axis

Estimated tank volumes and capture rates determined by this analysis are listed below.

SSO Location	Tank Volume (million gallons)	Capture of Historic SSO Events
Ballpark	2.30	92%
General Tire	1.60	91%
Deshon Pump Station	2.50	90%
Monroe Pump Station	0.70	76%
Total Tank Volume	7.10	

The same procedure can be used to estimate tank volumes for other design storms, using the NOAA precipitation estimates for Butler, Pennsylvania. The NOAA data shows that a 5-year, 24-hour storm produces 2.93 inches of precipitation and 3.37 inches of precipitation results from a 10-year, 24-hour storm.

DISCUSSION

Equalization tanks sized to contain SSOs from a 2-year, 24 hour storm would capture more than 90 percent of historic SSO events at the Ballpark, General Tire, and Deshon pump station locations. Results for the Monroe pump station are skewed by a small number of SSO events and the fact that 24% of the events were over one million gallons.

The remaining events were all smaller than 600,000 gallons and 60% of the total events were less than 320,000 gallons

A benefit-cost analysis for three of the SSO locations is presented below. The table lists estimated tank sizes needed to capture 90 and 95 percent of historic overflow events and shows the increased tank volumes that would be required to contain the additional SSOs

SSO Location	Volume for 90% Capture (MG)	Volume for 95% Capture (MG)	Volume Increment (MG)	Increase for Additional Capture
Ballpark	1 90	2.95	1.05	55 3%
General Tire	1 40	2.20	0.80	57 1%
Deshon PS	2 50	4.75	2.25	90 0%

This comparison shows that the incremental tank volume needed to contain 95 percent of historic SSOs would be quite large relative to the volume needed to capture the first 90 percent. The Ballpark and General Tire tanks would need to be about 55 percent larger to contain an additional 5 percent of SSOs, while the tank for the Deshon Pump station would have to be almost doubled in size. The diminishing returns are best illustrated by the charts that show the overflow events ordered from highest to lowest. For these three SSO locations, the break point (location where the slope of the graph changes significantly) occurs at about 90 percent capture volume. Above this point, large volume increases would be required to capture small numbers of additional SSO events.

The graph break point for the Monroe Pump Station SSO occurs at about 600,000 gallons, which is equivalent to a 75 percent capture rate for historic SSOs The calculated tank volume for a 2-year, 24-hour storm is slightly higher at 700,000 gallons However, the Monroe Pump Station chart has a plateau above the graph break point, caused by 6 of the 25 recorded SSO events having discharge volumes in excess of one million gallons. A storage tank volume of about 1.27 million gallons would be required to capture 90% of historic SSOs, more than double the volume required for 75% capture Relative to the best-fit linear regression line, a 1.27 million gallon tank volume corresponds to an approximate 50-year, 24-hour design storm (4.50 inches of precipitation).

CONCLUSIONS

This analysis indicates that flow equalization tanks sized to contain overflows from a 2-year, 24-hour storm event would capture more than 90 percent of the historic SSOs recorded at the Ballpark, General Tire, and Deshon Pump Station locations A tank sized to capture overflows from a 2-year, 24-hour storm event would store 76 percent of the

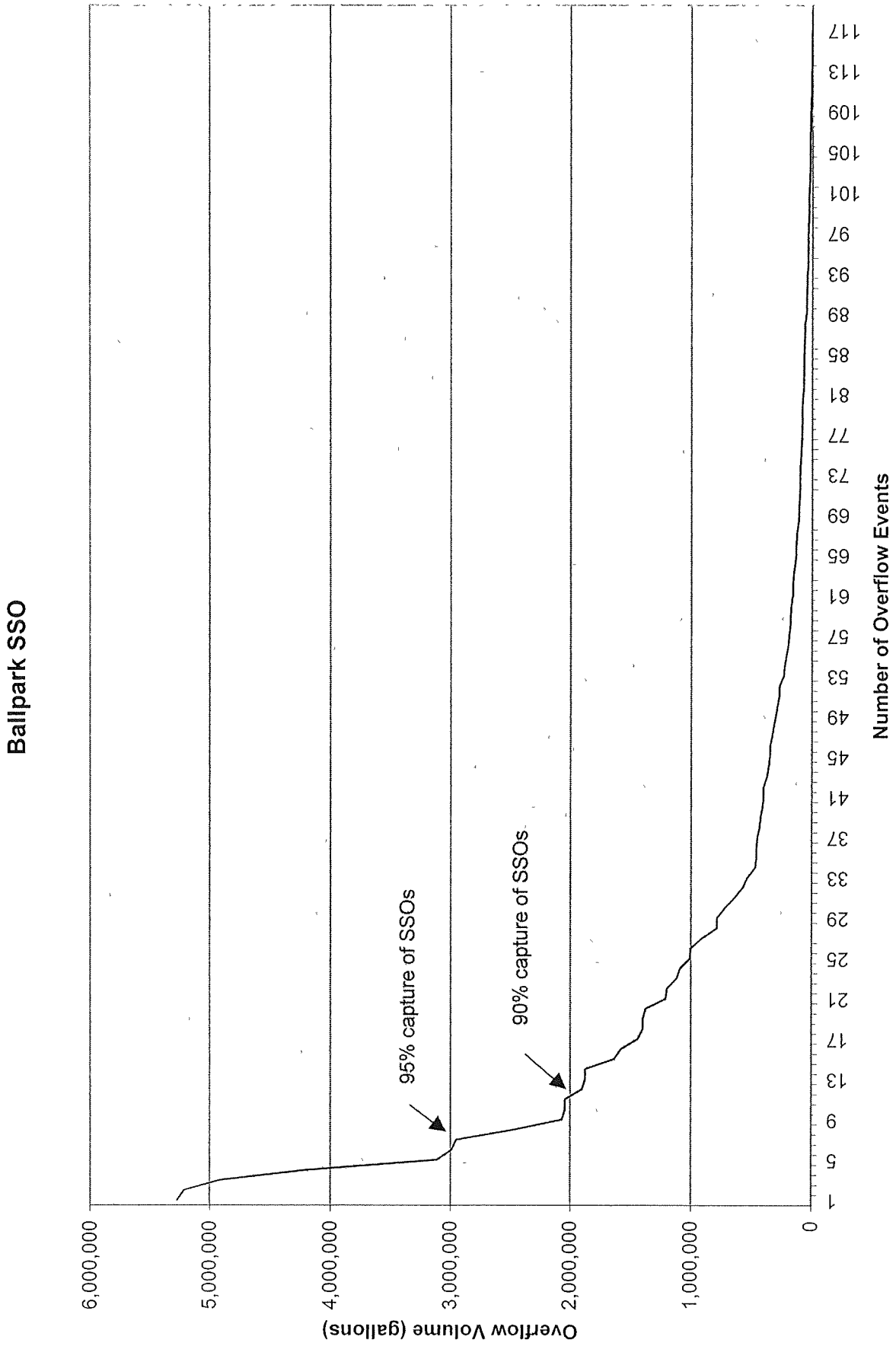
historic SSOs recorded at the Monroe Pump Station Large volume increases would be needed to contain SSOs beyond a 2-year, 24-hour design storm. The cost for extra storage capacities in excess of these capture rates would be large relative to the benefits provided by the additional storage volumes

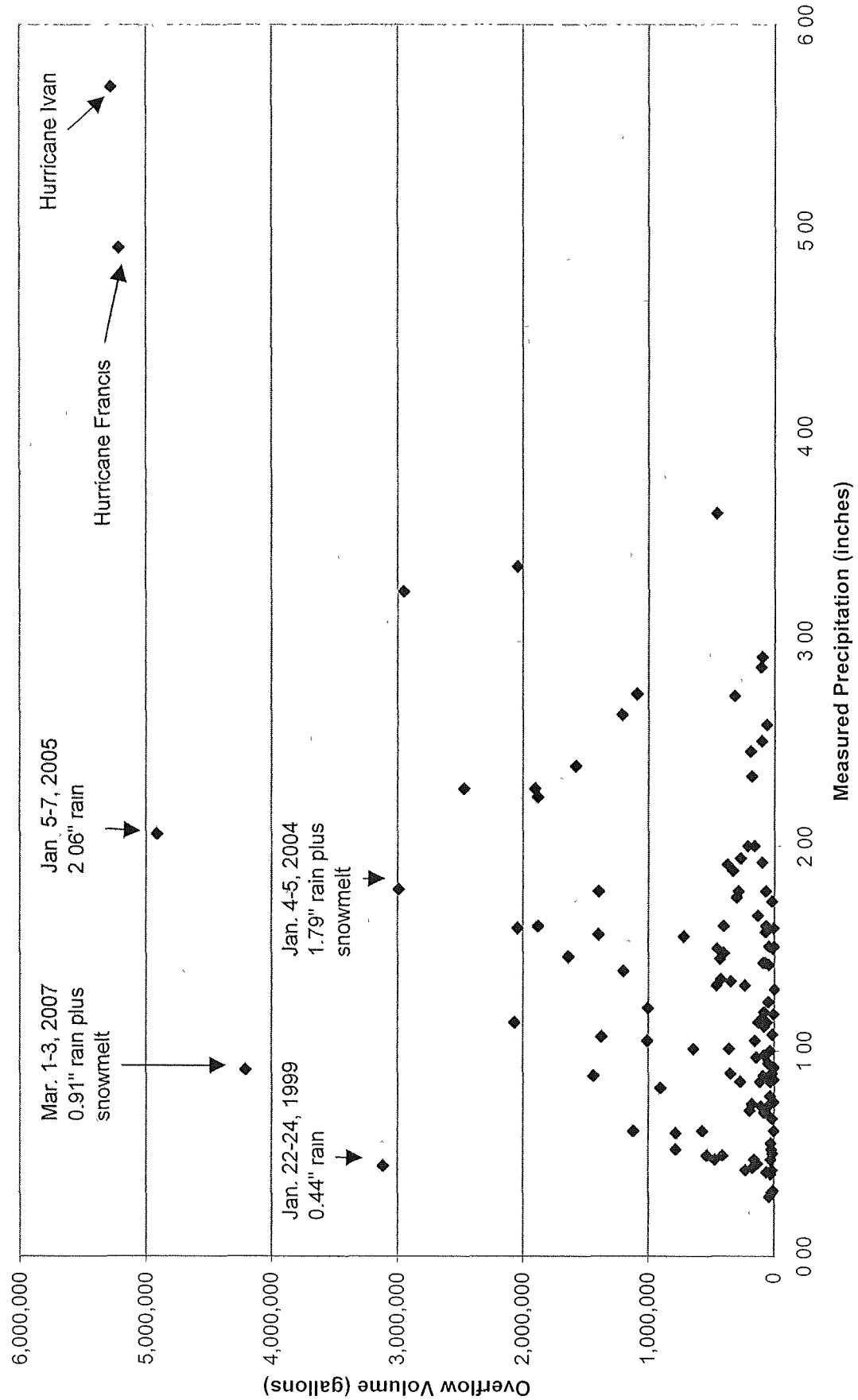
The purpose of this submittal is to allow the DEP Meadville office to review the data and identify acceptable design criteria for sizing of future flow equalization tanks in the BASA system. However, the capture rates and storage tank volumes discussed in this memorandum are based on historic SSOs and corresponding customer service populations. The volumes that are ultimately required will vary depending on a number of factors, including the DEP's approval of a design storm or capture rate for sizing the storage tanks. For example, future growth in areas tributary to the SSO locations would generate additional wastewater and require larger storage tank volumes. Information from the Act 537 special studies prepared by the member municipalities will be used to determine future needs in the BASA service area. Efforts to control peak flows to the treatment plant to within current permit and reduce the peak hydraulic loading on the interceptor sewers downstream of the overflows would also increase the required sizes of the storage tanks. Conversely, provision of additional conveyance and treatment capacity would reduce the equalization tank volumes needed

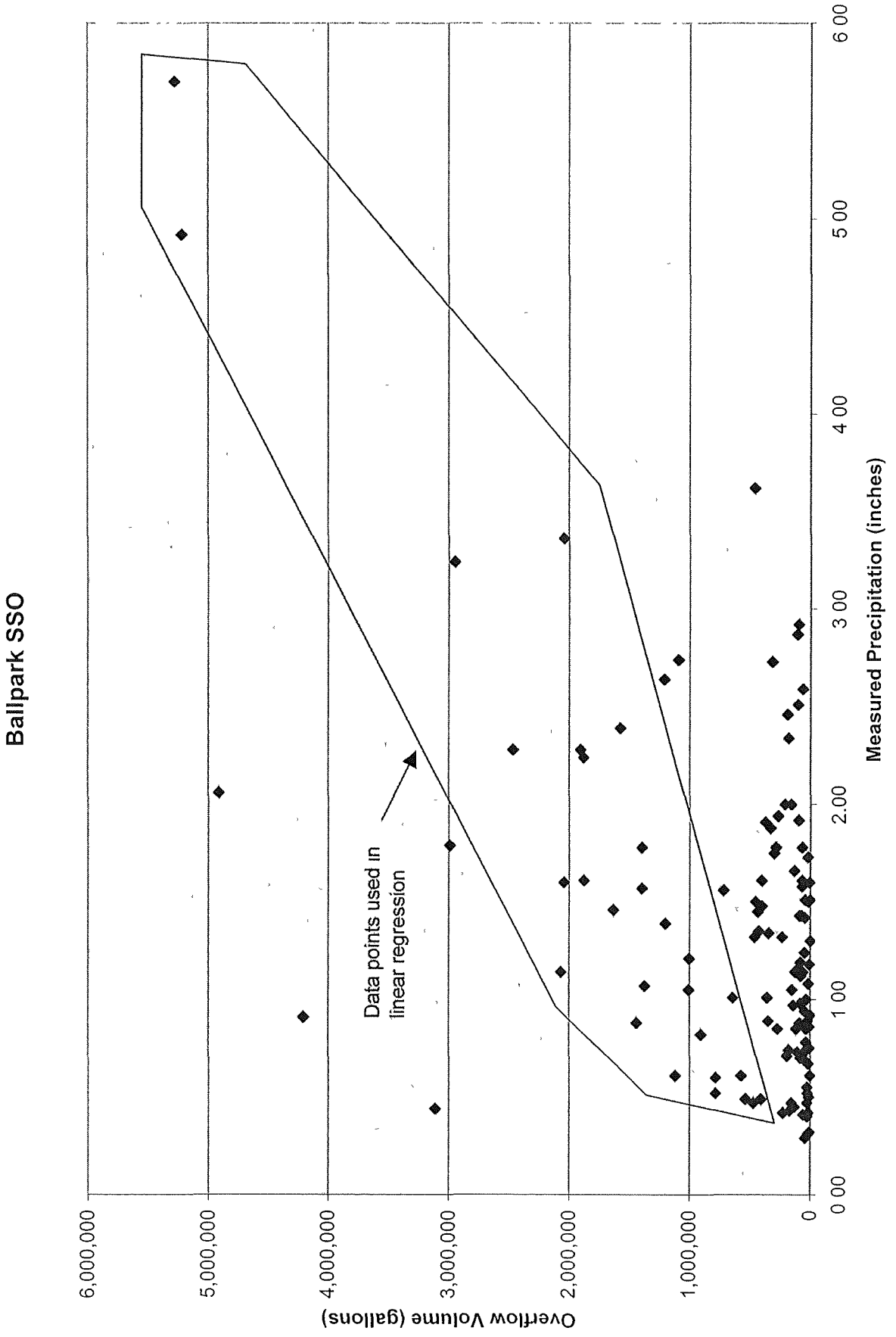
ATTACHMENTS

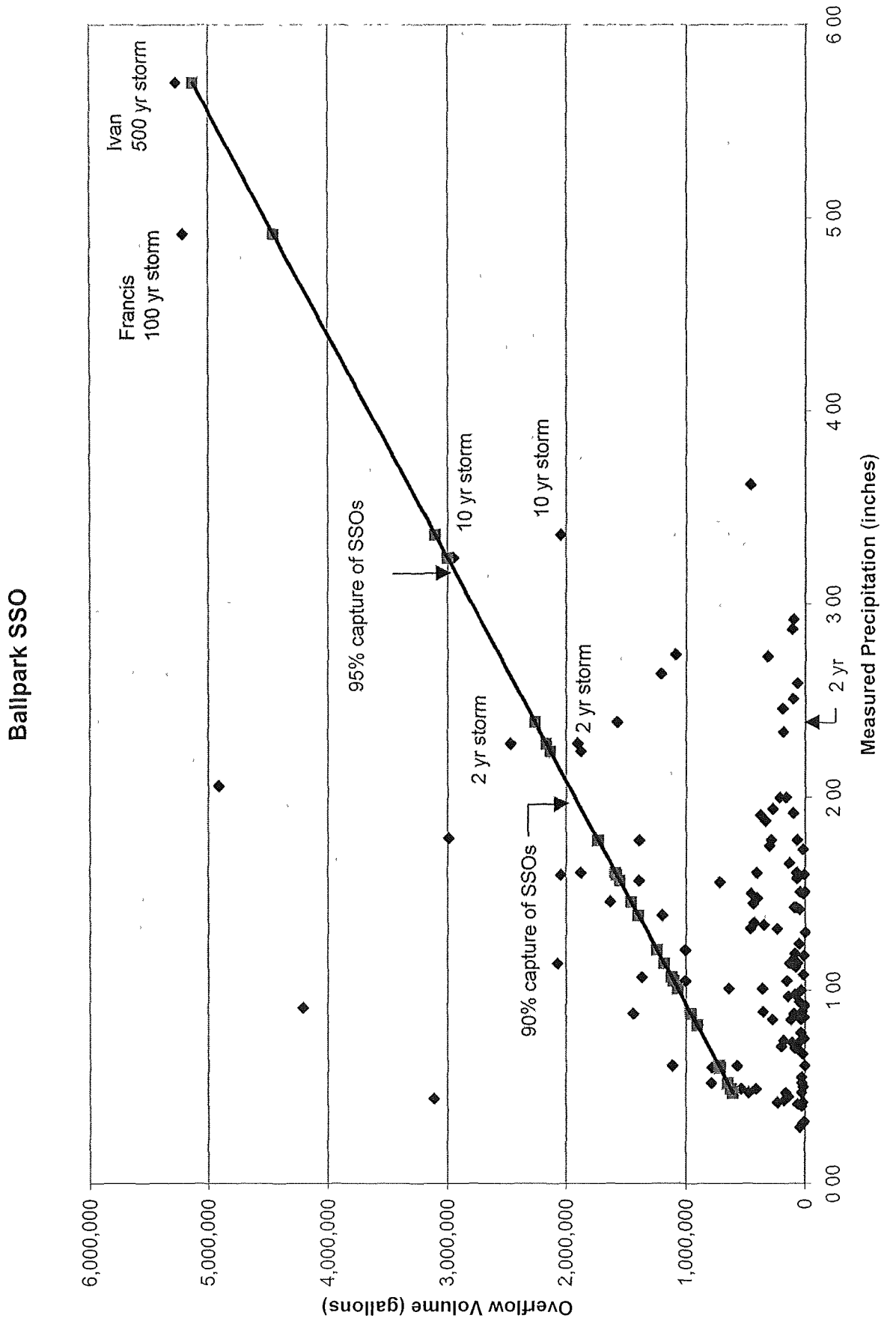
Attachments to this memo include four graphs for each SSO location, the rainfall and overflow data used to generate the graphs, a list of flow equalization tanks designed by Chester Engineers, and a point precipitation frequency estimate by NOAA for Butler, Pennsylvania that lists rainfall amounts for different storm durations and recurrence intervals

GRAPHS AND DATA FOR BALLPARK SSO


Ballpark SSO
Overflow Volume (gallons)
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Number of Overflow Events
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
95% capture of SSOs
90% capture of SSOs


Ballpark SSO
Overflow Volume (gallons)
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2 00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Mar. 1-3, 2007
0.91" rain plus
snowmelt
Jan. 5-7, 2005
2 06" rain
Hurricane Francis
Hurricane Ivan
Jan. 4-5, 2004
1.79" rain plus
snowmelt
Jan. 22-24, 1999
0.44" rain


Ballpark SSO
Overflow Volume (gallons)
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Data points used in linear regression
Measured Precipitation (inches)
0 00
1 00
2.00
3 00
4 00
5 00
6 00


Ballpark SSO
Overflow Volume (gallons)
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2 00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Ivan
500 yr storm
Francis
100 yr storm
95% capture of SSOs
90% capture of SSOs
10 yr storm
10 yr storm
2 yr storm
2 yr storm
2 yr

BUTLER AREA SEWER AUTHORITY
RAINFALL / STORMFLOW CORRELATION ANALYSIS
BALL PARK OVERFLOW
OUTFALL NO 010

Linear Regression Parameters

Data Points Used	28
X-range (independent variable)	Total Precipitation
Y-range (dependent variable)	Total Bypass Volume

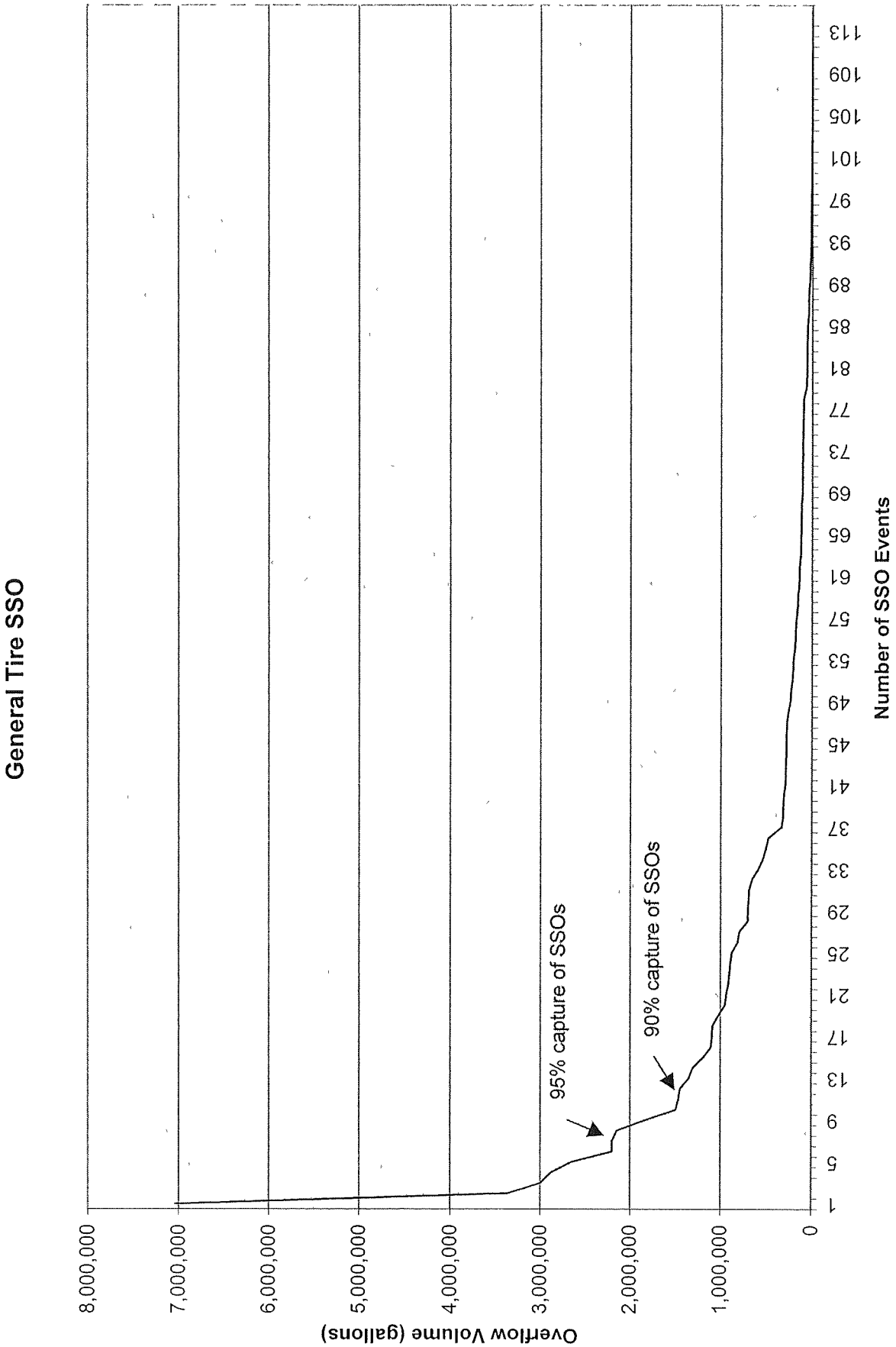
Event Number	Date	X Measured Precip (inches)	Y1 Total Bypass Volume (Gallons)	Y2 Best Fit Line	Comment
73	09/17-19/2004	5 70	5,274,000	5,126,484	Ivan - 500 yr storm
72	09/08-10/2004	4 92	5,214,800	4,451,992	Francis - 100 yr storm
71	08/20-21/2004	3 24	2,949,300	2,999,240	10 yr storm
105	10/19-21/2006	2 28	2,471,200	2,169,096	2 yr storm
112	3/15/2007	1 14	2,070,200	1,183,300	
84	04/02-03/2005	1 60	2,044,300	1,581,077	
117	8/20-21/2007	3 36	2,043,100	3,103,008	10 yr storm
45	06/12-13/2003	2 28	1,903,500	2,169,096	2 yr storm
33	12/17-18/2001	2 24	1,878,700	2,134,507	2 yr storm
58	02/06-07/2004	1 61	1,876,800	1,589,725	
110	01/14-15/2007	1 46	1,636,100	1,460,015	
55	11/19-20/2003	2 39	1,577,800	2,264,217	
8	1/18-19/1999	0 88	1,438,587	958,469	
68	6/15/2004	1 57	1,395,600	1,555,135	
104	10/17/2006	1.78	1,395,200	1,736,729	
60	03/20-21/2004	1 07	1,372,200	1,122,769	
56	12/10-11/2003	1 39	1,200,900	1,399,483	
79	1/12/2005	0 61	1,117,700	724,992	
34	03/26-27/2002	1 05	1,009,200	1,105,474	
42	01/01-02/2003	1.21	1,004,300	1,243,831	
63	04/13-14/2004	0 82	906,600	906,585	
65	5/21/2004	0 60	786,300	716,344	
66	5/22/2004	0 52	786,300	647,166	
82	02/14-15/2005	1 01	643,100	1,070,885	
113	03/19-20/2007	0 61	573,800	724,992	
92	03/13-14/2006	0 49	538,500	621,224	
31	10/23-24/2001	0 47	472,200	603,929	
114	3/23/2007	0 49	410700	621,224	
77	01/05-07/2005	2 06	4,913,400		precipitation
111	03/01-03/2007	0.91	4,205,800		precip + snow melt
9	1/22-24/1999	0 44	3,112,859		
57	01/04-05/2004	1 79	2,991,000		precip + snow melt

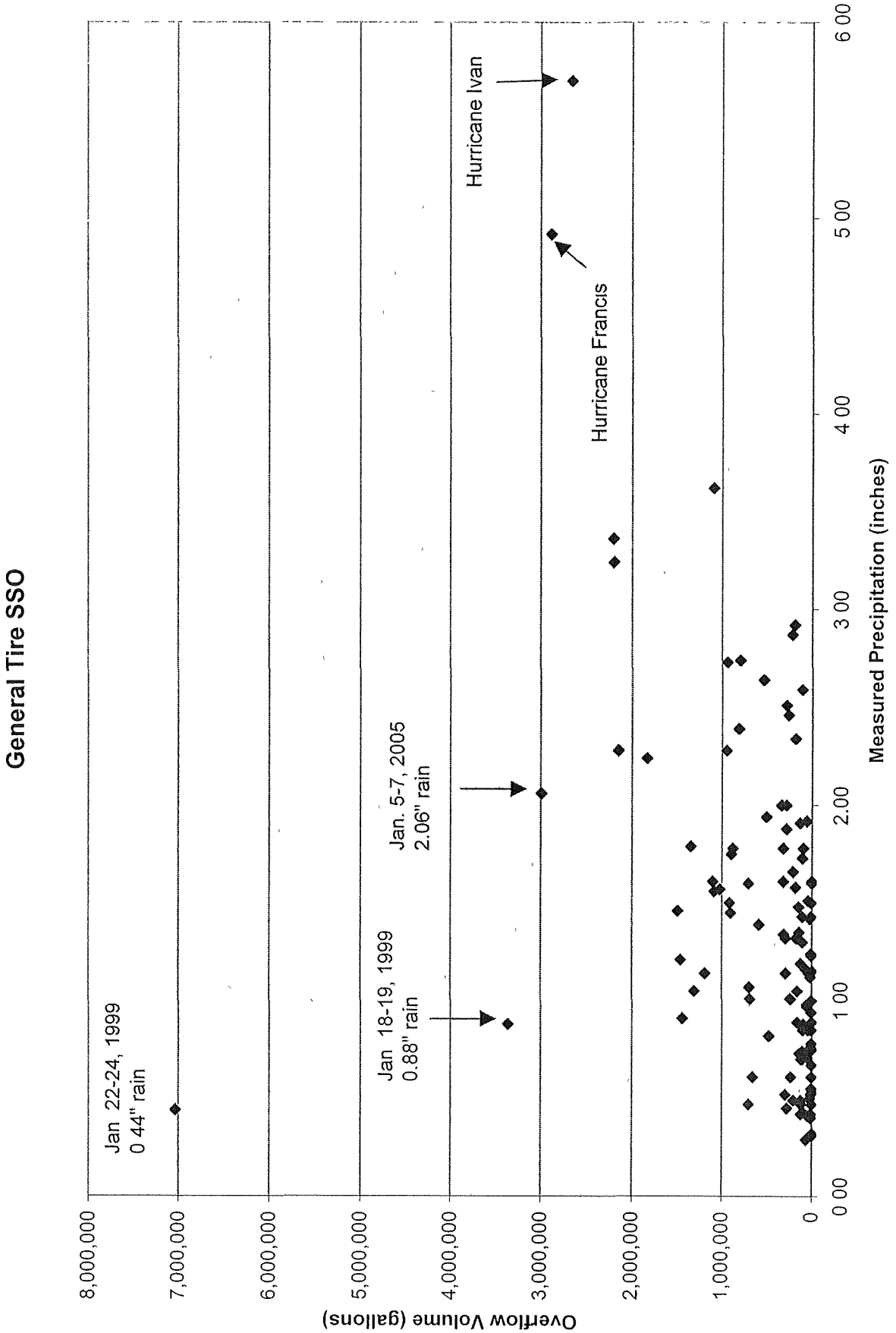
18	4/3-4/2000	2 64	1,211,000
69	7/26/2004	2 74	1,090,700
39	6/6/2002	1 56	720,300
89	11/29/2005	1 32	463,200
4	10/8/1998	3 62	461,700
5	12/21-22/98	1 50	453,700
76	01/03-04/2005	1 45	436,800
98	7/22/2006	1 35	428,600
67	6/14/2004	1 61	403,700
17	2/14/2000	1 48	403,300
107	11/16/2006	1 91	373,900
75	12/1/2004	1 01	360,300
78	1/11/2005	0 89	349,900
108	01/05-06/2007	1 34	347,900
51	8/30/2003	1 88	331,500
11	4/9-10/1999	2.73	318,129
13	7/2/1999	1 75	301,520
23	12/16/2000	1 78	287,000
19	4/8/2000	0 85	273,300
35	04/14-15/2002	1 94	270,100
25	3/21/2001	1.32	237,000
96	5/18/2006	0 42	228,000
26	4/7/2001	2 00	214,100
80	1/14/2005	0 71	196,900
37	05/13-14/2002	2 46	191,400
86	08/30-31/2005	2 34	181,700
115	4/1/2007	0 74	178,700
64	04/25-26/2004	0 43	174,100
1	7/89/98	2 00	161,300
43	02/22-23/2003	0 47	159,100
24	1/30-31/2001	1 05	154,000
103	9/30-10/1/2006	0 97	142,200
83	03/07-08/2005	0 45	134,800
15	12/14/1999	1 66	132,822
10	2/28/1999	1 14	127,971
94	5/15/2006	0 85	116,800
14	11/2/1999	2 87	108,392
41	12/14/2002	0 73	107,100
3	8/25/1998	2 51	102,900
100	8/27/2006	1 92	99,600
12	5/18-19/1999	2 92	98,988
74	10/18-19/2004	1 16	97,200
38	5/18/2002	1 43	91,100
47	7/10/2003	0.88	88,900
20	5/28/2000	1 19	83,700
28	6/30/2001	0 70	83,500
118	8/23/2007	0 98	82,100
97	6/27/2006	1 12	81,400
99	7/31/2006	1 43	75,500
21	8/6/2000	1 58	69,600
29	7/1/2001	0 70	68,800
48	07/21-22/2003	1 78	68,700

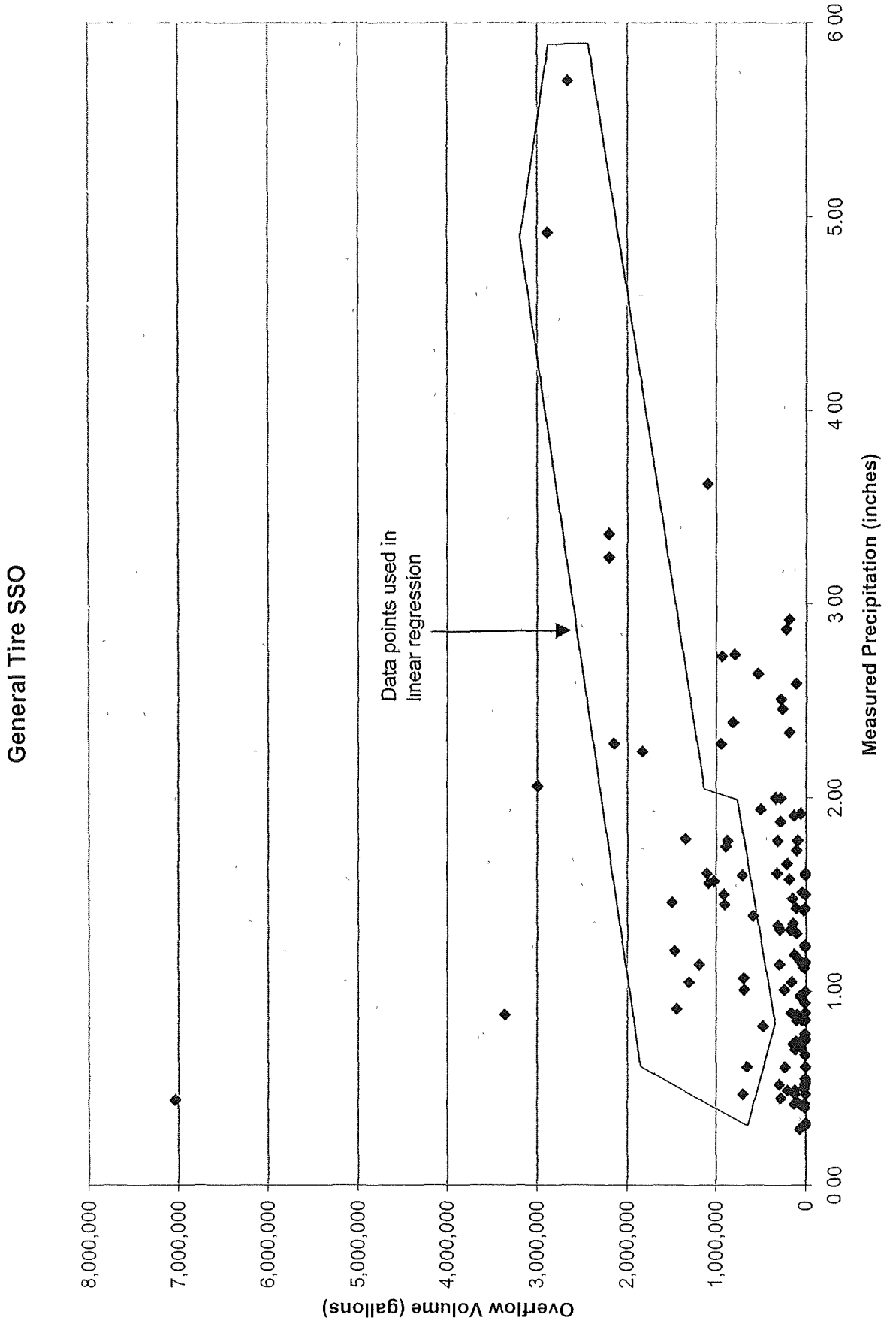
106	10/28/2006	1 61	68,100
40	9/27/2002	2 59	65,500
52	9/3/2003	0 41	61,500
53	9/19/2003	1.14	60,300
27	4/15-16/2001	1 24	48,000
119	9/27/2007	0 94	46,400
93	5/11/2006	1 42	46,200
81	2/9/2005	0 29	43,500
46	7/8/2003	1.51	42,100
54	10/14/2003	0 78	35,000
6	1/13/1999	0 74	34,031
61	4/1/2004	1 00	33,700
109	1/13/2007	0 85	33,700
85	4/23/2005	0.86	32,600
95	5/17/2006	0 40	28,700
44	3/13/2003	0 55	27,800
22	9/12/2000	0 47	27,700
116	7/11/2007	0 52	23,600
102	09/12-13/2006	0 89	21,700
7	1/14-15/1999	1 73	21,171
91	3/13/2006	0 31	19,900
49	7/22/2003	0 42	19,100
88	11/15/2005	0 67	18,000
36	5/13/2002	1 08	16,200
70	8/19/2004	1 50	15,700
30	7/24/2001	0 50	14,300
59	2/21/2004	0 32	8,300
101	9/2/2006	1.18	8,200
90	3/12/2006	0 86	7,500
62	4/12/2004	0 75	6,200
16	1/4/2000	1 60	6,100
32	11/25/2001	0 61	4,000
87	9/26/2005	1 51	1,700
2	8/16/1998	1 30	500
50	8/27/2003	0.92	200

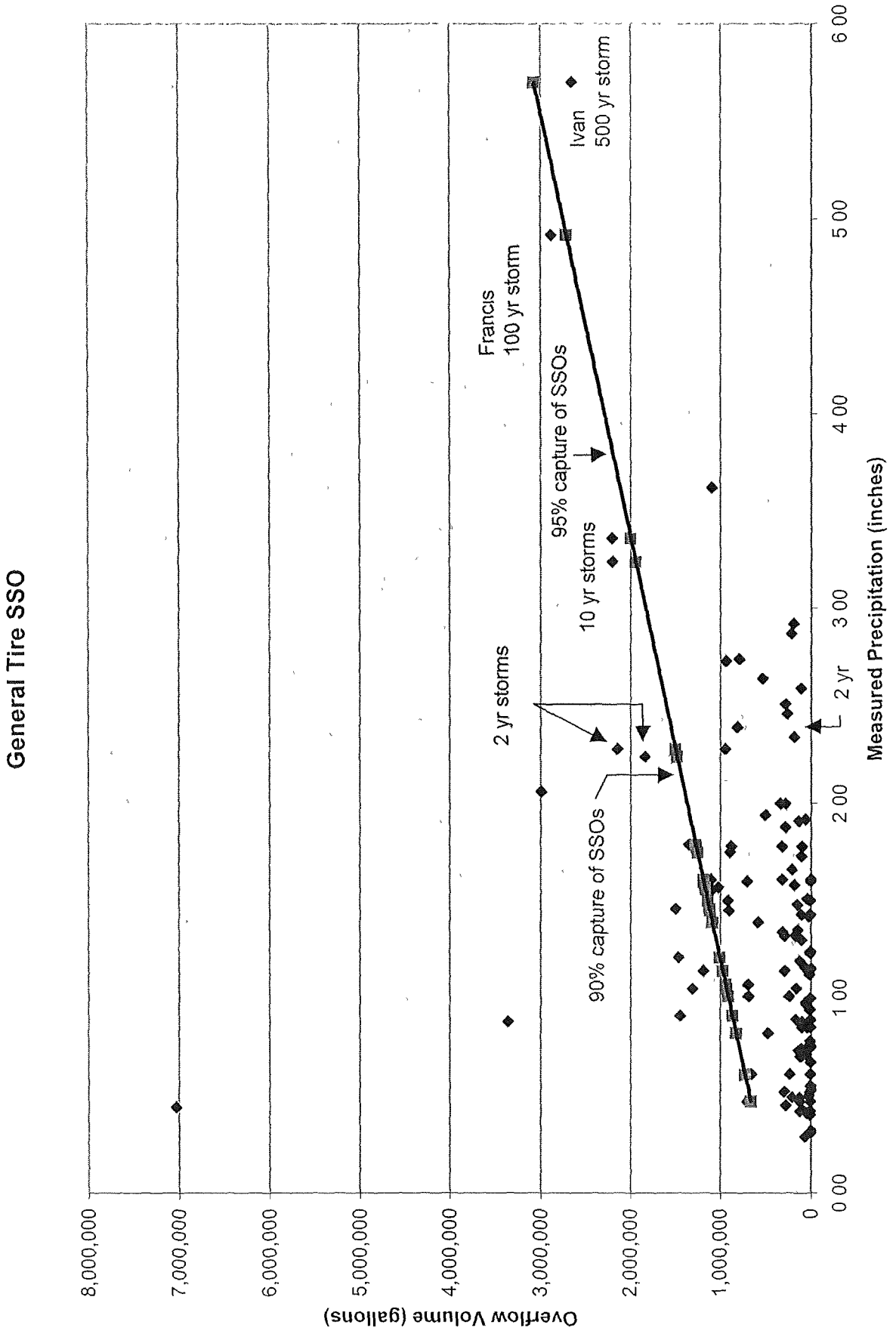
119 SSO Events Total

GRAPHS AND DATA FOR GENERAL TIRE SSO


General Tire SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Number of SSO Events
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
95% capture of SSOs
90% capture of SSOs


General Tire SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2.00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Jan 22-24, 1999
0 44" rain
Jan 18-19, 1999
0.88" rain
Jan. 5-7, 2005
2.06" rain
Hurricane Ivan
Hurricane Francis


General Tire SSO
Data points used in linear regression
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Measured Precipitation (inches)
0 00
1.00
2.00
3 00
4 00
5.00
6 00


General Tire SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2 00
2 yr
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
2 yr storms
10 yr storms
Francis
100 yr storm
Ivan
500 yr storm
95% capture of SSOs
90% capture of SSOs

BUTLER AREA SEWER AUTHORITY
SANITARY SEWER OVERFLOW (SSO) DATA - 1999 to 2007
GENERAL TIRE OVERFLOW
OUTFALL NO 009

Linear Regression Parameters

Data Points Used	26
X-range (independent variable)	Total Precipitation
Y-range (dependent variable)	Total Bypass Volume

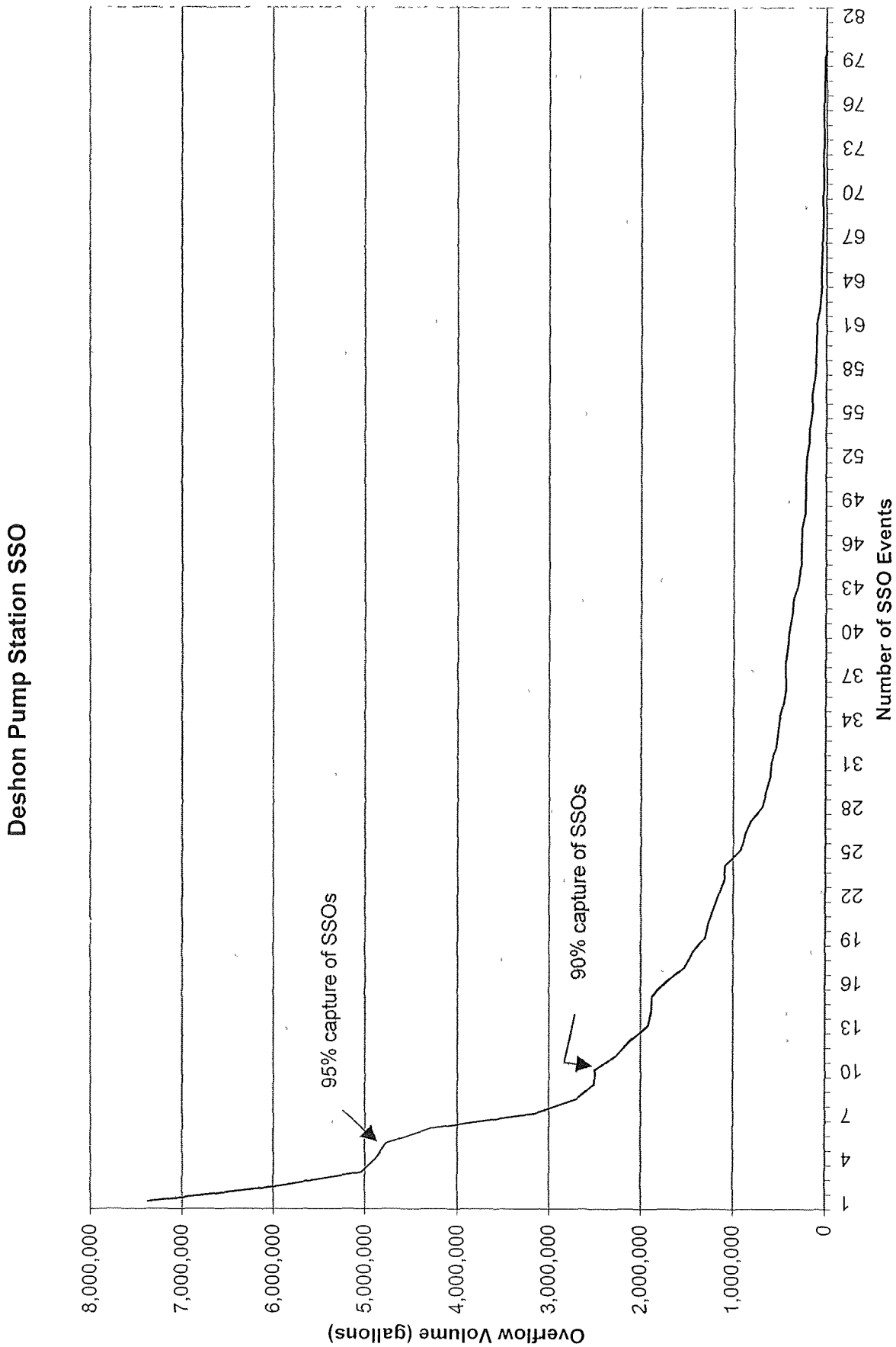
Event Number	Date	X Measured Precip (inches)	Y1 Total Bypass Volume (Gallons)	Y2 Best-Fit Line (gallons)	Comment
71	09/08-10/2004	4 92	2,883,000	2,714,029	Francis - 100 yr storm
72	09/17-19/2004	5 70	2,658,500	3,073,424	Ivan - 500 yr storm
113	8/20-21/2007	3 36	2,203,900	1,995,238	10 yr storm
70	08/20-21/2004	3 24	2,200,700	1,939,946	10 yr storm
45	06/12-13/2003	2 28	2,147,900	1,497,614	2 yr storm
33	12/17-18/2001	2 24	1,834,700	1,479,183	2 yr storm
106	01/14-15/2007	1 46	1,494,900	1,119,788	
42	01/01-02/2003	1 21	1,464,900	1,004,597	
107	03/01-03/2007	0 91	1,444,100	866,368	plus melt
57	01/04-05/2004	1 79	1,349,000	1,271,839	plus melt
34	03/26-27/2002	1 05	1,306,700	930,875	
108	3/15/2007	1.14	1,188,100	972,343	
58	02/06-07/2004	1 61	1,102,400	1,188,902	
38	6/6/2002	1 56	1,085,500	1,165,864	
67	6/15/2004	1.57	1,024,500	1,170,472	
5	12/21-22/98	1 50	916,700	1,138,218	
75	01/03-04/2005	1 45	905,700	1,115,180	
13	7/2/1999	1 75	894,152	1,253,409	
100	10/17/2006	1 78	879,800	1,267,232	
83	04/02-03/2005	1 60	707,400	1,184,294	
31	10/23-24/2001	0 47	703,400	663,632	
60	03/20-21/2004	1 07	695,800	940,090	
81	02/14-15/2005	1.01	689,900	912,444	
78	1/12/2005	0.61	658,600	728,139	
56	12/10-11/2003	1 39	588,300	1,087,534	plus melt
63	04/13-14/2004	0 82	477,000	824,899	
9	1/22-24/1999	0 44	7,034,493		
8	1/18-19/1999	0 88	3,357,547		
76	01/05-07/2005	2 06	2,994,400		
4	10/8/1998	3 62	1,095,100		
101	10/19/20/2006	2 28	950,000		
11	4/9-10/1999	2 73	937,791		

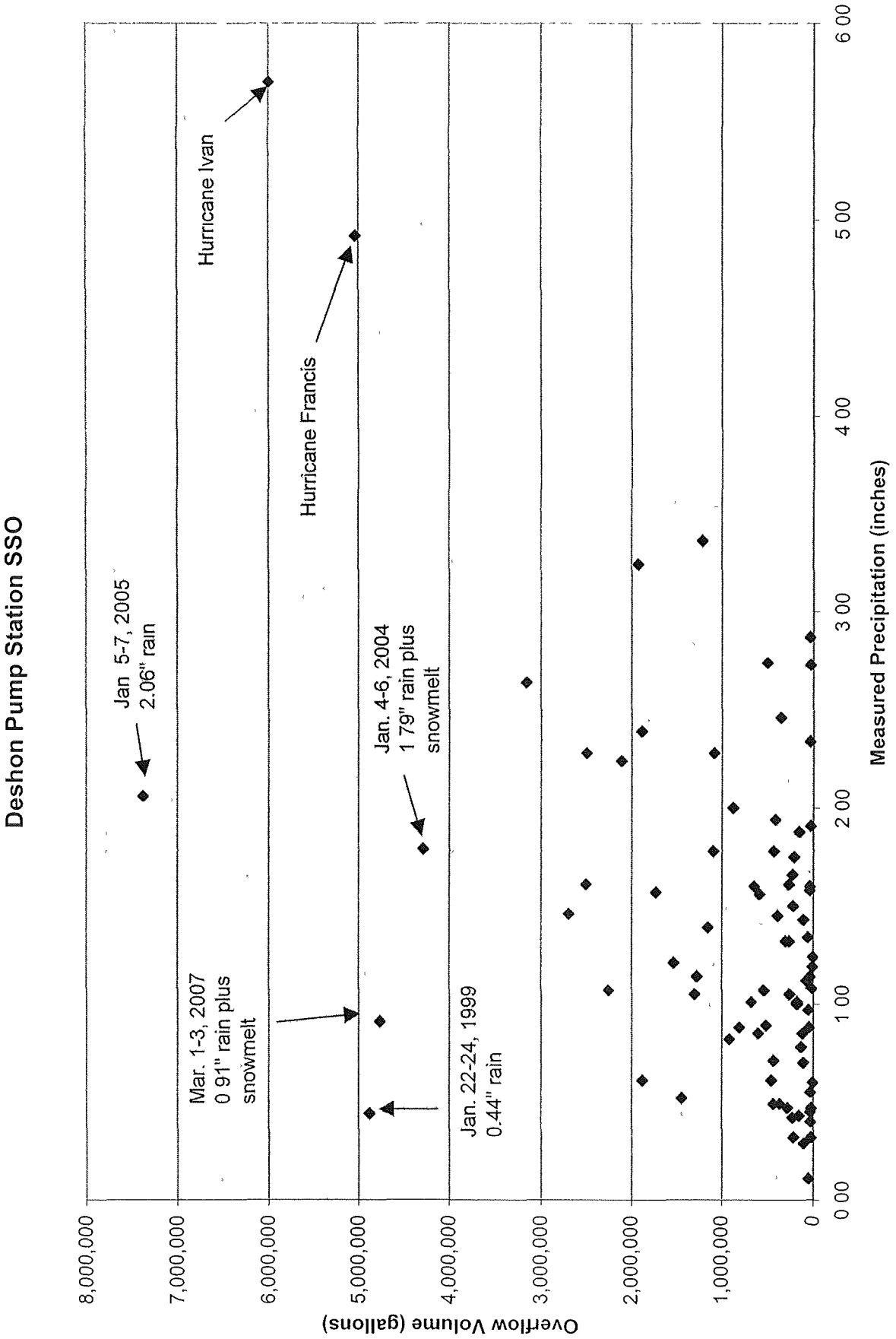
55	11/19-20/2003	2 39	814,100	
68	7/26/2004	2 74	794,700	
18	4/3-4/2000	2 64	537,200	
35	04/14-15/2002	1 94	504,800	
1	7/8/1998	2.00	336,500	
66	6/14/2004	1 61	317,600	
23	12/16/2000	1 78	317,000	
104	01/05-06/2007	1 34	311,500	
65	5/22/2004	0 52	295,500	
10	2/28/1999	1 14	291,857	
25	3/21/2001	1.32	291,000	
26	4/7/2001	2 00	282,800	
50	8/29-30/2003	1 88	282,700	
3	8/25/1998	2 51	282,600	
82	03/07-08/2005	0 45	277,800	
36	05/13-14/2002	2 46	262,400	
74	12/1/2004	1 01	238,800	
109	03/19-20/2007	0 61	233,200	
14	11/2/1999	2 87	218,326	
15	12/14/1999	1.66	209,900	
88	03/13-14/2006	0 49	205,200	
12	5/18-19/1999	2 92	192,403	
84	08/30-31/2005	2 34	184,600	
21	8/6/2000	1 58	183,300	
86	11/29/2005	1 32	173,900	
77	1/11/2005	0.89	163,500	
24	1/30-31/2001	1 05	161,000	plus melt
17	2/14/2000	1 48	147,800	
95	7/22/2006	1 35	141,700	
41	12/14/2002	0.73	140,100	plus melt
103	11/16/2006	1 91	131,400	
92	5/18/2006	0 42	125,000	
110	3/23/2007	0.49	123,800	
20	5/28/2000	1 19	123,400	
43	02/22-23-2003	0.47	122,600	plus melt
29	7/1/2001	0 70	119,900	
28	6/30/2001	0.70	109,800	
39	9/27/2002	2 59	109,600	
6	1/13/1999	0 74	108,493	
7	1/14-15/1999	1 73	108,443	
37	5/18/2002	1 43	107,200	
2	8/16/1998	1 30	106,900	
19	4/8/2000	0 85	102,400	
64	04/25-26/2004	0 43	101,000	
47	7/10/2003	0 88	97,900	
48	07/21-22/2003	1 78	97,800	
73	10/18-19/2004	1.16	68,700	
80	2/9/2005	0 29	64,700	plus melt
111	4/1/2007	0 74	60,400	
97	8/27/2006	1 92	59,400	
114	8/23/2007	0 98	59,200	
99	9/30-10/1/2006	0 97	57,800	

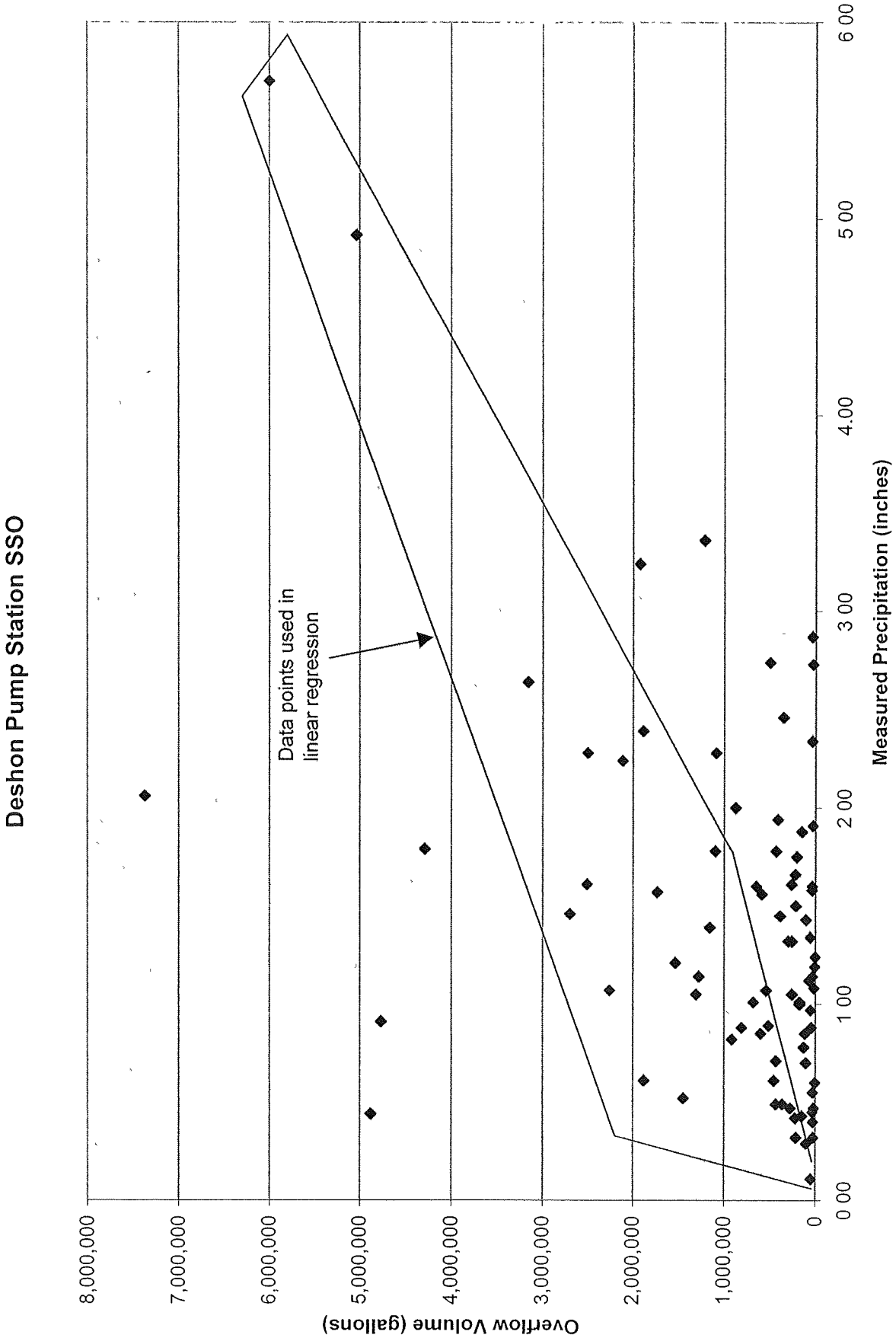
79	1/14/2005	0 71	53,500	
90	5/15/2006	0 85	43,900	
52	9/3/2003	0 41	42,100	
46	7/8/2003	1 51	41,800	
53	9/19/2003	1 14	31,500	
89	5/11/2006	1 42	24,900	
30	7/24/2001	0 50	23,800	
94	6/27/2006	1.12	19,600	
96	7/31/2006	1 43	14,700	
49	7/22/2003	0 42	13,000	
91	5/17/2006	0 40	12,800	
112	7/11/2007	0 52	12,400	
27	4/15-16/2001	1.24	11,300	
115	9/27/2007	0 94	9,800	
69	8/19/2004	1 50	8,300	
44	3/13/2003	0 55	8,000	plus melt
61	4/1/2004	1 00	7,100	
54	10/14/2003	0 78	6,900	
105	1/13/2007	0.85	6,900	
22	9/12/2000	0 47	6,100	
32	11/25/2001	0 61	5,000	
85	11/15/2005	0 67	5,000	
98	9/12/2006	0 89	4,800	
93	6/23/2006	1 23	4,600	
16	1/4/2000	1 60	2,900	
87	3/13/2006	0.31	2,800	
102	10/28/2006	1 61	2,000	
51	9/1/2003	1 15	1,000	
62	4/12/2004	0 75	800	
40	10/3/2002	0.53	200	
59	2/21/2004	0 32	200	

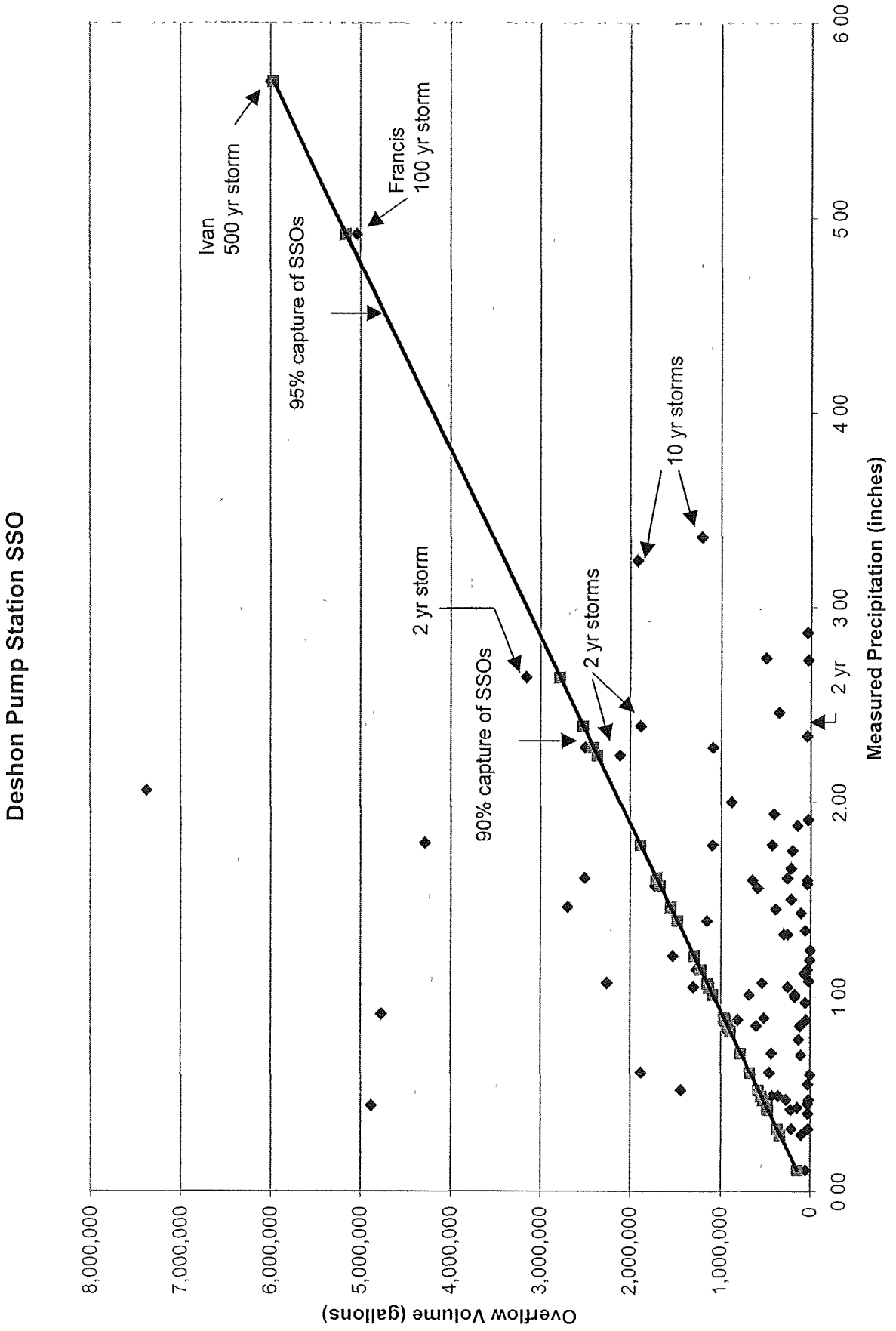
115 SSO Events Total

GRAPHS AND DATA FOR DESHON PUMP STATION SSO


Deshon Pump Station SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Number of SSO Events
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
61
64
67
70
73
76
79
82
95% capture of SSOs
90% capture of SSOs


Deshon Pump Station SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2 00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Jan 5-7, 2005
2.06" rain
Hurricane Ivan
Hurricane Francis
Jan. 4-6, 2004
1 79" rain plus
snowmelt
Mar. 1-3, 2007
0 91" rain plus
snowmelt
Jan. 22-24, 1999
0.44" rain


Deshon Pump Station SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Data points used in linear regression
Measured Precipitation (inches)
0 00
1 00
2 00
3 00
4.00
5 00
6 00


Deshon Pump Station SSO
Overflow Volume (gallons)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0 00
1 00
2.00
2 yr
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Ivan
500 yr storm
Francis
100 yr storm
95% capture of SSOs
90% capture of SSOs
2 yr storm
2 yr storms
10 yr storms

BUTLER AREA SEWER AUTHORITY
SANITARY SEWER OVERFLOW (SSO) DATA - 1999 to 2007
DESHON P S OVERFLOW
OUTFALL NO 015

Linear Regression Parameters

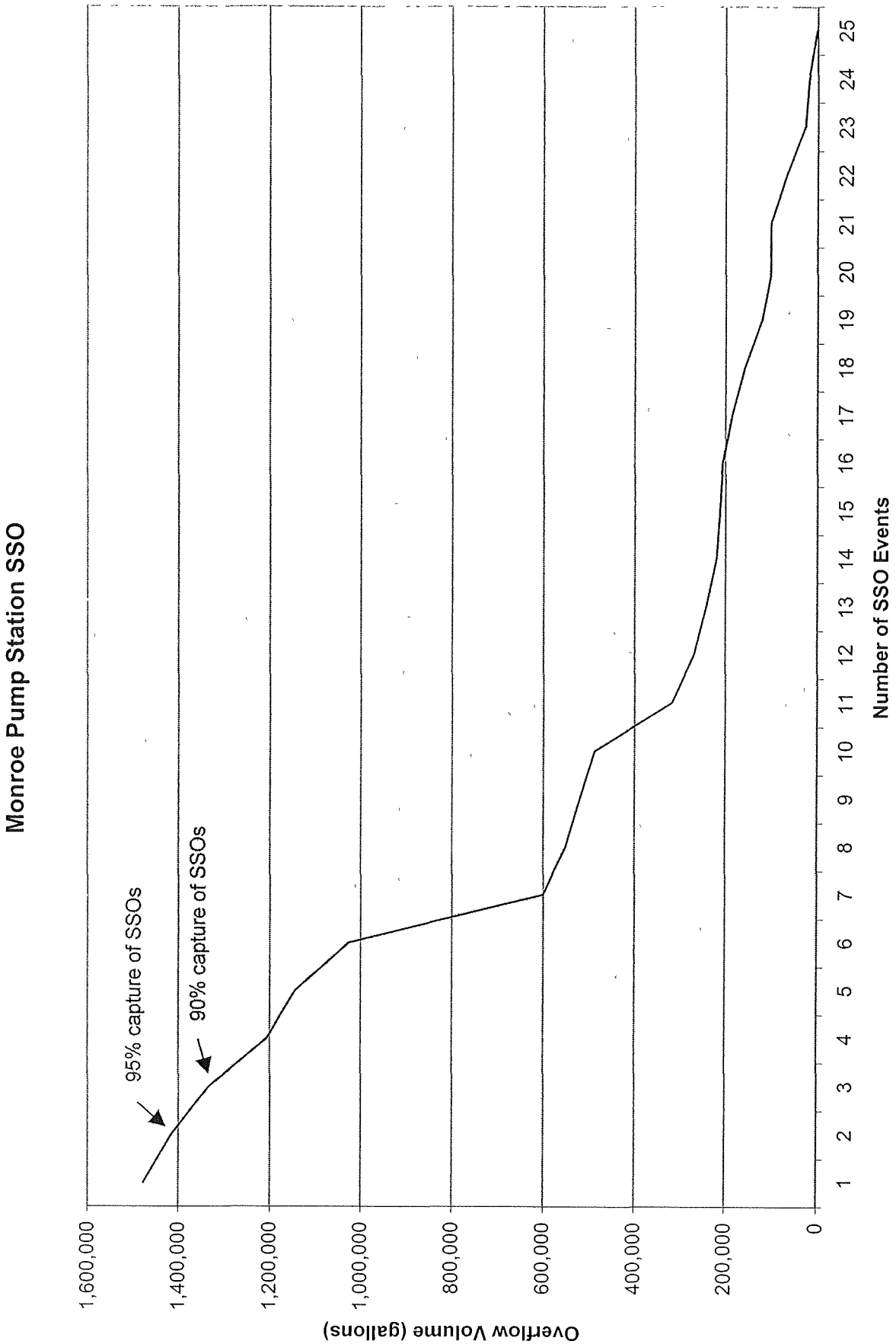
Data Points Used	33
X-range (independent variable)	Total Precipitation
Y-range (dependent variable)	Total Bypass Volume

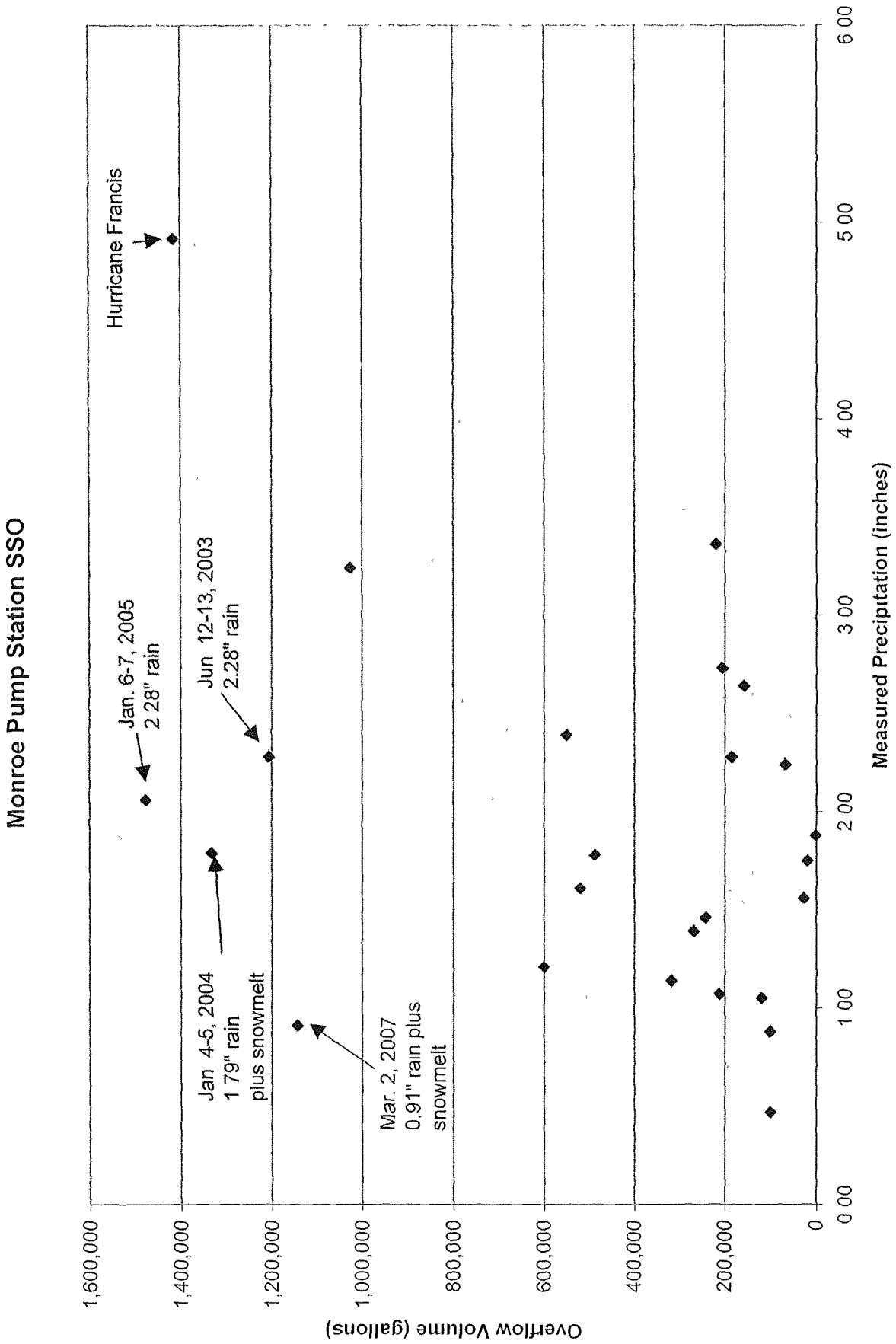
Event Number	Date	X Measured Precip (inches)	Y1 Total Bypass Volume (Gallons)	Y2 Best-Fit Line (gallons)	Comment
53	09/17-19/2004	5 70	5,997,900	5,966,187	Ivan - 500 yr storm
52	09/08-10/2004	4 92	5,036,100	5,154,588	Francis - 100 yr storm
8	4/3-4/2000	2 64	3,158,700	2,782,222	2 yr storm
76	01/14-15/2007	1 46	2,698,000	1,554,419	
40	02/06-07/2004	1 61	2,509,200	1,710,496	
73	10/19-20/2006	2 28	2,501,800	2,407,638	2 yr storm
22	12/17-18/2001	2 24	2,114,300	2,366,018	2 yr storm
42	03/20-21/2004	1 07	2,259,200	1,148,620	
37	11/19-20/2003	2 39	1,887,300	2,522,095	2 yr storm
59	01/12-13/2005	0 61	1,881,800	669,985	
49	6/15/2004	1 57	1,732,800	1,668,875	
29	01/01-02/2003	1 21	1,533,100	1,294,291	
47	5/22/2004	0 52	1,444,800	576,339	
23	03/26-27/2002	1 05	1,305,300	1,127,809	
78	3/15/2007	1 14	1,273,600	1,221,455	
38	12/10-11/2003	1 39	1,155,900	1,481,583	snowmelt
72	10/17/2006	1 78	1,095,900	1,887,383	
44	04/13-14/2004	0 82	920,400	888,492	
2	1/18/1999	0 88	810,107	950,923	
62	02/14-15/2005	1 01	682,800	1,086,189	
10	4/8/2000	0 85	600,800	919,707	
82	8/21/2007	1 07	537,800	1,148,620	
58	01/11-12/2005	0 89	515,800	961,328	
79	03/19-20/2007	0.61	456,800	669,985	
60	1/14/2005	0 71	431,700	774,036	
67	03/13-14/2006	0 49	431,200	545,123	
80	3/23/2007	0 49	363,100	545,123	
21	10/23-24/2001	0 47	277,100	524,313	
69	5/18/2006	0.42	223,400	472,287	
57	1/8/2005	0 32	216,100	368,236	
45	04/25-26/2004	0 43	152,500	482,692	
61	2/9/2005	0 29	105,400	337,021	snowmelt
30	3/9/2003	0 11	53,100	149,729	snowmelt

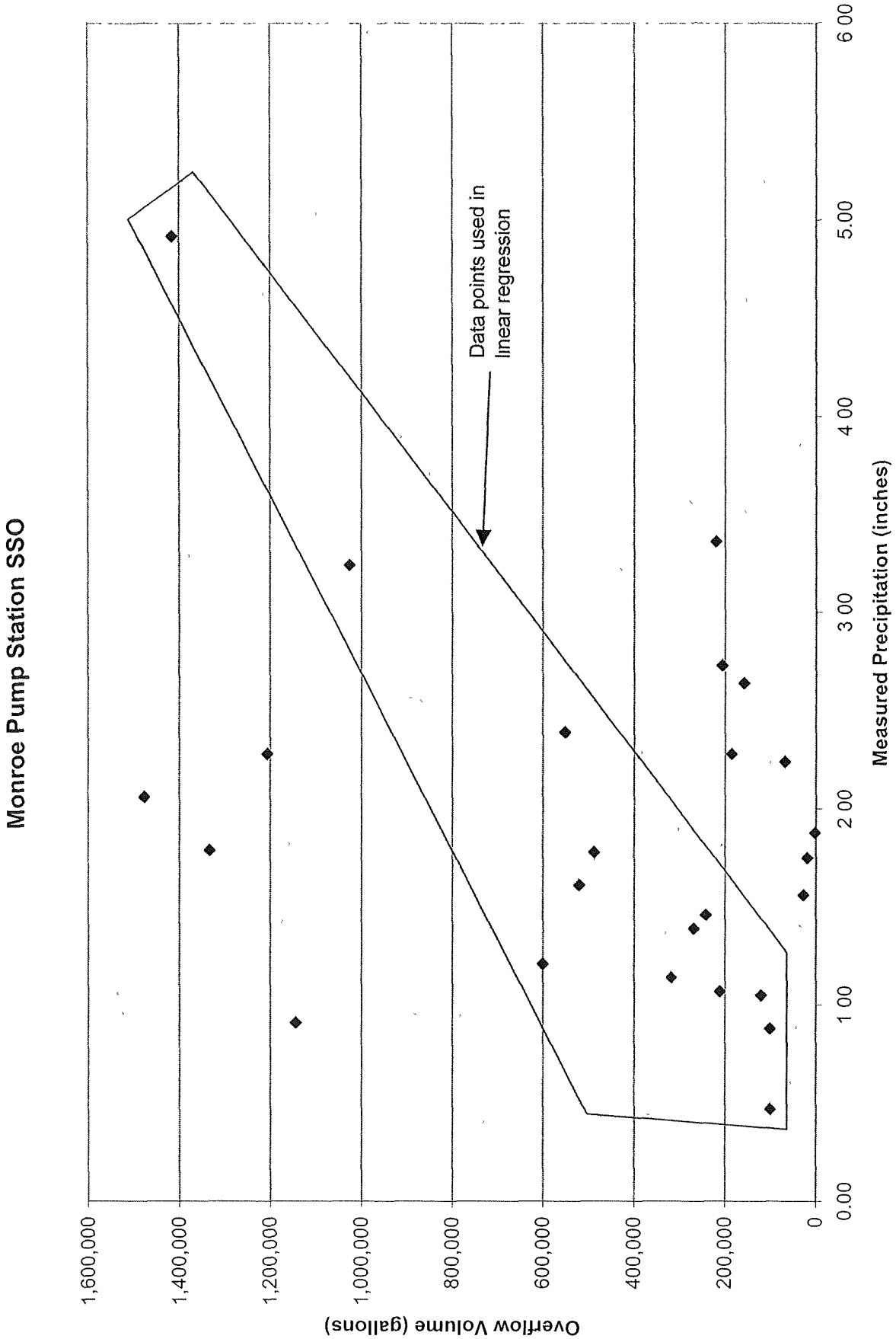
56	01/05-07/2005	2 06	7,374,100	
3	1/22-24/1999	0 44	4,882,501	
77	03/01-03/2007	0 91	4,767,200	snowmelt
39	01/04-06/2004	1 79	4,284,600	snowmelt
51	08/20-21/2004	3 24	1,924,300	10 yr storm
81	8/20/2007	3 36	1,212,100	10 yr storm
32	06/12-13/2003	2 28	1,087,000	
18	4/7/2001	2.00	878,300	
64	04/02-03/2005	1 60	646,900	
28	6/6/2002	1 56	588,700	
50	7/26/2004	2 74	497,900	
14	12/16/2000	1.78	431,000	
24	04/14-15/2002	1 94	412,500	
55	01/03-04/2005	1.45	389,300	
26	05/13-14/2002	2 46	354,400	
66	11/29/2005	1.32	299,700	
48	6/14/2004	1 61	263,200	
17	3/21/2001	1 32	261,000	
15	1/31/2001	1 05	258,000	snowmelt
7	12/14/1999	1.66	222,552	
1	12/21-22/98	1 50	218,500	
5	7/2/1999	1 75	208,847	
54	12/1/2004	1 01	178,300	
43	4/1/2004	1 00	177,100	
34	8/30/2003	1 88	152,400	
36	10/14/2003	0 78	131,900	
68	5/15/2006	0 85	118,500	
27	5/18/2002	1 43	108,900	
20	6/30/2001	0.70	107,100	
70	6/27/2006	1 12	72,100	
75	1/5/2007	1 34	60,100	
71	9/30/2006	0.97	56,000	
33	7/10/2003	0 88	48,600	
12	8/6-7/2000	1 58	41,460	
8	1/4/2000	1 60	38,200	
65	8/31/2005	2 34	38,100	
6	11/2/1999	2 87	37,384	
63	3/7/2005	0 45	35,300	
35	9/19/2003	1 14	34,200	
31	3/13/2003	0 55	32,900	snowmelt
74	11/16/2006	1 91	29,300	
16	3/16/2001	0 40	29,000	
4	4/9/1999	2 73	28,504	
41	2/21/2004	0 32	27,100	
13	9/12/2000	0 47	20,700	
25	5/13/2002	1 08	18,300	
11	5/28/2000	1 19	8,374	
46	5/21/2004	0 60	5,700	
19	4/15-16/2001	1 24	1,500	

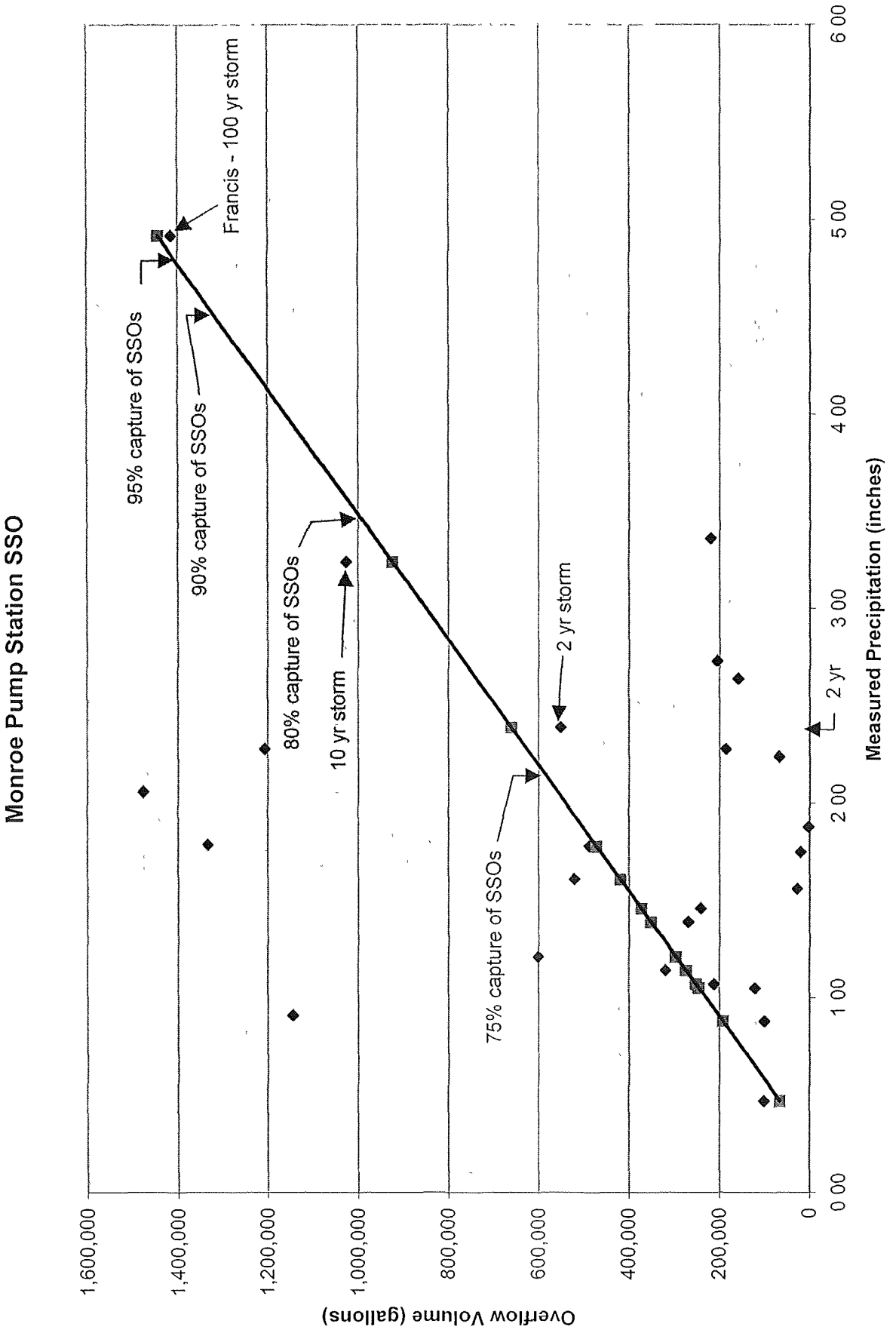
82 SSO Events Total

GRAPHS AND DATA FOR MONROE PUMP STATION SSO


Monroe Pump Station SSO
95% capture of SSOs
90% capture of SSOs
Overflow Volume (gallons)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Number of SSO Events


Monroe Pump Station SSO
Overflow Volume (gallons)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
0 00
1 00
2 00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
Hurricane Francis
Jan. 6-7, 2005
2 28" rain
Jun 12-13, 2003
2.28" rain
Jan 4-5, 2004
1 79" rain
plus snowmelt
Mar. 2, 2007
0.91" rain plus
snowmelt


Monroe Pump Station SSO
Overflow Volume (gallons)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Measured Precipitation (inches)
0.00
1 00
2 00
3 00
4 00
5.00
6 00
Data points used in linear regression


Monroe Pump Station SSO
Overflow Volume (gallons)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
0 00
1 00
2 00
3 00
4 00
5 00
6 00
Measured Precipitation (inches)
2 yr
Francis - 100 yr storm
95% capture of SSOs
90% capture of SSOs
80% capture of SSOs
10 yr storm
2 yr storm
75% capture of SSOs

BUTLER AREA SEWER AUTHORITY
SANITARY SEWER OVERFLOW (SSO) DATA - 1999 to 2007
MONROE ST P S OVERFLOW
OUTFALL NO 003

Linear Regression Parameters

Data Points Used	13
X-range (independent variable)	Total Precipitation
Y-range (dependent variable)	Total Bypass Volume

Event Number	Date	X Total Precip (inches)	Y1 Total Bypass Volume (Gallons)	Y2 Best-Fit Line	Comment
18	09/08-10/2004	4 92	1,415,400	1,444,235	Francis - 100 yr storm
17	08/20-21/2004	3 24	1,025,900	923,687	10 yr storm
9	01/01-02-2003	1 21	600,700	294,692	
12	11/19-20/2003	2.39	550,700	660,315	2 yr storm
15	2/6/2004	1 61	520,300	418,632	
21	10/17/2006	1.78	487,600	471,307	
25	3/15/2007	1 14	317,900	273,003	
13	12/10-11/2003	1 39	268,400	350,465	plus melt
23	1/15/2007	1.46	241,600	372,155	
16	03/20-21/2004	1.07	211,700	251,313	
7	3/26/2002	1 05	120,800	245,116	
1	1/18/1999	0 88	100,965	192,442	
5	10/23-24/2001	0 47	100,800	65,403	
20	01/06-07/2005	2 06	1,477,500		
14	01/04-05/2004	1 79	1,333,000		plus melt
10	06/12-13/2003	2 28	1,206,400		
24	3/2/2007	0 91	1,143,700		plus melt
26	8/20/2007	3.36	219,500		
2	4/9/1999	2 73	206,022		
22	10/20/2006	2.28	186,200		
4	4/3-4/2000	2 64	158,300		
6	12/17-18/2001	2 24	67,900		
8	6/6/2002	1 56	27,700		
3	7/2/1999	1 75	19,660		
11	8/30/2003	1 88	2,200		

25 SSO Events Total

SUMMARY OF CHESTER ENGINEERS
FLOW EQUALIZATION TANK PROJECTS

Chester Engineers Flow Equalization Tank Projects

Client	County	Tank Capacity (MG)	Design Storm Basis	Facility Description
Municipality of Penn Hills	Allegheny	0 35	2-yr, 24-hr	In-ground, poured-in-place concrete
		1.00	2-yr, 24-hr	In-ground, poured-in-place concrete
		0.45	2-yr, 24-hr	In-ground, poured-in-place concrete
		1 13	2-yr, 24-hr	In-ground, poured-in-place concrete
		1 38	2-yr, 24-hr	WWTP converted to flow EQ tank
		2 05	2-yr, 24-hr	WWTP converted to flow EQ tank
		1 39	2-yr, 24-hr	In-ground, poured-in-place concrete
		1.13	2-yr, 24-hr	In-ground, poured-in-place concrete
		1.80	2-yr, 24-hr	WWTP converted to flow EQ tank
		1 50	2-yr, 24-hr	Above-grade, bolted steel tank
Girty's Run Joint Sewer Authority	Allegheny	5 00	2-yr, 24-hr	In-ground, poured-in-place concrete
		3.20	2-yr, 24-hr	In-ground, poured-in-place concrete
Bethel Park Municipal Authority	Allegheny	3 00	2-yr, 24-hr	In-ground, pre-cast concrete
West Mifflin San. Sewer Mun Auth	Allegheny	0 50	2-yr, 24-hr	In-ground, pre-cast concrete
		0.50	2-yr, 24-hr	In-ground, poured-in-place concrete
		0.30	2-yr, 24-hr	In-ground, poured-in-place concrete
		0 10	2-yr, 24-hr	In-ground, poured-in-place concrete
City of DuBois	Jefferson	2.10	2-yr, 24-hr	Above-grade, bolted steel tank
Mun Auth of the City of Monongahela	Washington	3.50	N/A *	Above-grade, bolted steel tank

* Tank sized to capture at least 85% of combined sewage volume for treatment

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Appendix A-22-b

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

BUTLER 2 SW, PENNSYLVANIA (36-1139) 40.85 N 79.9167 W 1062 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G M Bonnin, D Martin, B Lin, T Parzybok, M Yekta, and D Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted Thu Nov 8 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0 32	0 49	0.60	0 80	0 97	1 11	1.19	1 42	1 69	2 02	2.34	2 69	3 23	3.74	5 25	6 61	8 47	10 21
2	0 38	0 59	0 72	0 97	1.19	1 35	1 43	1.71	2 03	2 40	2 79	3 19	3 82	4.40	6 16	7 72	9 87	11 87
5	0 46	0.71	0.87	1.20	1 50	1 70	1 80	2 13	2.50	2 93	3 37	3 81	4 50	5 14	7 10	8 81	11 13	13 29
10	0.52	0.80	0 99	1 37	1 74	1 97	2 09	2 47	2 89	3 37	3 85	4 32	5 05	5.73	7.84	9 68	12 12	14 38
25	0.60	0 91	1 13	1 59	2 06	2 35	2.50	2 95	3 45	3 99	4 51	5 01	5 79	6 52	8 82	10 80	13 36	15 73
50	0 66	0 99	1 23	1 76	2 32	2 65	2.82	3 35	3 91	4 50	5 04	5 57	6.37	7 14	9 56	11 64	14 27	16 72
100	0 71	1 07	1 33	1 93	2 58	2 96	3 16	3 75	4 40	5 02	5 60	6.15	6.96	7.75	10.29	12 46	15 13	17 64
200	0 77	1.15	1 43	2 09	2 84	3 27	3 51	4.19	4.91	5 58	6 17	6 73	7 55	8.35	11 00	13 25	15 95	18 49
500	0 85	1 25	1 56	2 31	3 20	3.71	4 00	4 80	5 65	6 35	6.95	7.53	8 34	9.15	11.91	14 26	16 95	19 52
1000	0 91	1 32	1 65	2 48	3 48	4 05	4 38	5 29	6 25	6 98	7 58	8 16	8 94	9 75	12.57	14 98	17 66	20 23

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero

APPENDIX F
TECHNICAL MEMORANDUM ON INTERCEPTOR SEWER MODEL

CHESTER ENGINEERS

Memorandum

TO: File Ref No.:

FROM: John M. Maslanik cc.:

DATE: April 13, 2008

SUBJECT: BASA Act 537 Plan – Sizing of Wet Weather Flow Control Facilities – 2-Year 24-Hour Storm Conditions V3

This memorandum outlines the procedures and results of the analysis of the Butler Area Sewer Authority (BASA) primary conveyance and treatment facilities for the purpose of sizing wet weather flow diversion and storage facilities.

APPROACH TO SIZING DIVERSION AND STORAGE FACILITIES

FACILITIES SIZING OBJECTIVES

Sizing of wet weather flow diversion and storage facilities is based upon meeting the objectives of: 1) eliminating the occurrence of the existing overflows and 2) maintaining influent wastewater treatment plant flows to a maximum of 28-mgd under the 24-hour, 2-year, design storm conditions. Facilities have been sized under baseline and potential future conditions. Baseline conditions represent current loading conditions. The potential future conditions represent anticipated future loadings, including future loadings identified by the tributary communities in their special studies.

Identified overflows occur at the Deshon Pump Station, the Monroe Pump Station, and two locations on the Sullivan Run interceptor at locations designated as the "Ballpark" and "General Tire" overflow locations. One of the objectives of the sewer system improvements is the elimination of overflows from these locations. During major storm events, influent flows to the Butler Wastewater Treatment Plant (WWTP) exceed the 28-mgd permitted peak flow capacity of the plant. The second primary objective of the sewerage system improvements is the maintaining flow to the WWTP to 28-mgd. This will also result in maintaining flows in the main interceptor along Connoquenessing Creek within the interceptor's conveyance capacity. The locations of the overflows are illustrated in Figure 1. Figure 1 also presents the general locations of the primary BASA sewage conveyance and treatment facilities.

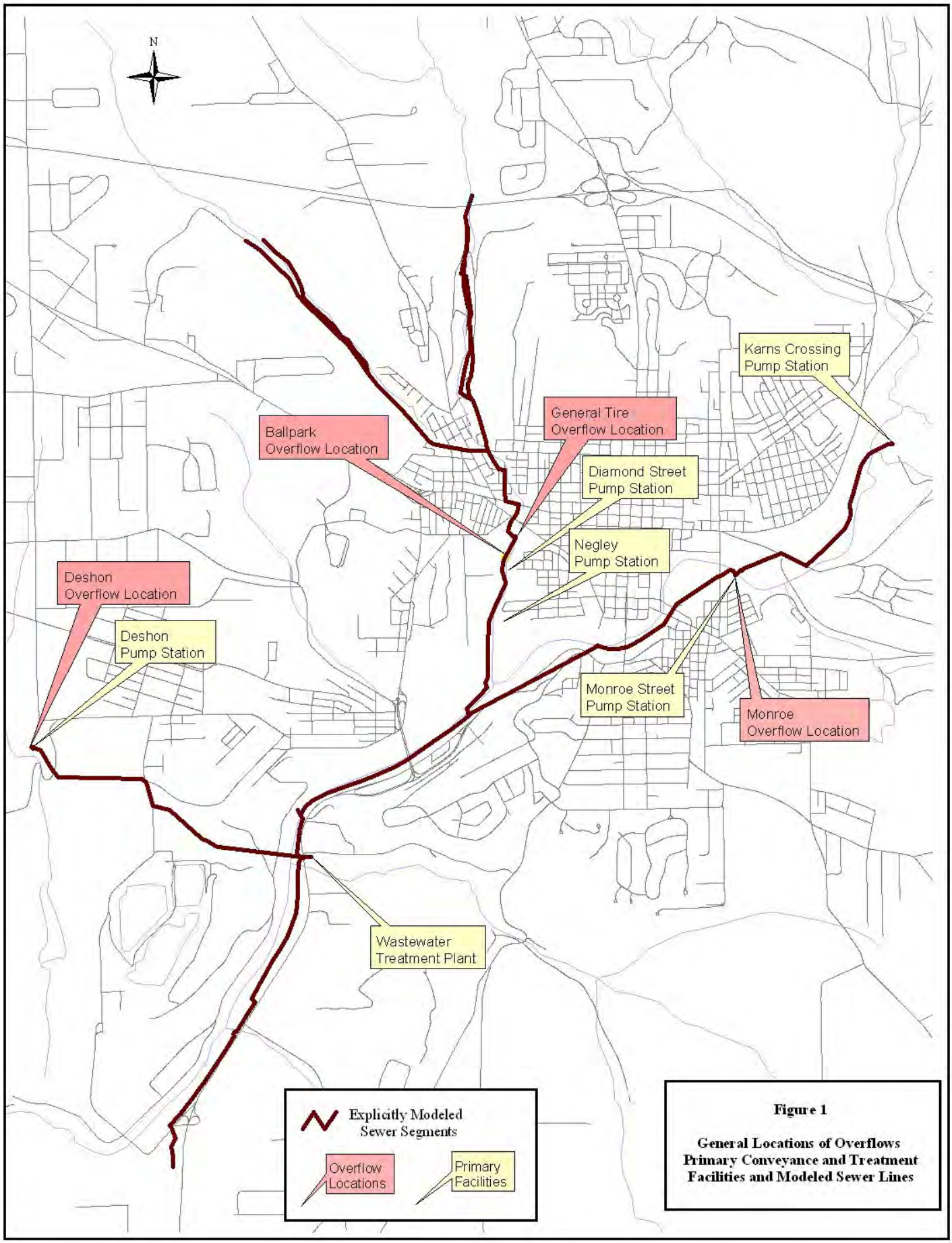
GENERAL APPROACH

The required analyses were performed using computer modeling techniques in order to estimate dry and wet weather loading rates, apply these loadings to the BASA interceptor sewer system, evaluate system performance, and identify and size wet weather diversion and storage facilities that are required to meet the project objectives.

SELECTED PRIMARY MODEL

The SewerCAD model, by Haestad Methods, was selected as the primary model for use in this modeling project. The SewerCAD model was selected for the following reasons.

- SewerCAD is a full-featured modeling program. It is capable of performing time-based simulations of sewage flows in a mixture of gravity and pumping / pressure elements. It includes provisions that can be used to model sewage, base infiltration, and storm induced flows as separate elements combined into total flow hydrographs. The model permits the assignment of differing temporal variation patterns to the sewage and storm induced flow components.


N
Karns Crossing Pump Station
General Tire Overflow Location
Ballpark Overflow Location
Diamond Street Pump Station
Negley Pump Station
Deshon Overflow Location
Deshon Pump Station
Monroe Street Pump Station
Monroe Overflow Location
Wastewater Treatment Plant
Explicitly Modeled Sewer Segments
Overflow Locations
Primary Facilities
Figure 1
General Locations of Overflows Primary Conveyance and Treatment Facilities and Modeled Sewer Lines

- The model output includes: pipe element capacities, and instantaneous flow rates and water levels throughout the sewer network.
- Sewage pumping stations and wet well operation is modeled to reflect facility geometry, pump characteristics, and an infinite variation of pump control protocols.
- The model provides the ability to simulate the performance of separate sanitary sewer overflows and diversions.
- The model facilitates the simulation of alternative piping and storage arrangements.
- SewerCAD provides extensive graphical and tabular output reporting formats.
- SewerCAD has the ability to link to and from ESRI ArcView databases. This provided the capability of extracting sewer system configuration data from BASA's ArcView geographic information system (GIS).

SELECTED WET WEATHER LOADING MODEL

The SewerCAD has the ability to route wet weather flow hydrographs through the sewerage system; however, it does not generate the wet weather loading hydrographs. The Storm Water Management Model (SWMM) was used to generate wet weather flow hydrographs for input into SewerCAD. SWMM is widely used for modeling urban runoff and sewer system hydraulics. SWMM is comprised of service modules and four computation modules or "blocks": RUNOFF, TRANSPORT, EXTRAN, and STORAGE/TREATMENT. The RUNOFF block was used in this project to model wet weather flows.

The RUNOFF block represents the drainage area by an aggregation of subareas. The program accepts a specified rainfall hyetograph data describing the hydrologic characteristics of the drainage area. It produces runoff hydrographs that can be loaded into SewerCAD.

MODEL ASSEMBLY

The following paragraphs summarize the approach used to assemble the model.

Physical Characteristics Input Data

The WaterCAD model simulates the performance of sewer systems based upon the physical characteristics of the collection and conveyance system and the sewage loadings that are placed on the system. The primary system physical system characteristics input parameters required by SewerCAD are listed in Table 1.

Table 1
Primary SewerCAD System Physical Characteristics Input Parameters

Manholes	Sewer Lines	Pump Stations	Overflows
Location Interconnecting pipes Top elevation Bottom elevation Headloss coefficient	Connected manholes Length Diameter Roughness coefficient Upstream elevation Downstream elevation	Location Wet well dimensions Facility elevations Pump operating curves Pump control settings	Location Overflow rating curve

The required physical characteristics information was data assembled via importation from the Authority's geographic information system (GIS) data files and supplementation of that information, as necessary, with data extracted from design/construction drawings. Pump station information was provided by BASA in the form of pump curves, pump station drawings, and descriptions of the pump control settings. This information was loaded into the model input files. The general locations of the sewer system components that were explicitly modeled are provided in Figure 1.

Existing System Infiltration Loading Input Data

Existing base infiltration rates were modeled as constant flows into the system at the input locations. This constant flow regime is an appropriate way of representing base infiltration rates. Storm induced infiltration and inflow was modeling using wet weather flow hydrographs produced using SWMM as discussed below. Information regarding base infiltration rates was extracted from the August 1976 report titled Butler Area Sewer Authority Infiltration/Inflow Analysis of the Wastewater Collection System. This report describes the subdivision of the BASA system into subareas for which base infiltration rates were determined and reported. This information was extracted from the report and the infiltration rates were added to model interceptor input manholes that approximate the point of connection of each subarea to the interceptor sewer network. Infiltration rates for "new" sewers (that were not in existence when the I/I Study was performed) were estimated based upon a review of the rates for the sewers included in the I/I study. The total base infiltration rate used is 5,370,000 gpd. This represents base infiltration conditions that typically are experienced during high groundwater seasons.

Existing System Sewage Loading Input Data

Existing “legitimate” sewage loading rates were supplied to the model for identified drainage areas comprising the system. This was accomplished using the following procedure:

- Customer location and loading data was obtained from BASA. This information included the street address locations and assigned equivalent dwelling unit (EDU) values for each of BASA’s customer accounts.

- The locations of the individual customers were distributed throughout the sewer area using geographic information system (GIS) geolocation techniques. This process used the customer location addresses contained in the customer database and street centerline/address range data to create a GIS point coverage displaying the location of each account.

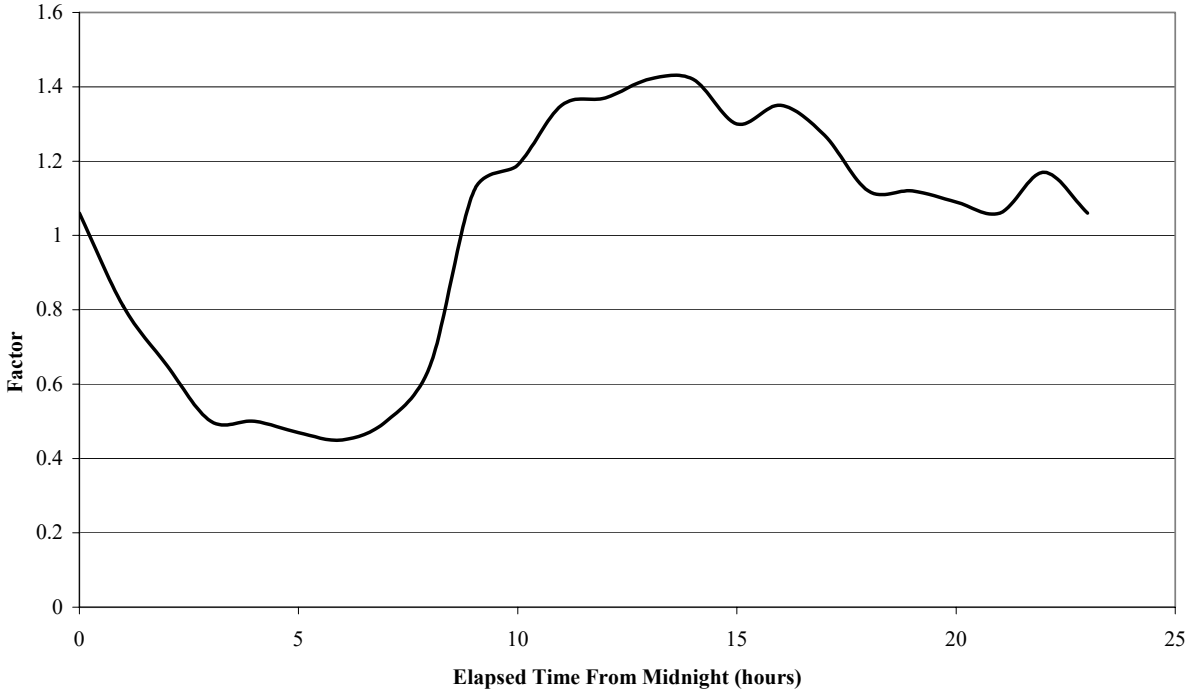
- Unit loading rates were calculated in terms of gallons per day per EDU. This unit loading rate reflects the average “actual” sewage loading rate per EDU. BASA wastewater treatment plant flow charts were reviewed to estimate the total “actual” or “legitimate” sewage flow rate. An analysis of daily flow records during dry weather periods determined that dry weather “actual” sewage flow rates approximates 3.9 mgd. This total flow rate was divided by the number of EDUs in the BASA customer data base to produce a unit flow rate per EDU (gallons per day/EDU). A loading rate for each customer account was calculated by multiplying the number of EDUs assigned to that account in the customer database the unit gpd/EDU value.

- Using the GIS, the individual point loadings were aggregated into delineated drainage areas tributary to various points in the interceptor sewer system. These aggregated legitimate sewage loadings were incorporated into the model input files.

The existing typical diurnal variation in sewage generation rates was determined based upon an analysis of wastewater treatment plant influent flow charts. Hourly flow variations were extracted

from the chart information supplied to the model. The diurnal flow variation pattern is illustrated by **Figure 2**.

Figure 2
Existing Diurnal Sewage Flow Pattern



Future Dry Weather Loadings

Future dry weather loadings were estimated by multiplying the number of future EDUs projected by the various municipalities time a unit loading rate of 400 gpd/edu to include base infiltration plus sewage flows. The future loadings were applied to the appropriate locations in the computer model. The diurnal pattern identified for existing sewage flows was applied to the future sewage loading rates.

Wet Weather Hydrographs – Existing System

The RUNOFF block of SWMM was used to develop wet weather loading hydrographs representing rainfall induced infiltration and inflow into the existing sewers. The RUNOFFF block requires an input hyetograph that describes the variation of rainfall over time. The rainfall hyetograph for the 24-hour duration, 2-year return frequency design storm was developed and input to the model.

Design Storm Characteristics

Precipitation frequency estimates for Butler as developed by the NOAA National Weather Service ("Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3) are presented in Table 2.

Table 2

Point Precipitation Frequency Estimates For Butler, PA *

Butler 2 SW, Pennsylvania (36-1130) 40.85 N 79.9167 W 1062 feet

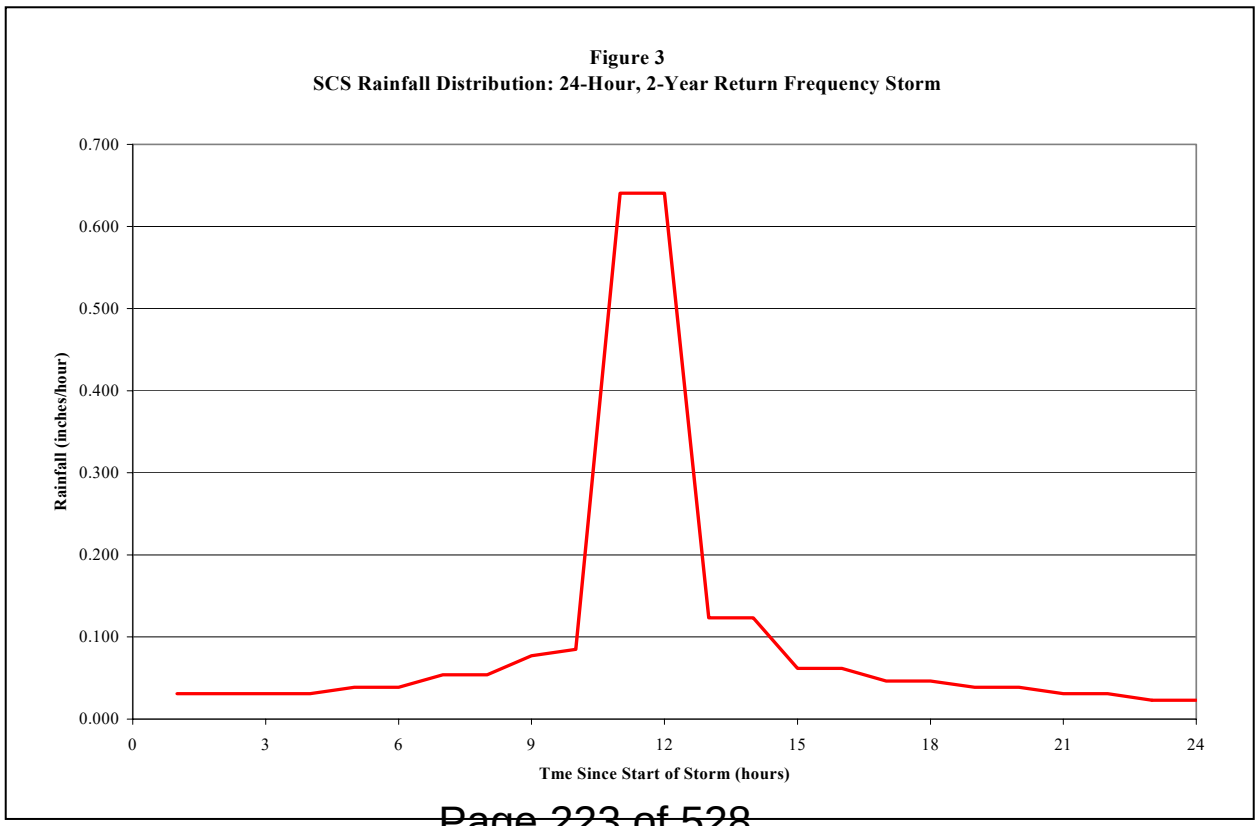
Precipitation Frequency Estimates (inches)																		
ARI (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.32	0.49	0.60	0.80	0.97	1.11	1.19	1.42	1.69	2.02	2.34	2.69	3.23	3.74	5.25	6.61	8.47	10.21
2	0.38	0.59	0.72	0.97	1.19	1.35	1.43	1.71	2.03	**2.40**	2.79	3.19	3.82	4.40	6.16	7.72	9.87	11.87
5	0.46	0.71	0.87	1.20	1.50	1.70	1.80	2.13	2.50	2.93	3.37	3.81	4.50	5.14	7.10	8.81	11.13	13.29
10	0.52	0.80	0.99	1.37	1.74	1.97	2.09	2.47	2.89	3.37	3.85	4.32	5.05	5.73	7.84	9.68	12.12	14.38
25	0.60	0.91	1.13	1.59	2.06	2.35	2.50	2.95	3.45	3.99	4.51	5.01	5.79	6.52	8.82	10.80	13.36	15.73
50	0.66	0.99	1.23	1.76	2.32	2.65	2.82	3.35	3.91	4.50	5.04	5.57	6.37	7.14	9.56	11.64	14.27	16.72
100	0.71	1.07	1.33	1.93	2.58	2.96	3.16	3.75	4.40	5.02	5.60	6.15	6.96	7.75	10.29	12.46	15.13	17.64
200	0.77	1.15	1.43	2.09	2.84	3.27	3.51	4.19	4.91	5.58	6.17	6.73	7.55	8.35	11.00	13.25	15.95	18.49
500	0.85	1.25	1.56	2.31	3.20	3.71	4.00	4.80	5.65	6.35	6.95	7.53	8.34	9.15	11.91	14.26	16.95	19.52
1000	0.91	1.32	1.65	2.48	3.48	4.05	4.38	5.29	6.25	6.98	7.58	8.16	8.94	9.75	12.57	14.98	17.66	20.23

ARI = Average Recurrence Interval

* From "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
NOAA, National Weather Service, Silver Spring, Maryland, 2004

As is indicated in Table 1, the 24-hour precipitation volume for the 2-year return frequency storm is 2.40-inches. The SCS Type II design storm distribution of the 24-hour, 2-year return frequency rainfall volume is illustrated in Figure 3.

Figure 3
SCS Rainfall Distribution: 24-Hour, 2-Year Return Frequency Storm



The area served by the BASA system was subdivided into drainage subareas using the GIS. The limits of the drainage area were defined to represent areas immediately adjacent to sewers. The following hydrologic characteristics data was developed for each of the subareas for use in SWMM.

Drainage Area: The total area of encompassed by each of the subarea was measured in the GIS. An area equivalent to 2.5% of the total drainage area was assigned to each drainage area. This 2.5% of the total area represents an initial estimate of an equivalent area connected to the sewer system and resulting in storm-induced infiltration and inflow. This initial estimate is based upon experience in wet weather modeling of other sanitary sewer. This equivalent connected area parameter was adjusted during model calibration.

Mannings n Coefficient for Impervious Surfaces: A value of 0.012 was selected for use as an average of the following values reported in the SWMM User's Manual:

Smooth Asphalt (Crawford & Linsley) = 0.012
Asphalt or Concrete Paving (Crawford & Linsley) = 0.014
Concrete or Asphalt (Engman) = 0.011

Mannings n Coefficient for Pervious Surfaces: A values for each subarea was calculated as a weighted average (by area) assigned as follows based upon the land use classifications identified within each subarea. The values listed below were extracted from the SWMM User's Manual).

Commercial Business = 0.20 (light turf, Crawford & Linsley)
High Density Residential = 0.35 (dense turf, Crawford & Linsley)
Medium Density Residential = 0.35 (dense turf, Crawford & Linsley)
Low Density Residential = 0.35 (dense turf, Crawford & Linsley)
Urban open space = 0.4 (dense shrubbery and forest litter, Crawford & Linsley)
Rural open space = 0.4 (dense shrubbery and forest litter, Crawford & Linsley)

Approximate, generalized land use throughout the service area was manually classified using the GIS based using information visible on the BASA digital orthophoto quads and U.S.G.S. quadrangle maps. This information was defined as land use polygons.

Maximum Infiltration Rate: The maximum infiltration rate as used in the Horton Equation for pervious surfaces was calculated for each subarea based upon the classified land use as described in the SWMM User's Manual. Condition A (dry soils with little or no vegetation) was taken to represent commercial and residential land uses. Condition B (dry soils with dense vegetation). Values for loamy soils were used in the calculations since it is the predominant general soil type in the area. Weighted averages of the following maximum infiltration rates associated with the various land use classifications were calculated and assigned to each subarea.

Commercial Business = 1.5 inches/hour
High Density Residential = 1.5 inches/hour
Medium Density Residential = 1.5 inches/hour
Low Density Residential = 1.5 inches/hour
Urban open space = 3.0 inches per hour
Rural open space = 3.0 inches per hour

Minimum Infiltration Rate: Minimum infiltration rate values for each subarea were calculated as weighted averages of values associated with hydrologic soil groups as listed below. Hydrologic soil group information was obtained and analyzed using the GIS.

Soil data for the area was obtained from the NRCS from their web site. The distribution of soils by hyrologic soil groups in the BASA area is illustrated in Figure 4. Assignments for minimum infiltration rate values were made in accordance with the following information extracted from the SWMM User's Manual.

Hydrologic Soil Group A = 0.37
Hydrologic Soil Group B = 0.22
Hydrologic Soil Group C = 0.10
Hydrologic Soil Group D = 0.025

Slope: Average ground slopes were calculated for each subarea using USGS digital elevation model (DEM) data. This data was analyzed using the GIS to calculate average ground slopes in each subarea.

This data was used in the SWMM RUNOFF block to produce wet weather induced infiltration and inflow hydrographs for each of the subareas. These hydrographs were assigned to appropriate input manholes in the SewerCAD model and loaded into the model.

Wet Weather Model Calibration

Calibration of the model was performed against four representative storms for which BASA provided hourly rainfall and flow data. The general characteristics of these storms are presented in Table 3.

Table 3
Calibration Storm Characteristics

	Storm of 12/21/1998	Storm of 5/28/2000	Storm of 12/16/2000	Storm of 4/15/2001
Total Storm Precipitation (inches)	2.07	1.12	1.78	1.43
Total Storm Duration (hours)	14	17	22	11
Average Storm Intensity (inches/hour)	0.15	0.07	0.08	0.13
Total Storm Return Frequency (years)	2	<1	1	1
Peak 1-Hour Storm Volume (inches)	0.32	0.30	0.36	0.23
Peak 1-Hour Storm Intensity (inches/hour)	0.32	0.30	0.36	0.23
Peak 1-Hour Return Frequency (years)	<1	<1	<1	<1
Peak 3-Hour Storm Volume (inches)	0.74	0.65	0.55	0.48
Peak 3-Hour Storm Intensity (inches/hour)	0.25	0.22	0.18	0.16
Peak 3-Hour Return Frequency (years)	<1	<1	<1	<1
Peak 5-Hour Storm Volume (inches)	1.19	0.78	0.69	0.79
Peak 5-Hour Storm Intensity (inches/hour)	0.24	0.16	0.14	0.16
Peak 5-Hour Return Frequency (years)	1	<1	<1	<1
Peak 7-Hour Storm Volume (inches)	1.63	0.89	0.85	0.99
Peak 7-Hour Storm Intensity (inches/hour)	0.23	0.13	0.12	0.14
Peak 7-Hour Return Frequency (years)	2	<1	<1	<1

Table 3 (continued)
Calibration Storm Characteristics

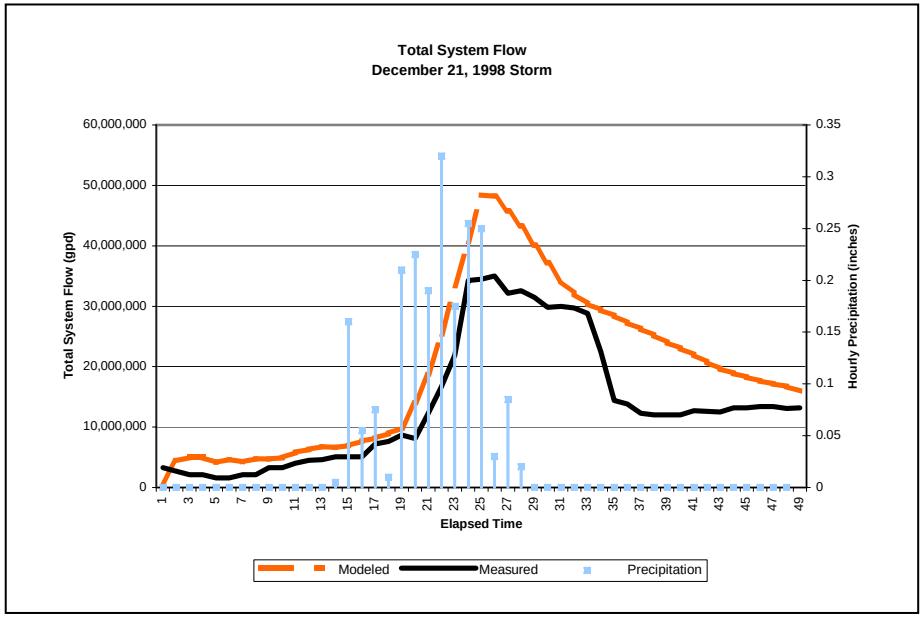
	Storm of 12/21/1998	Storm of 5/28/2000	Storm of 12/16/2000	Storm of 4/15/2001
Peak 9-Hour Storm Volume (inches)	1.74	1.03	1.50	1.22
Peak 9-Hour Storm Intensity (inches/hour)	0.19	0.11	0.17	0.14
Peak 9-Hour Return Frequency (years)	2	<1	1.5	<1
Peak 11-Hour Storm Volume (inches)	1.925	1.09	1.05	1.43
Peak 11-Hour Storm Intensity (inches/hour)	0.18	0.10	0.10	0.13
Peak 11-Hour Return Frequency (years)	2	<1	<1	<1
Peak 13-Hour Storm Volume (inches)	2.04	1.09	1.42	n/a
Peak 13-Hour Storm Intensity (inches/hour)	0.16	0.08	0.11	n/a
Peak 13-Hour Return Frequency (years)	3	<1	<1	n/a

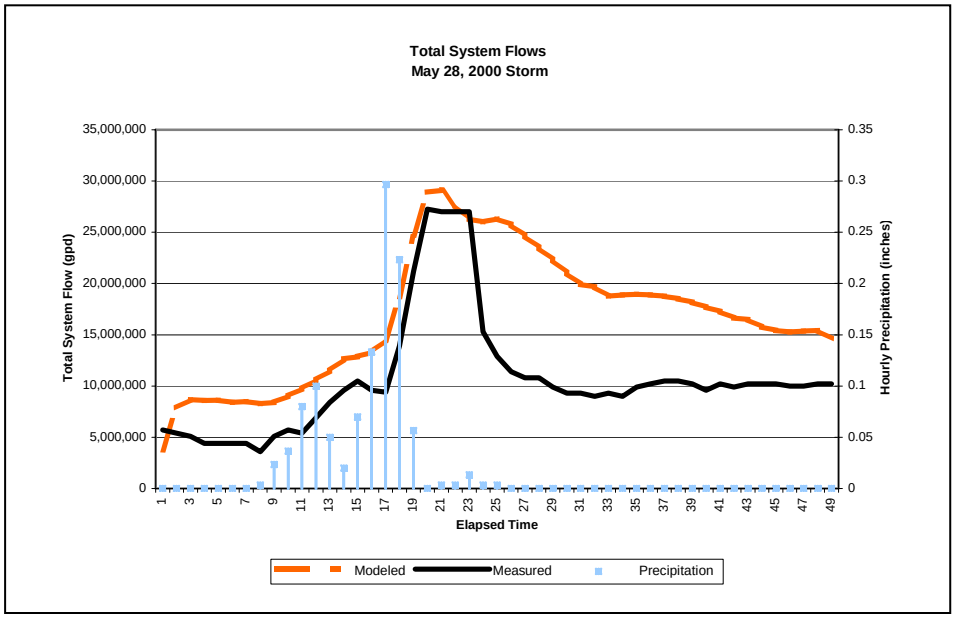
The following procedure was used to construct and calibrate the model for wet weather conditions.

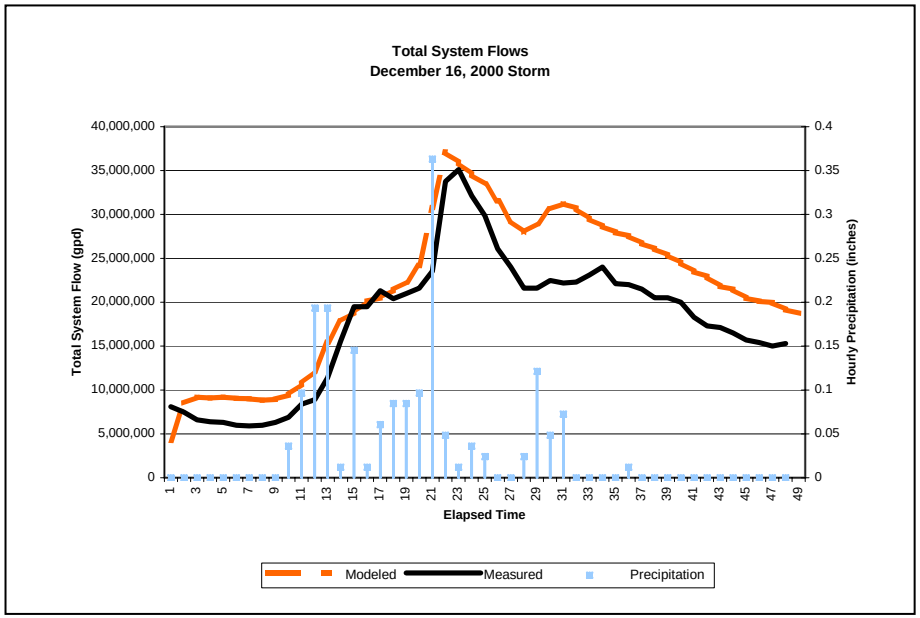
- A 48 hour simulation duration was used to facilitate the capture of the storm events.
- Rainfall reported by BASA for the 48 hour period from midnight to midnight that brackets the storm event was obtained and input into the SWMM Runoff model. The average of the three gauges was used.
- The SWMM RUNOFF block was run.
- The hourly hydrograph values were extracted from the SWMM output and input into the SewerCAD loading file.
- The SewerCAD model was run and the output extracted for the following locations: 1) treatment plant influent, 2) the Deshon Overflow (manhole 999951), 3) the Ballpark Overflow (manhole 5158), 4) the General Tire Overflow (manhole 5154), the Monroe Street P.S. Overflow (manhole 5667), and the Monroe and Deshon pumping stations
- An Excel file was developed to include and compare the model output hydrographs and the BASA monitoring hydrographs.
- The modeled and observed hydrographs for the four calibration storm as well as the other calibration storms were analyzed to evaluate how well the model replicated observed conditions. Based upon this analysis, the calibration factors were applied to the SWMM catchment input parameters and SewerCAD input data. The models were re-run using the adjusted input data and the output evaluation and input adjustment process was completed until acceptable results were obtained.

Comparisons of the flow hydrographs produced by the calibrated model to the observed data (as provided by BASA as hourly flow monitoring results) are presented graphically in Figures 4-6.

Figure 4
Total Flow Hydrographs – BASA WTP Tributary Area







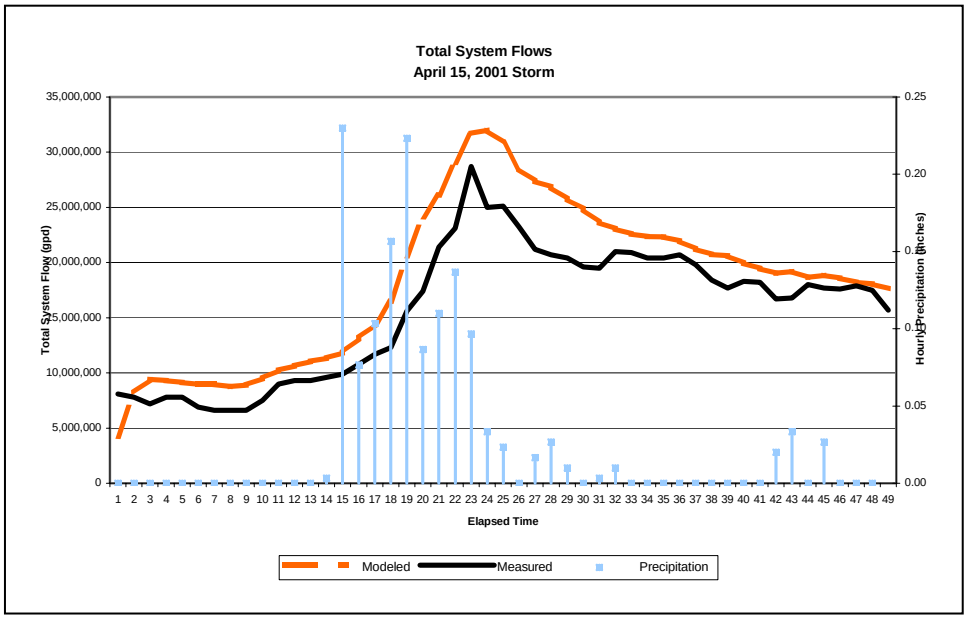
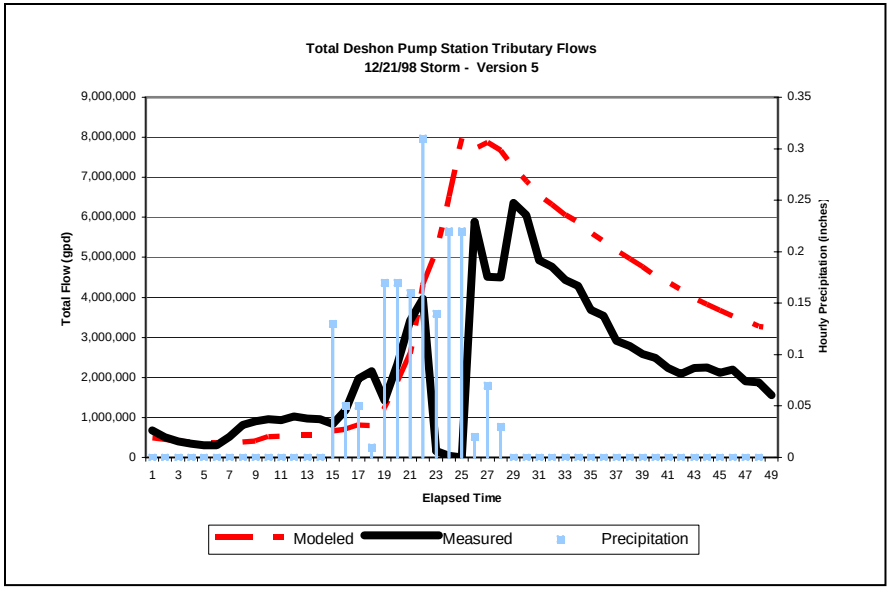
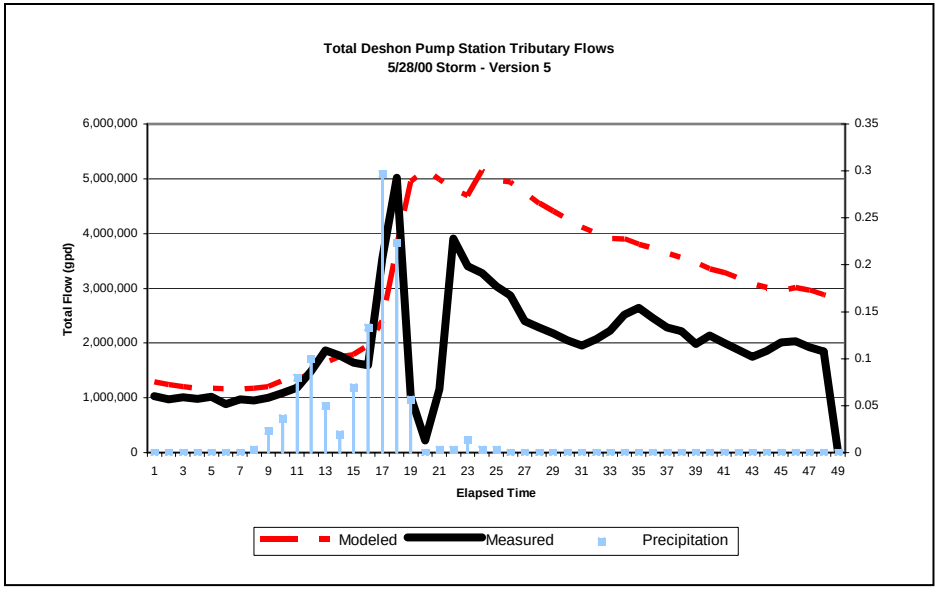
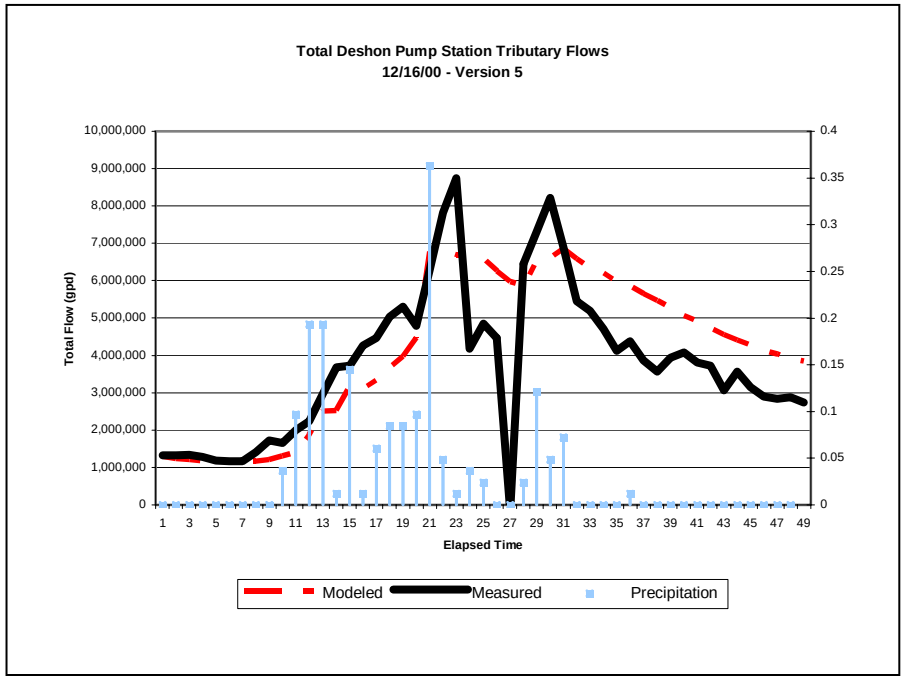


Figure 5
Total Flow Hydrographs – BASA Deshon Pumping Station Tributary Area







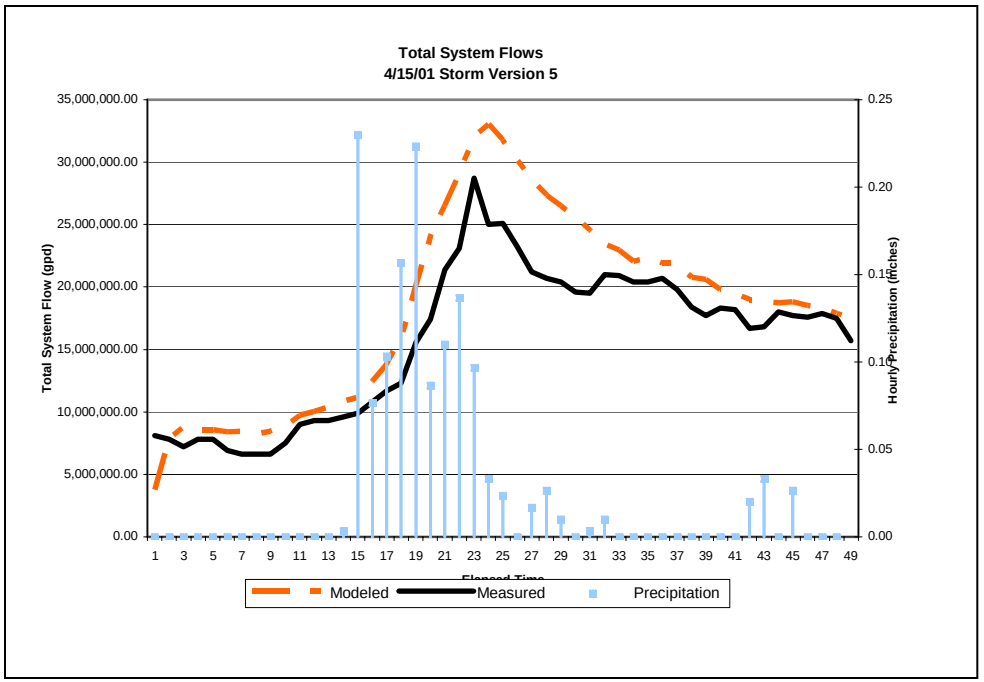
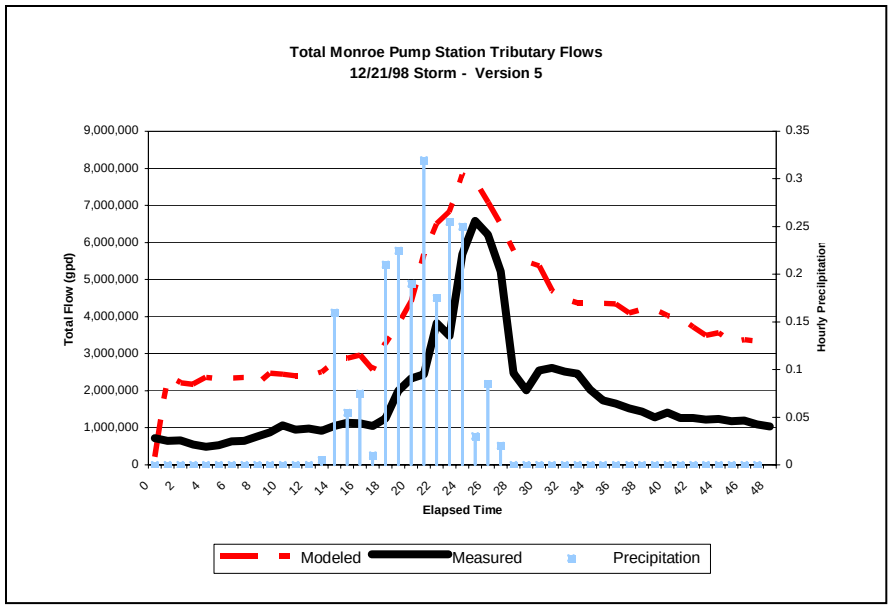
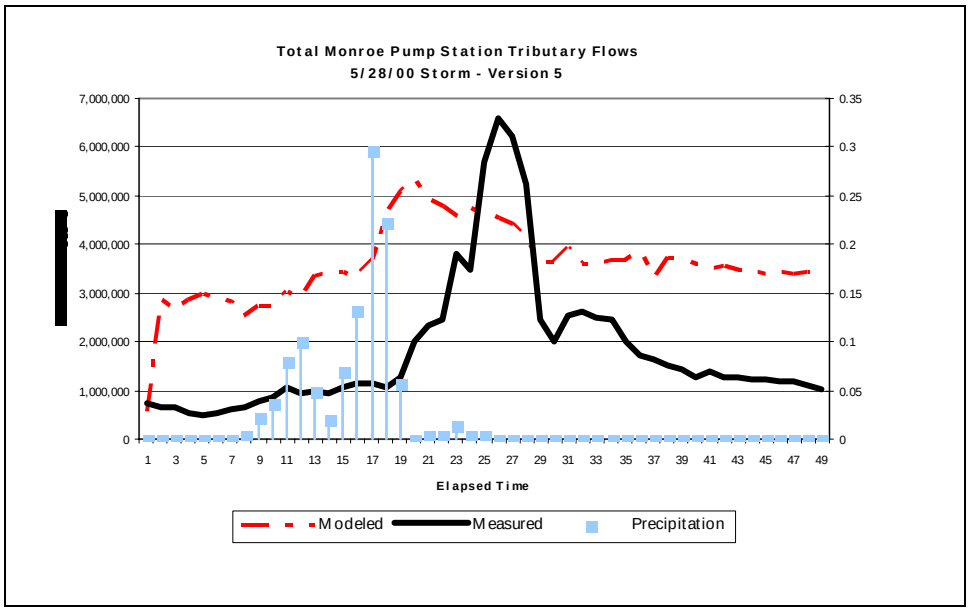
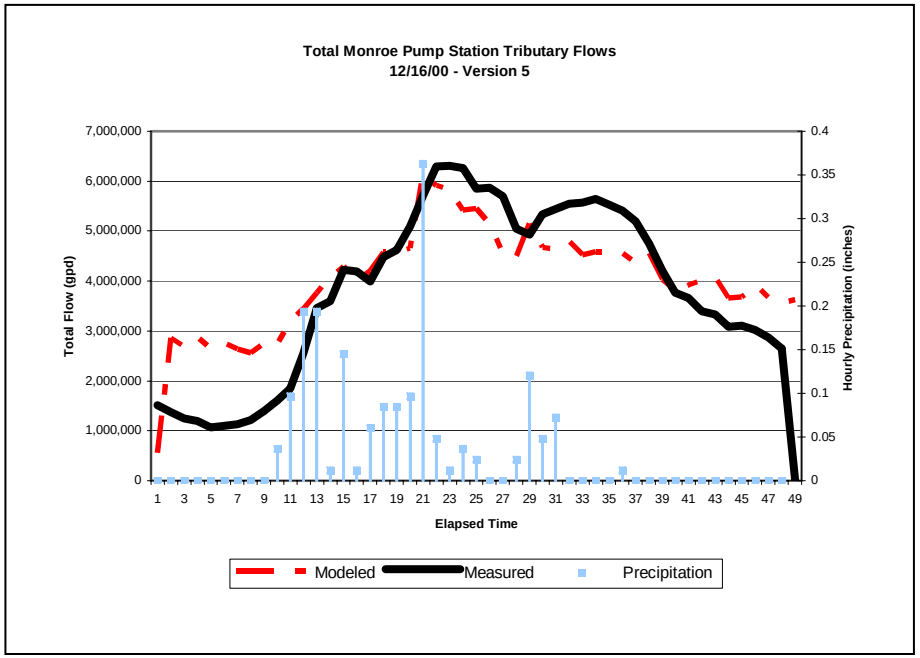


Figure 6
Total Flow Hydrographs – BASA Monroe Pumping Station Tributary Area







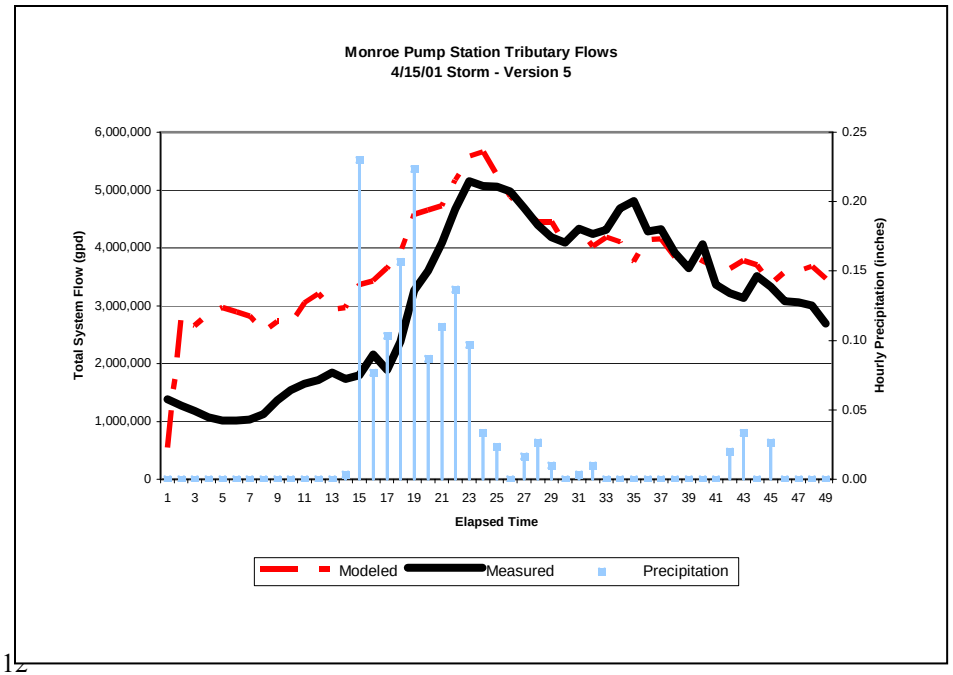
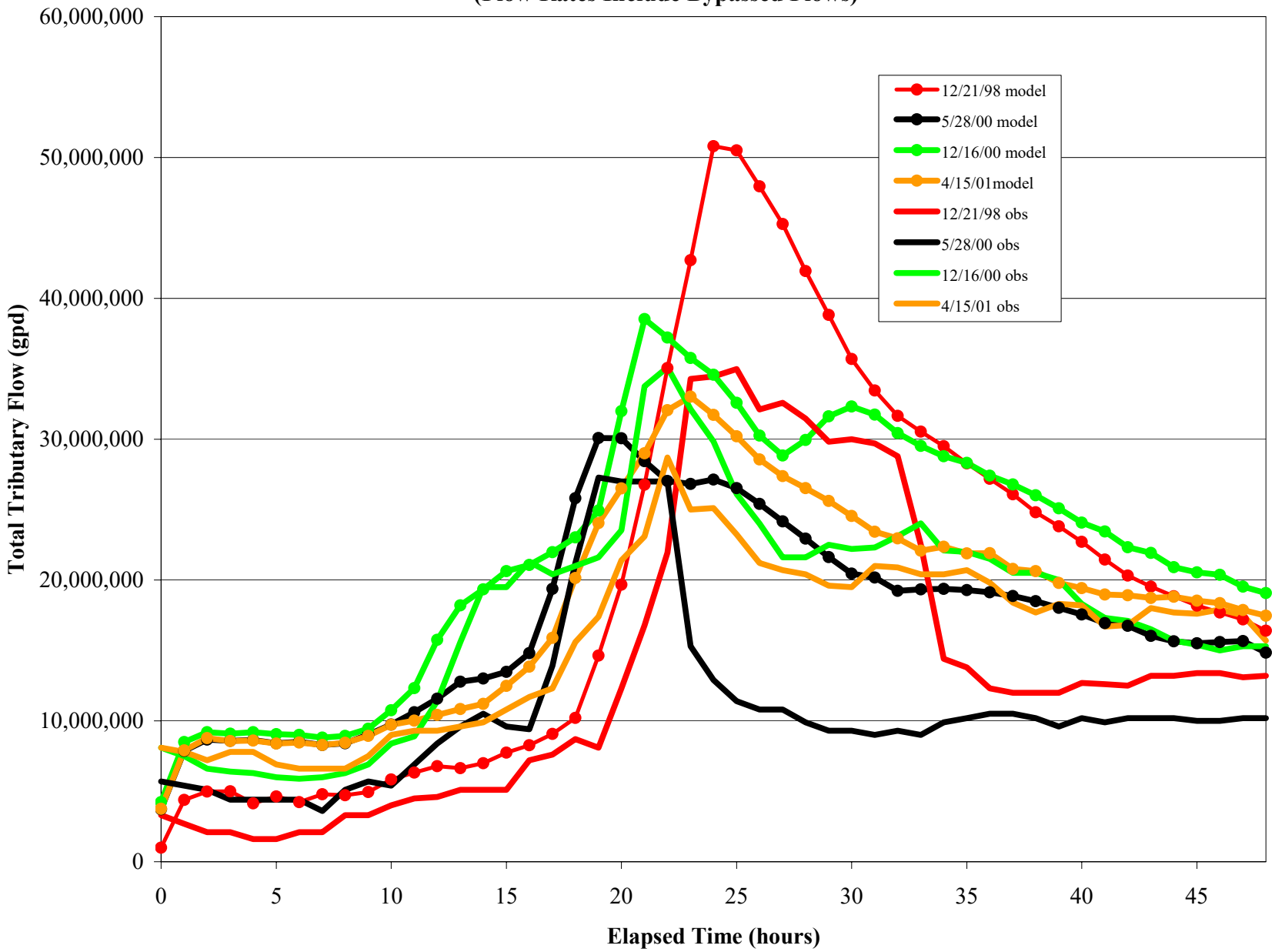


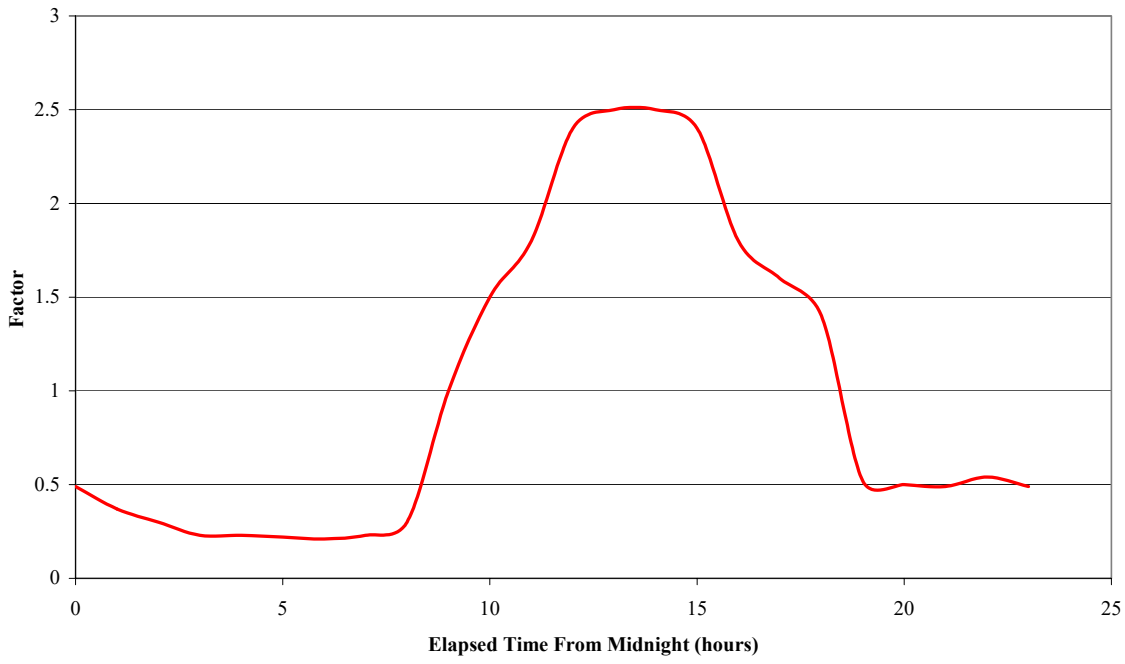
Figure 7
Comparison of Modeled to Observed Hydrographs Tributary to BASA WWTP
(Flow Rates Include Bypassed Flows)



Wet Weather Hydrographs – Future Loadings

Future wet weather loadings were estimated by applying a 2.5 peaking factor to the 400 gpd/edu future unit loading rate and adjusting the dry weather diurnal pattern to simulate a future wet weather flow hydrograph from new collection systems. The assumed wet weather diurnal pattern utilized for future contributions is illustrated in Figure 8.

Figure 8
Wet Weather Flow Pattern Future Additional Flows



SIZING DIVERSION AND STORAGE FACILITIES – EXISTING CONDITIONS

DESCRIPTION OF ALTERNATIVE

Model simulations were conducted in order to determine the flow diversion rates and volumes that are required to eliminate the existing overflows and to restrict flows to the wastewater treatment plant to approximately 28-mgd under existing conditions. The following approach to accomplishing these objectives defined.

Flow diversion facilities will be constructed at each of the existing overflow locations: Deshon, Ballpark/General Tire and Monroe. These facilities are required to eliminate the existing overflows at these locations. In addition, an additional diversion facility is constructed on the Connoquenessing interceptor east of the point of connection of the Sullivan Run interceptor to the Connoquenessing

interceptor. This additional diversion location is required in order to limit flows to the wastewater treatment plant to 28-mgd. The diversion facilities consist of flow measurement, flow control/diversion chambers, diversion pumping facilities at the diversion locations, and force mains from the pump stations to the associated storage facilities. It is anticipated that the Ballpark and General Tire overflows will be consolidated into one diversion pumping facility. Wet weather flow storage facilities will be constructed adjacent to the Deshon and Monroe diversion facilities. Centralized flow storage facilities will be constructed to service the Ballpark/General Tire and Connoquenessing diversions. The approximate locations of the diversion points and facilities and associated storage facilities are indicated in Figure 9. As is also indicated in Figure 9, storage facilities are anticipated at the Deshon and Monroe locations and a centralized storage facility is anticipated for the Ballpark/General Tire and Connoquenessing Interceptor diversions. This alternative configuration will be referred to as "**Alternative 1: Four Diversion Facilities – Existing Conditions**."

It is anticipated that the facilities will be operated in a real-time control mode in which flows are diverted as required to 1) capture flows that would otherwise be overflowed due to limitations of the conveyance system while also 2) diverting flows as necessary to limit flows reaching the treatment plant to 28-mgd or less.

FACILITIES SIZING – EXISTING CONDITIONS

Facilities sizing of the two alternatives under existing conditions was performed by modeling the existing system under 2-year return frequency, 24-hour, SCS design storm wet weather conditions. Table 4 presents a summary of the computed required capacities of the diversion and storage facilities included in Alternative 1.

Table 6
Alternative 1: Four Diversion Facilities – Existing Loading Conditions
Facility Sizing

	Peak Diversion Rate (mgd)	Storage Volume (million gallons)
Deshon Diversion Facilities	6.6	
Ballpark/General Tire Diversion Facilities	12.3	
Connoquenessing Interceptor Diversion Facilities	12.8	
Monroe Diversion Facilities	3.8	
Deshon Storage Facilities		4.0
Central Storage Facilities*		9.7
Monroe Storage Facilities		1.0

Figure 10 presents the total system flow (including diverted flows) and controlled WWTP influent flow hydrographs for Alternative 1. Figure 11 presents graphs that represent the flow diversions required from each of the diversion facilities under the design storm conditions. Figure 12 contains graphs of cumulative storage volumes required to capture the identified flow diversions.

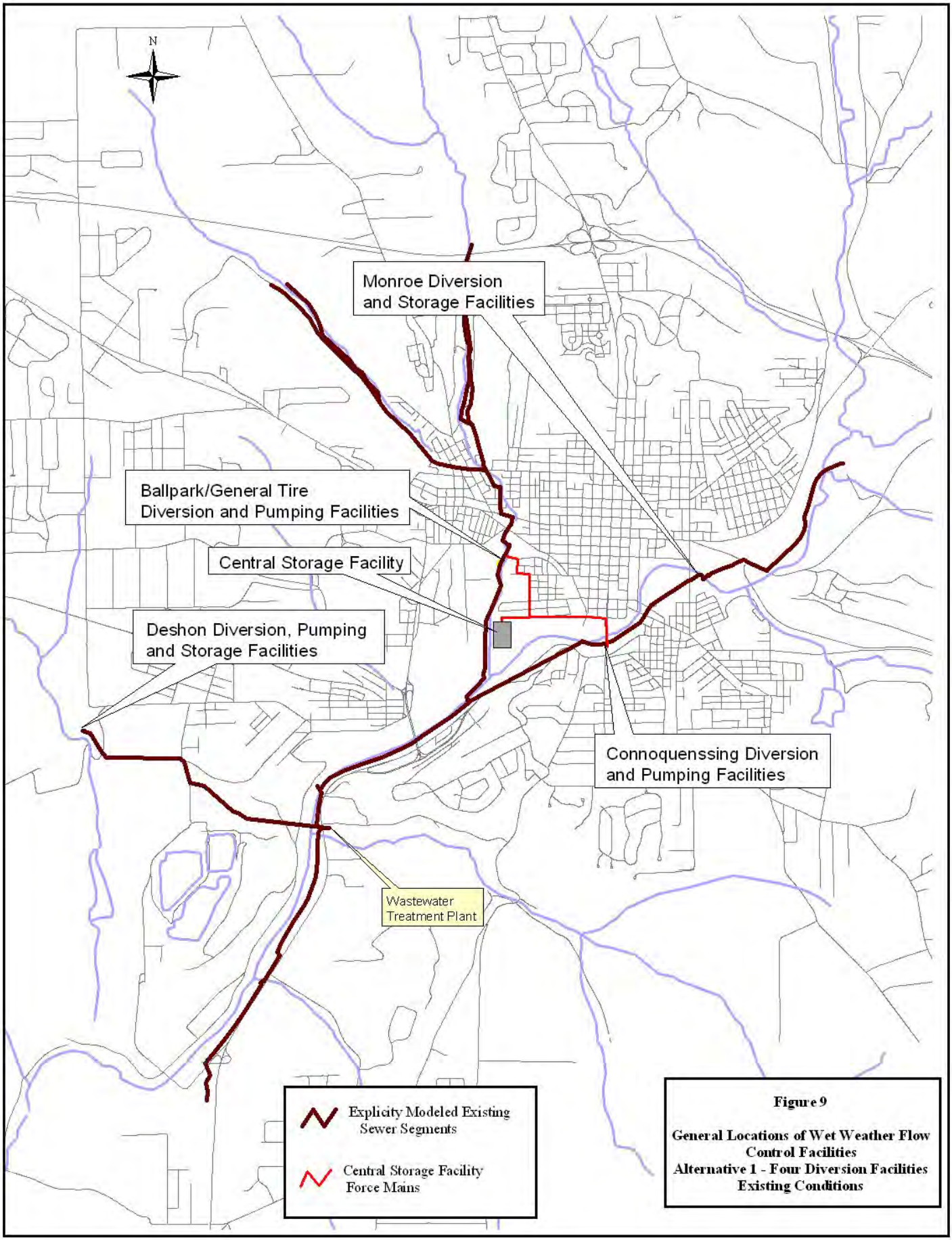


Figure 9

General Locations of Wet Weather Flow Control Facilities
Alternative 1 - Four Diversion Facilities
Existing Conditions

Figure 10
Alternative 1: Four Diversion Facilities - Existing Loading Conditions
Total System and Controlled WWTP Plant Flows

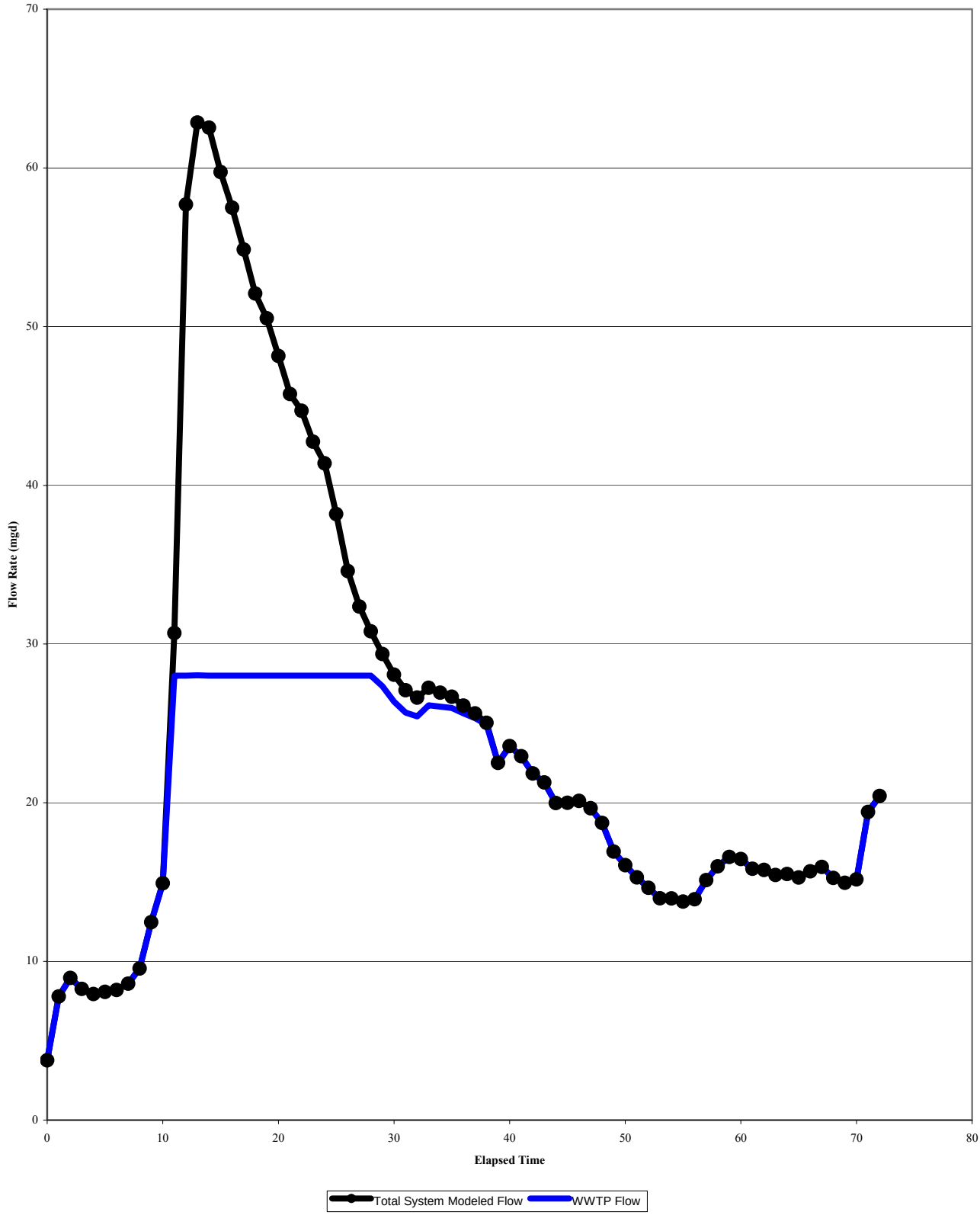


Figure 11
Alternative 1: Four Diversion Facilities - Existing Loading Conditions
Cumulative Storage Volumes

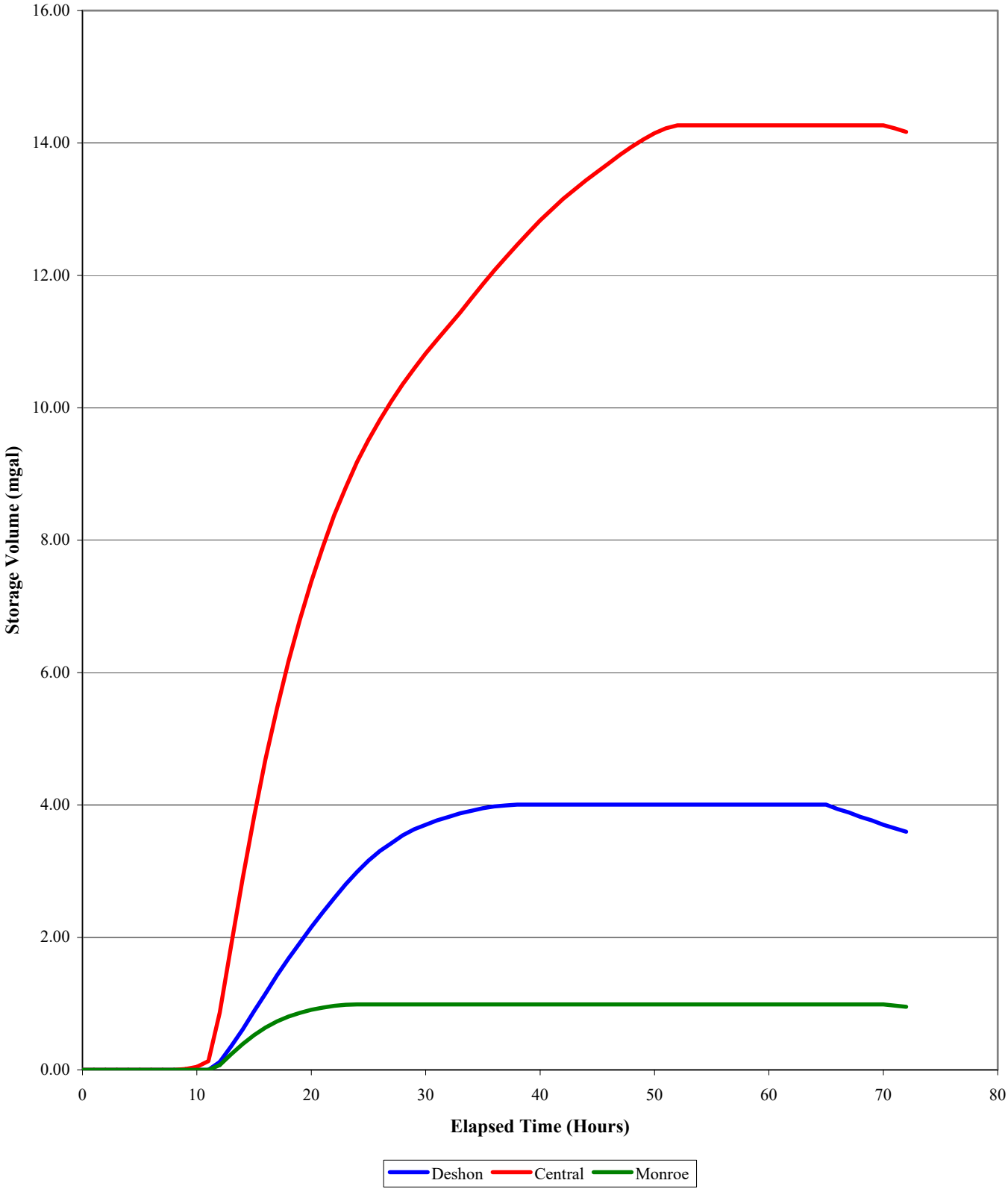
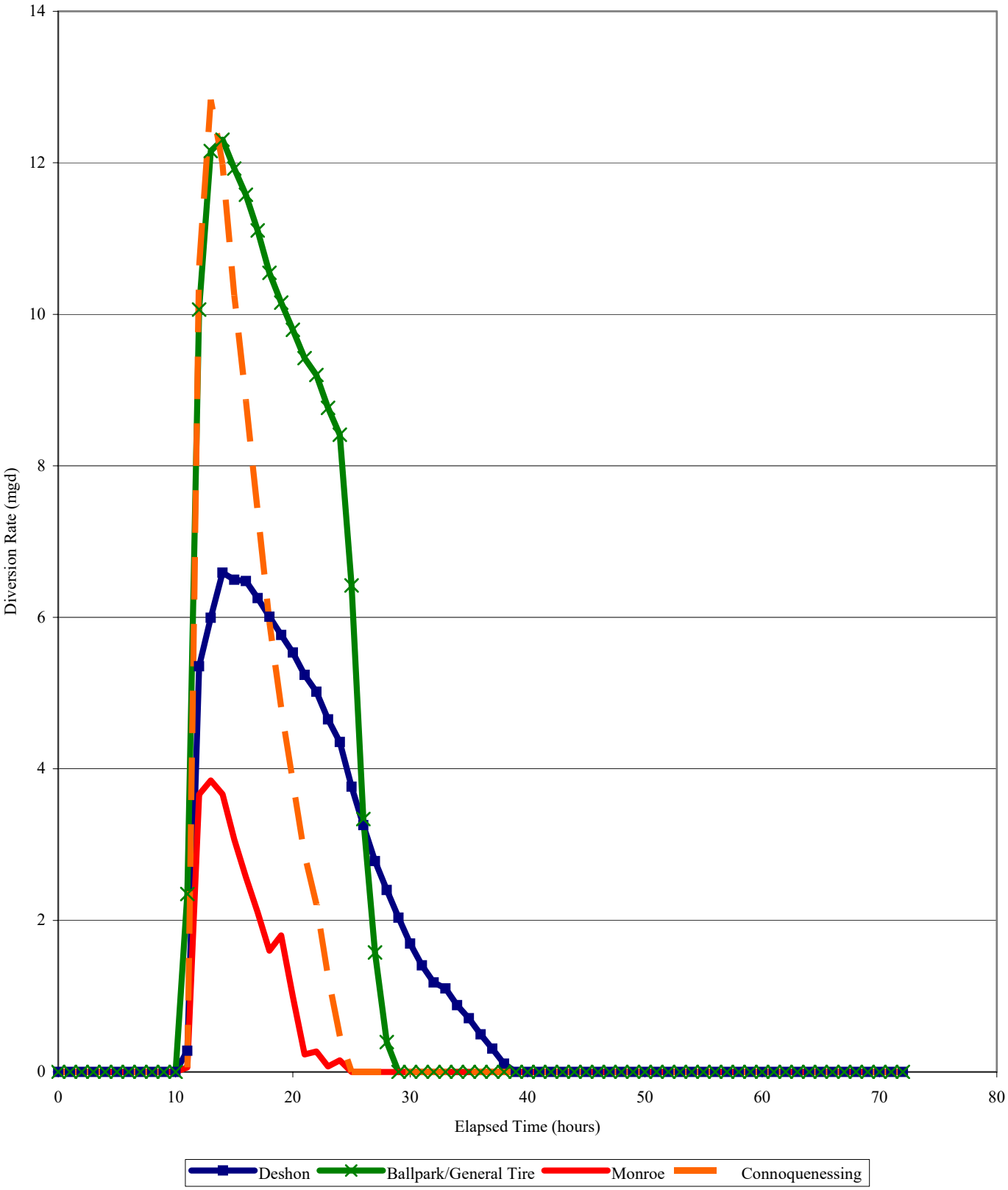


Figure 12
Alternative 1: Four Diversion Facilities -Existing Loading Conditions
Flow Diversion Rates



SIZING DIVERSION AND STORAGE FACILITIES – FUTURE TRIBUTARY LOADING CONDITIONS

DESCRIPTION OF ALTERNATIVE

Model simulations were conducted in order to determine the flow diversion rates and volumes that are required to eliminate overflows and to restrict flows to the wastewater treatment plant to approximately 28-mgd under future tributary loading conditions. The same approache to accomplishing these objectives was used as were presented previously under existing loading conditions.

Flow diversion facilities are constructed at each of the existing overflow locations: Deshon, Ballpark/General Tire and Monroe. These facilities are required to eliminate the existing overflows at these locations. In addition, an additional diversion facility is constructed on the Connoquenessing interceptor east of the point of connection of the Sullivan Run interceptor to the Connoquenessing interceptor. This additional diversion location is required in order to limit flows to the wastewater treatment plant to 28-mgd. The diversion facilities consist of flow measurement, flow control/diversion chambers, diversion pumping facilities at the diversion locations, and force mains from the pump stations to the associated storage facilities. It is anticipated that the Ballpark and General Tire overflows will be consolidated into one diversion pumping facility. Wet weather flow storage facilities will be constructed adjacent to the Deshon and Monroe diversion facilities. Centralized flow storage facilities will be constructed to service the Ballpark/General Tire and Connoquenessing diversions. The approximate locations of the diversion points and facilities and associated storage facilities are same as indicated in previously in Figure 9. As is also indicated in Figure 9, storage facilities are anticipated at the Deshon and Monroe locations and a centralized storage facility is anticipated for the Ballpark/General Tire and Connoquenessing Interceptor diversions. This alternative configuration will be referred to as "**Alternative 2: Four Diversion Facilities – Future Tributary Loading Conditions**."

It is anticipated that the facilities will be operated in a real-time control mode in which flows are diverted as required to 1) capture flows that would otherwise be overflowed due to limitations of the conveyance system while also 2) diverting flows as necessary to limit flows reaching the treatment plant to 28-mgd or less.

FACILITIES SIZING – FUTURE TRIBUTARY CONDITIONS

Facilities sizing under the projected future conditions was performed by modeling the existing system with the anticipated future additional loadings imposed on the system under 2-year return frequency, 24-hour, SCS design storm wet weather conditions. Table 5 presents a summary of the computed required capacities of the diversion and storage facilities included in Alternative 2.

Table 7
Alternative 2: Four Diversion Facilities – Future Tributary Conditions
Facility Sizing

	Peak Diversion Rate (mgd)	Storage Volume (million gallons)
Deshon Diversion Facilities	7.7	
Ballpark/General Tire Diversion Facilities	14.6	
Connoquenessing Interceptor Diversion Facilities	18.8	
Monroe Diversion Facilities	6.1	
Deshon Storage Facilities		4.6
Central Storage Facilities*		14.1
Monroe Storage Facilities		1.8

Figure 13 presents the total system flow (including diverted flows) and controlled WWTP influent flow hydrographs for Alternative 3. Figure 14 presents graphs that represent the flow diversions required from each of the diversion facilities under the design storm conditions. Figure 15 contains graphs of cumulative storage volumes required to capture the identified flow diversions.

Figure 13
Alternative 2: Four Diversion Facilities - Future Tributary Loading Conditions
Total System and Controlled WWTP Plant Flows

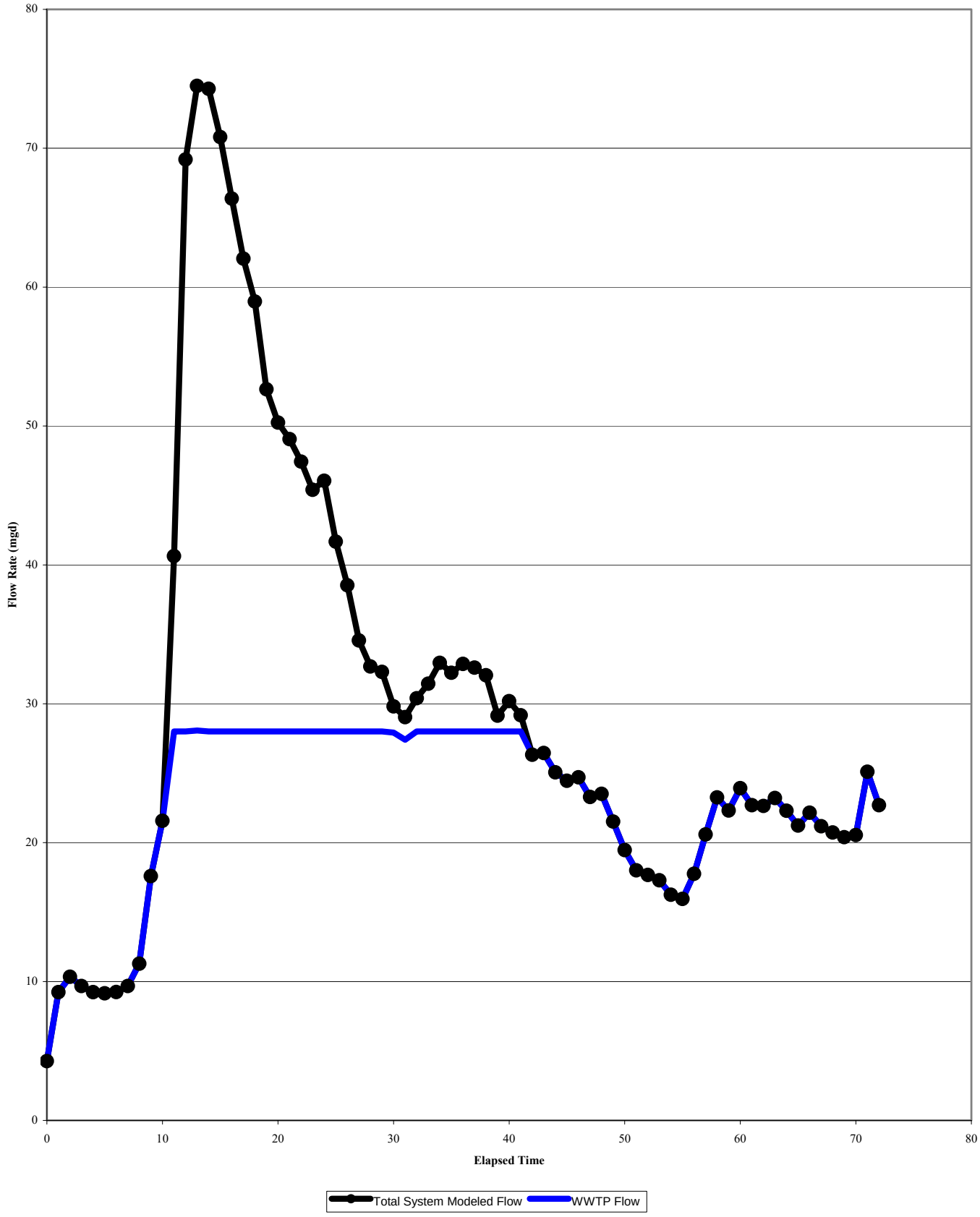


Figure 14
Alternative 2: Four Diversion Facilities - Future Tributary Loading Conditions
Flow Diversion Rates

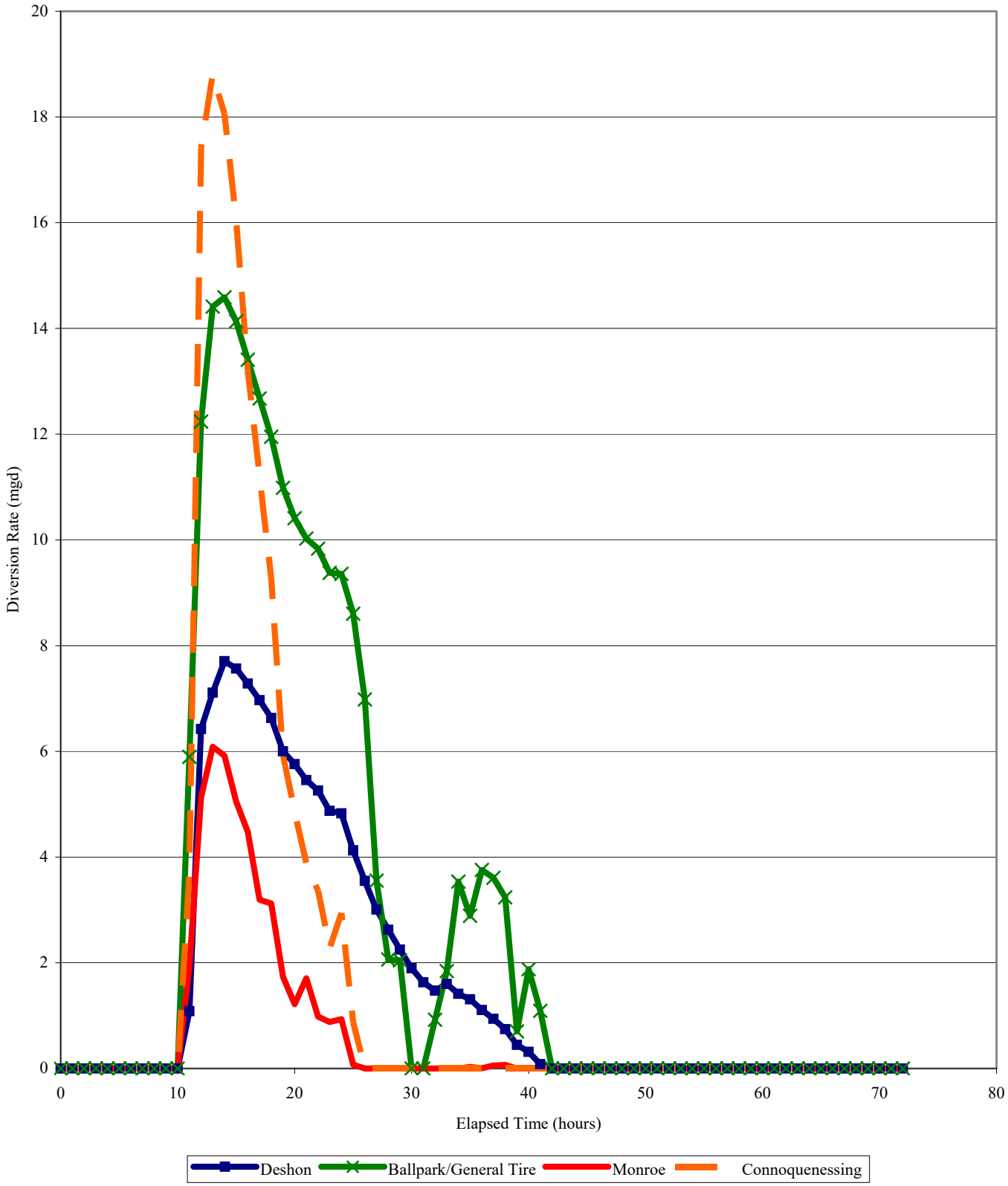
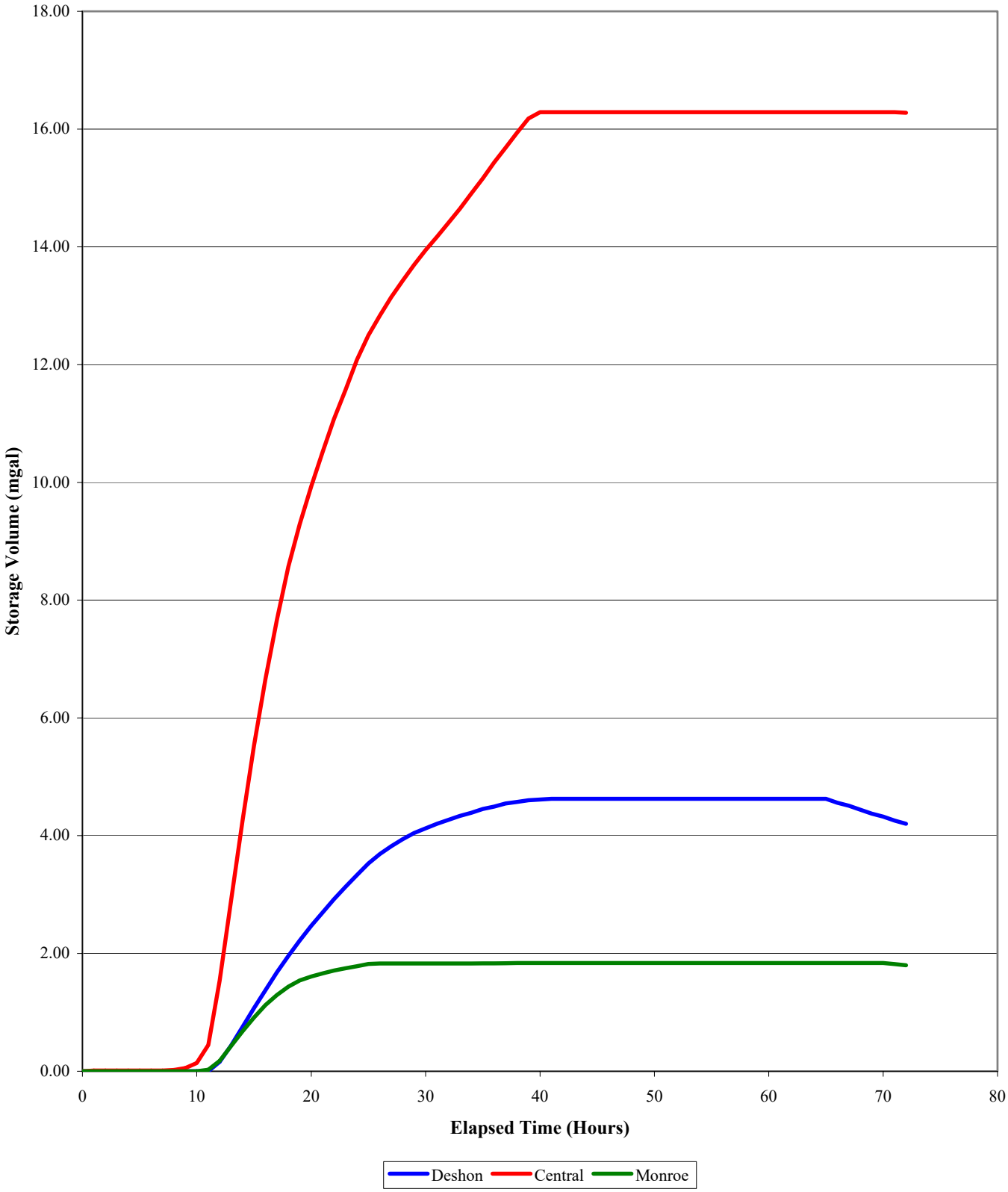


Figure 15
Alternative 2: Four Diversion Facilities - Future Tributary Loading Conditions
Cumulative Storage Volumes



UPPER SULLIVAN RUN INTERCEPTOR IMPROVEMENTS

Modeling indicates that the Upper Sullivan Run Interceptor can be overloaded under the design storm conditions both with and without the projected future contributions from the tributary areas. The general location of the segments of the interceptor requiring upsizing and the preliminary sizing of the upsized facilities under design storm conditions including the projected future service area contributions are provided in Figure 16. Approximate quantities of replacement sewer by size are presented in Table 7.

Table 7
Upper Sullivan Run Interceptor Sewer Upsizing Quantities

Diameter	Length (feet)
18-inches	1,400
24-inches	3,500
36-inches	2,400

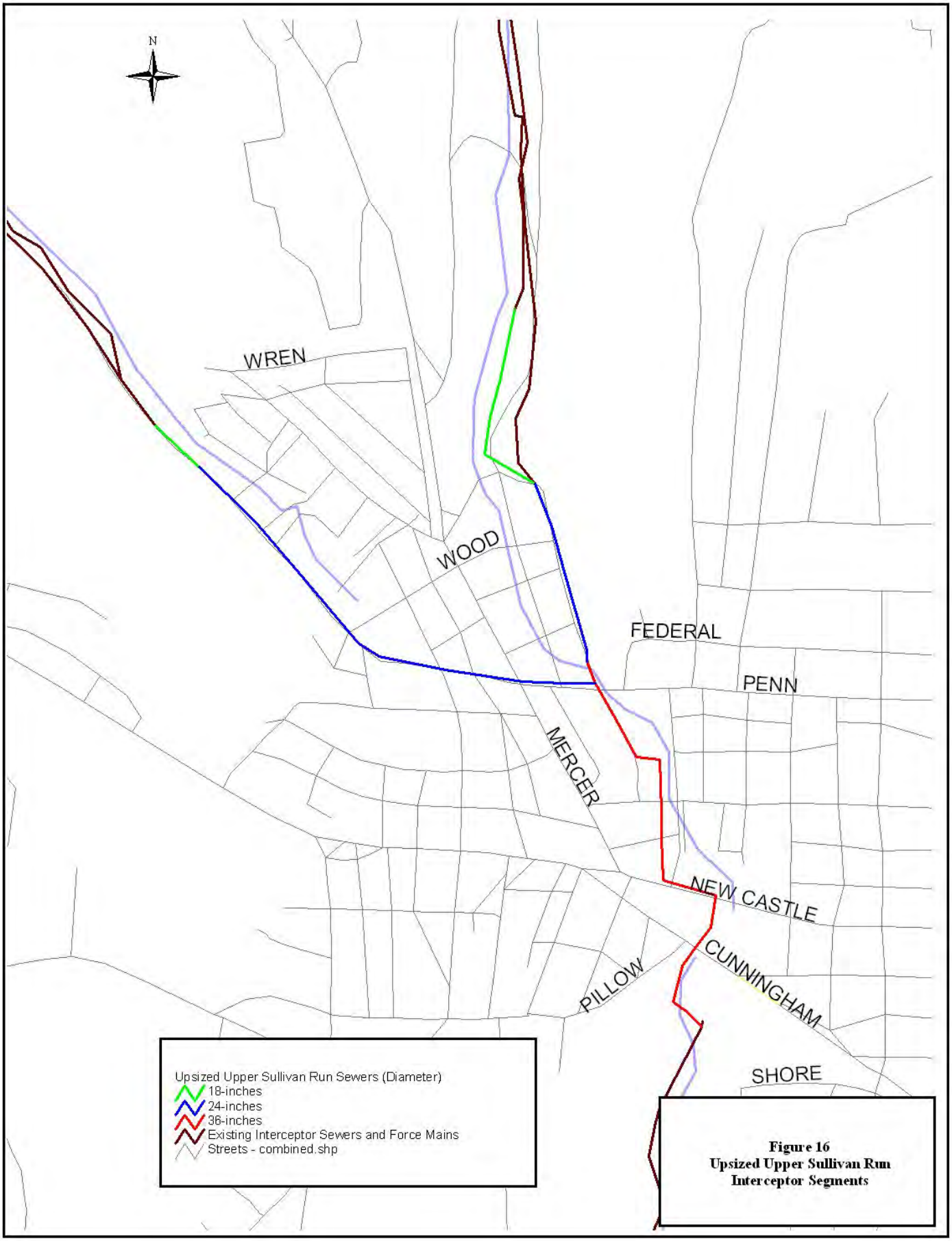
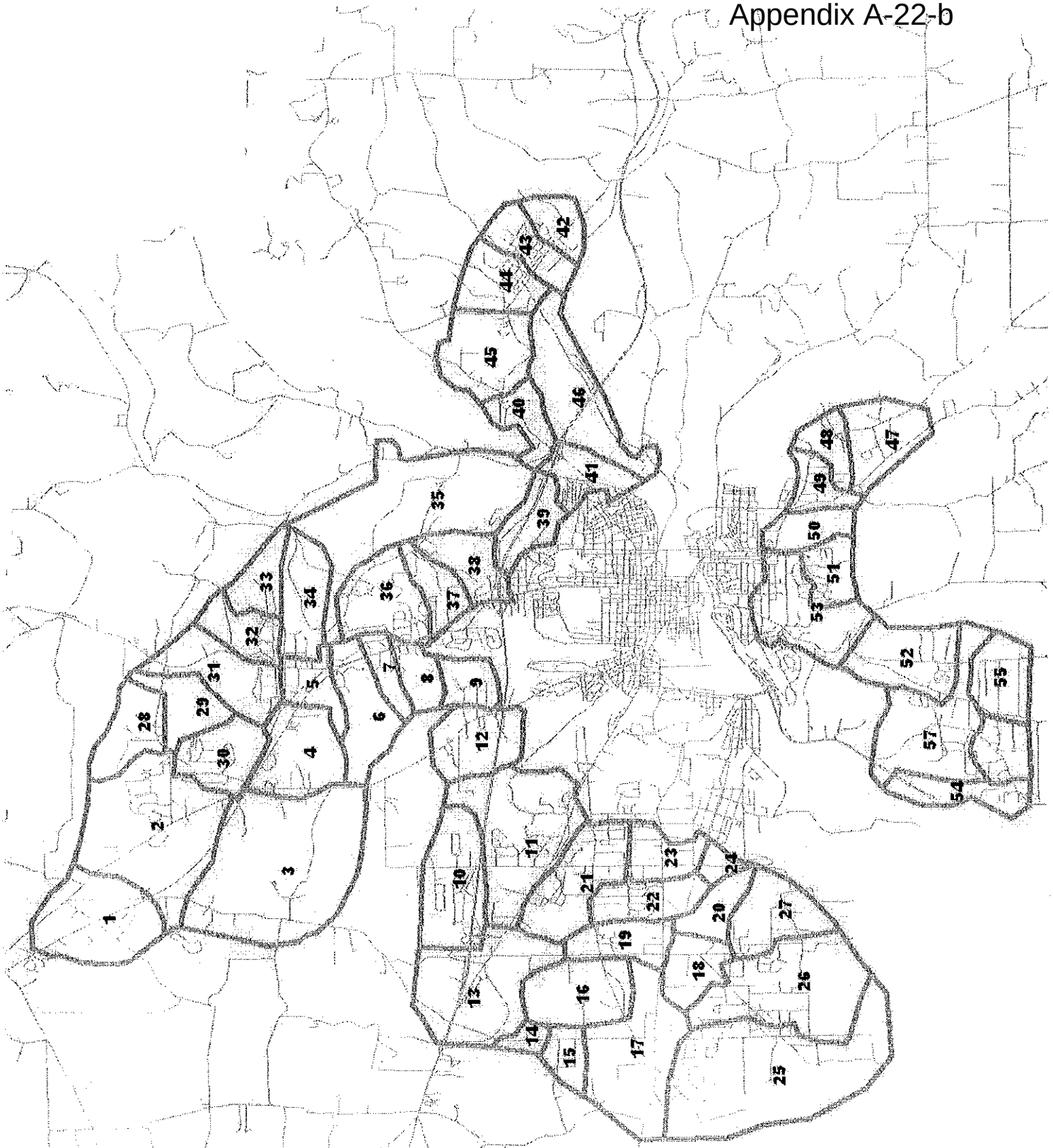


Figure 16
Upsized Upper Sullivan Run Interceptor Segments

APPENDIX G
CAPACITY ANALYSIS FOR SEWERS UPSTREAM OF SEWER MODEL


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Capacity Check for BASA Sewers Upstream of Model - Existing Conditions

2.5 peaking factor

Sullivan Run Watershed

Area	Current BASA EDUs	Cumulat Current BASA EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
1	134	134	53,600	134,000	8	494,005	360,005	360,000	226,000	Fisher Heights	
2	266	400	160,000	400,000	10	749,377	349,377				
3	72	472	188,800	472,000	12	1,080,134	608,134	864,000	392,000	Brewster Rd. & Booster	
4	128	600	240,000	600,000	15	1,617,082	1,017,082				
5	162	762	64,800	162,000	8	1,617,082	1,455,082				
6	81	843	337,200	843,000	15	1,617,082	774,082				
7	66	909	363,600	909,000	15	1,617,082	708,082				
8	33	942	376,800	942,000	15	1,617,082	675,082				
9	23	965	386,000	965,000	15	1,617,082	652,082				
10	270	270	108,000	270,000	8	494,005	224,005				
11	631	901	360,400	901,000	12	1,080,134	179,134				
12	62	62	24,800	62,000	8	494,005	432,005				
Subtotal	1,928										

Deshon Watershed

Area	Current BASA EDUs	Cumulat Current BASA EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
13	154	154	61,600	154,000	8	494,005	340,005	720,000	566,000	Greenwood Dr.	
14	1	155	62,000	155,000				720,000	565,000	Benbrook Road	
15	16	171	68,400	171,000				720,000	549,000	Bryson Road	
16	29	200	11,600	29,000	8	494,005	465,005				
17	247	447	178,800	447,000	10	749,377	302,377				
18	94	541	216,400	541,000	10	749,377	208,377				
19	179	720	71,600	179,000	8	494,005	315,005				
20	0	720	288,000	720,000	10	749,377	29,377				
21	381	381	152,400	381,000	12	1,080,134	699,134				
22	272	653	108,800	272,000	18	2,351,916	2,079,916				

Area	Current BASA EDUs	Cumulat Current BASA EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
23	312	965	277,200	693,000	18	2,351,916	1,658,916				
24	8	973	389,200	973,000	18	2,351,916	1,378,916				
25	399	399	159,600	399,000	12	1,080,134	681,134	1,584,000	1,185,000	Cupps Road	
26	269	668	267,200	668,000	10	749,377	81,377	2,304,000	1,636,000	Rocklick	
27	86	754	301,600	754,000	15	1,617,082	863,082				
Subtotal	2,447										

Monroe Watershed

Area	Current BASA EDUs	Cumulat Current BASA EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
28	75	75	30,000	75,000	8	494,005	419,005	403,200	328,200	Northvue	
29	1	76	30,400	76,000	10	749,377	673,377				
30	218	294	87,200	218,000	15	1,617,082	1,399,082				
31	110	404	161,600	404,000	15	1,617,082	1,213,082				
32	150	554	221,600	554,000	15	1,617,082	1,063,082				
33	23	577	230,800	577,000	15	1,617,082	1,040,082				
34	79	656	31,600	79,000	8	494,005	415,005				
35	146	802	320,800	802,000	20	2,899,779	2,097,779			PA American Water	
36	137	137	54,800	137,000	8	494,005	357,005				
37	93	230	92,000	230,000	12	1,080,134	850,134				
38	203	433	173,200	433,000	12	1,080,134	647,134				
39	29	462	184,800	462,000	12	1,080,134	618,134				
40	64	64	25,600	64,000	8	494,005	430,005				
41	139	1,467	586,800	1,467,000	20	2,899,779	1,432,779				
42	90	90	36,000	90,000	8	494,005	404,005				
43	98	188	75,200	188,000	10	494,005	306,005				
44	161	349	139,600	349,000	12	1,080,134	731,134				
45	68	417	27,200	68,000	8	494,005	426,005				
46	43	460	184,000	460,000	12	1,080,134	620,134				
Subtotal	1,927										

Capacity Check for BASA Sewers Upstream of Model - Existing Conditions Plus Current Unsewered Areas

Sullivan Run Watershed

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
1	334	334	133,600	334,000	8	494,005	160,005	360,000	26,000	Fisher Heights	
2	266	600	240,000	600,000	10	749,377	149,377				
3	72	672	268,800	672,000	12	1,080,134	408,134	864,000	192,000	Brewster Rd. & Booster	
4	138	810	324,000	810,000	15	1,617,082	807,082				
5	162	972	64,800	162,000	8	1,617,082	1,455,082				
6	81	1,053	421,200	1,053,000	15	1,617,082	564,082				
7	66	1,119	447,600	1,119,000	15	1,617,082	498,082				
8	33	1,152	460,800	1,152,000	15	1,617,082	465,082				
9	23	1,175	470,000	1,175,000	15	1,617,082	442,082				
10	320	320	128,000	320,000	8	494,005	174,005				
11	631	951	380,400	951,000	12	1,080,134	129,134				
12	62	62	24,800	62,000	8	494,005	432,005				
Subtotal	2,188										

Deshon Watershed

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
13	186	186	74,400	186,000	8	494,005	308,005	720,000	534,000	Greenwood Dr.	
14	1	187	74,800	187,000				720,000	533,000	Benbrook Road	
15	16	203	81,200	203,000				720,000	517,000	Bryson Road	
16	29	232	11,600	29,000	8	494,005	465,005				
17	508	740	296,000	740,000	10	749,377	9,377				
18	94	834	333,600	834,000	10	1,559,174	725,174				
19	179	1,013	71,600	179,000	8	494,005	315,005				
20	0	1,013	405,200	1,013,000	10	2,360,317	1,347,317				
21	381	381	152,400	381,000	12	1,080,134	699,134				
22	272	653	108,800	272,000	18	2,351,916	2,079,916				

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
23	312	965	277,200	693,000	18	2,351,916	1,658,916				
24	8	973	389,200	973,000	18	2,351,916	1,378,916				
25	610	610	244,000	610,000	12	1,080,134	470,134	1,584,000	974,000	Cupps Road	
26	269	879	351,600	879,000	10	2,820,145	1,941,145	2,304,000	1,425,000	Rocklick	
27	86	965	386,000	965,000	15	1,617,082	652,082				
Subtotal	2,951										

Monroe Watershed

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
28	75	75	30,000	75,000	8	494,005	419,005	403,200	328,200	Northvue	
29	1	76	30,400	76,000	10	749,377	673,377				
30	218	294	87,200	218,000	15	1,617,082	1,399,082				
31	110	404	161,600	404,000	15	1,617,082	1,213,082				
32	150	554	221,600	554,000	15	1,617,082	1,063,082				
33	23	577	230,800	577,000	15	1,617,082	1,040,082				
34	79	656	31,600	79,000	8	494,005	415,005				
35	329	985	394,000	985,000	20	2,899,779	1,914,779			PA American Water	
36	137	137	54,800	137,000	8	494,005	357,005				
37	93	230	92,000	230,000	12	1,080,134	850,134				
38	203	433	173,200	433,000	12	1,080,134	647,134				
39	29	462	184,800	462,000	12	1,080,134	618,134				
40	64	64	25,600	64,000	8	494,005	430,005				
41	139	1,650	660,000	1,650,000	20	2,899,779	1,249,779				
42	209	209	83,600	209,000	8	494,005	285,005				
43	99	308	123,200	308,000	10	494,005	186,005				
44	173	481	192,400	481,000	12	1,080,134	599,134				
45	68	549	27,200	68,000	8	494,005	426,005				
46	120	669	267,600	669,000	12	1,080,134	411,134				
Subtotal	2,319										

Butcher Run

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
47	156	156	62,400	156,000	8	494,005	338,005				
48	21	177	8,400	21,000	8	494,005	473,005				
49	172	349	139,600	349,000	8	494,005	145,005				
50	198	547	218,800	547,000	8	1,254,361	707,361				
51	143	690	276,000	690,000	8	1,246,189	556,189				
52	218	908	87,200	218,000	8	1,246,189	1,028,189				
53	684	1,592	636,800	1,592,000	10	985,114	**-606,886**				Upsize Line to 12" - 3,200 LF
Subtotal	1,592										

Connoq. South

Area	Unsewered + Current BASA EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
54	145	145	58,000	145,000	8	494,005	349,005				
55	80	80	32,000	80,000	8	494,005	414,005	259,200	179,200	Township Line	
56	124	204	81,600	204,000	8	494,005	290,005	460,800	256,800	Garden Grove	
57	105	309	123,600	309,000	8	494,005	185,005				
Subtotal	454										
Totals	9,504										

Capacity Check for BASA Sewers Upstream of Model - Future Conditions

Sullivan Run Watershed

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
1	334	334	133,600	334,000	8	494,005	160,005	360,000	26,000	Fisher Heights	
2	480	814	325,600	814,000	10	1,416,190	602,190				
3	502	1,316	526,400	1,316,000	12	2,427,421	1,111,421	864,000	**-452,000**	Brewster Rd. & Booster	1,000 gpm pumps
4	138	1,454	581,600	1,454,000	15	4,593,817	3,139,817				
5	162	1,616	64,800	162,000	8	4,593,817	4,431,817				
6	81	1,697	678,800	1,697,000	15	4,593,817	2,896,817				
7	66	1,763	705,200	1,763,000	15	4,296,337	2,533,337				
8	33	1,796	718,400	1,796,000	15	4,303,789	2,507,789				
9	451	2,247	898,800	2,247,000	15	4,909,034	2,662,034				
10	3,123	3,123	1,249,200	3,123,000	8	1,523,282	**-1,599,718**				Upsize Line to 12" - 6,100 LF
11	631	3,754	1,501,600	3,754,000	12	3,256,727	**-497,273**				Upsize Line to 15" - 1,900 LF
12	62	62	24,800	62,000	8	494,005	432,005				
Subtotal	6,063										

Deshon Watershed

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
13	245	245	98,000	245,000	8	494,005	249,005	720,000	475,000	Greenwood Dr.	
14	7	252	100,800	252,000				720,000	468,000	Benbrook Road	
15	16	268	107,200	268,000				720,000	452,000	Bryson Road	
16	35	303	14,000	35,000	8	494,005	459,005				
17	833	1,136	454,400	1,136,000	10	1,683,447	547,447				
18	94	1,230	492,000	1,230,000	10	1,559,174	329,174				
19	179	1,409	71,600	179,000	8	494,005	315,005				
20	0	1,409	563,600	1,409,000	10	2,360,317	951,317				
21	381	381	152,400	381,000	12	3,256,727	2,875,727				
22	272	653	108,800	272,000	18	2,351,916	2,079,916				

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
23	354	1,007	294,000	735,000	18	2,351,916	1,616,916				
24	8	1,015	406,000	1,015,000	18	2,351,916	1,336,916				
25	759	759	303,600	759,000	12	3,256,727	2,497,727	1,584,000	825,000	Cupps Road	
26	284	1,043	417,200	1,043,000	10	2,820,145	1,777,145	2,304,000	1,261,000	Rocklick	
27	92	1,135	454,000	1,135,000	15	1,617,082	482,082				
Subtotal	3,559										

Monroe Watershed

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
28	75	75	30,000	75,000	8	494,005	419,005	403,200	328,200	Northvue	
29	1	76	30,400	76,000	10	749,377	673,377				
30	218	294	87,200	218,000	15	1,617,082	1,399,082				
31	344	638	255,200	638,000	15	1,617,082	979,082				
32	150	788	315,200	788,000	15	1,617,082	829,082				
33	23	811	324,400	811,000	15	1,617,082	806,082				
34	79	890	31,600	79,000	8	494,005	415,005				
35	1,443	2,333	933,200	2,333,000	20	2,899,779	566,779			PA American Water	
36	137	137	54,800	137,000	8	494,005	357,005				
37	113	250	100,000	250,000	12	1,080,134	830,134				
38	223	473	189,200	473,000	12	1,080,134	607,134				
39	49	522	208,800	522,000	12	1,080,134	558,134				
40	64	64	25,600	64,000	8	494,005	430,005				
41	207	3,126	1,250,400	3,126,000	20	3,102,477	-23,523				
42	363	363	145,200	363,000	8	494,005	131,005				
43	110	473	189,200	473,000	10	494,005	21,005				
44	198	671	268,400	671,000	12	1,080,134	409,134				
45	145	816	58,000	145,000	8	494,005	349,005				
46	299	1,115	446,000	1,115,000	18	2,351,916	1,236,916				
Subtotal	4,241										

Butcher Run

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
47	333	333	133,200	333,000	8	494,005	161,005				
48	21	354	8,400	21,000	8	494,005	473,005				
49	222	576	230,400	576,000	8	1,164,381	588,381				
50	258	834	333,600	834,000	8	1,254,361	420,361				
51	203	1,037	414,800	1,037,000	8	1,246,189	209,189				
52	278	1,315	111,200	278,000	8	1,164,381	886,381				
53	2,944	4,259	1,703,600	4,259,000	10	985,114	**-3,273,886**				Upsize Line to 18" - 3,200
Subtotal	4,259										

Connoq. South

Area	Future EDUs	Cumulat EDUs	Average Flow @ 400 gpd/edu	Peak Flow @ 1,000 gpd/edu	Sewer Diameter (inches)	Full-Pipe Capacity @ Minimum Grade (gpd)	Sewer Peak Flow Reserve Capacity (gpd)	Maximum Pump Sta Capacity (gpd)	Pump Sta Peak Flow Reserve Capacity (gpd)	Pump Station	Comment
54	175	175	70,000	175,000	8	494,005	319,005				
55	83	83	33,200	83,000	8	494,005	411,005	259,200	176,200	Township Line	
56	127	210	84,000	210,000	8	494,005	284,005	460,800	250,800	Garden Grove	
57	195	405	162,000	405,000	8	494,005	89,005				
Subtotal	580										
Totals	18,702										

Sewer Capacities Based on Manning Equation

n = 0.013

2.5 peaking factor

AREA	WATERSHED	DIAMETER (inches)	MINIMUM SLOPE (percent)	FULL FLOW CAPACITY @ n = 0.013 (MGD)	AVERAGE FLOW CAPACITY (MGD)	EQ. SER. POP. @ 100 GPCD	FULL FLOW AREA (sq. ft.)	WETTED PERIMETER (feet)	FLOW (cfs)	VELOCITY (ft/sec)
		8	0.40%	0.49	0.20	1,976	0.3491	2.0944	0.76	2.19
		10	0.28%	0.75	0.30	2,998	0.5454	2.6180	1.16	2.13
		12	0.22%	1.08	0.43	4,321	0.7854	3.1416	1.67	2.13
		15	0.15%	1.62	0.65	6,468	1.2272	3.9270	2.50	2.04
		18	0.12%	2.35	0.94	9,408	1.7671	4.7124	3.64	2.06
		20	**0.10%**	**2.90**	**1.16**	**11,599**	**2.1817**	**5.2360**	4.49	**2.06**
		21	0.10%	3.24	1.30	12,954	2.4053	5.4978	5.01	2.08
		24	0.08%	4.14	1.65	16,542	3.1416	6.2832	6.40	2.04
		27	0.07%	5.18	2.07	20,725	3.9761	7.0686	8.02	2.02
		30	0.06%	6.38	2.55	25,538	4.9087	7.8540	9.88	2.01
		36	0.05%	9.25	3.70	36,983	7.0686	9.4248	14.31	2.02
		42	0.04%	12.51	5.00	50,031	9.6211	10.9956	19.35	2.01
		48	0.03%	16.35	6.54	65,382	12.5664	12.5664	25.29	2.01
49	Butcher	8	2.22%	1.16	0.47	4,658	0.3491	2.0944	1.80	5.16
50	Butcher	8	2.58%	1.25	0.50	5,017	0.3491	2.0944	1.94	5.56
51	Butcher	8	2.55%	1.25	0.50	4,985	0.3491	2.0944	1.93	5.52
53	Butcher	8	2.17%	1.15	0.46	4,607	0.3491	2.0944	1.78	5.10
		10	1.54%	1.76	0.70	7,026	0.5454	2.6180	2.72	4.98
		10	0.48%	0.99	0.39	3,940	0.5454	2.6180	1.52	2.79
		12	0.48%	1.60	0.64	6,408	0.7854	3.1416	2.48	3.16
		15	0.48%	2.90	1.16	11,617	1.2272	3.9270	4.49	3.66
		18	0.48%	4.72	1.89	18,891	1.7671	4.7124	7.31	4.14
17	Deshon	10	1.41%	1.68	0.67	6,734	0.5454	2.6180	2.60	4.78
18	Deshon	10	1.21%	1.56	0.62	6,237	0.5454	2.6180	2.41	4.42
20	Deshon	10	2.78%	2.36	0.94	9,441	0.5454	2.6180	3.65	6.70
26	Deshon	10	3.97%	2.82	1.13	11,281	0.5454	2.6180	4.36	8.00
2	Sullivan	10	1.00%	1.42	0.57	5,665	0.5454	2.6180	2.19	4.02
3	Sullivan	12	1.11%	2.43	0.97	9,710	0.7854	3.1416	3.76	4.78
6	Sullivan	15	1.21%	4.59	1.84	18,375	1.2272	3.9270	7.11	5.79
7	Sullivan	15	1.06%	4.30	1.72	17,185	1.2272	3.9270	6.65	5.42
8	Sullivan	15	1.06%	4.30	1.72	17,215	1.2272	3.9270	6.66	5.43
9	Sullivan	15	1.38%	4.91	1.96	19,636	1.2272	3.9270	7.60	6.19
10	Sullivan	8	3.80%	1.52	0.61	6,093	0.3491	2.0944	2.36	6.75
11	Sullivan	12	2.00%	3.26	1.30	13,027	0.7854	3.1416	5.04	6.42
10	Sullivan	12	3.80%	4.49	1.80	17,964	0.7854	3.1416	6.95	8.85
11	Sullivan	15	2.00%	5.90	2.36	23,619	1.2272	3.9270	9.14	7.44
41	Monroe	20	0.12%	3.10	1.24	12,410	2.1817	5.2360	4.80	2.20

APPENDIX H
HYDRAULIC RE-RATING STUDY

Butler Area Sewer Authority

Butler County, Pennsylvania

Wastewater Treatment Plant Re-Rating Study

June 2008

Butler Area Sewer Authority
Butler County, Pennsylvania

Wastewater Treatment Plant
Re-Rating Study

June 2008

Prepared by: Michael F. McKee, P.E.

Approved by: James R. Bowser, P.E.

Project No.: 08-0555-MC-A-101



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BUTLER AREA SEWER AUTHORITY
WASTEWATER TREATMENT PLANT RE-RATING STUDY

EXECUTIVE SUMMARY

The Butler Area Sewer Authority (BASA) wastewater treatment plant currently has a permitted hydraulic capacity of 10.0 million gallons per day (mgd). However, monthly average flows exceed the permitted plant capacity during wet weather periods. The purpose of re-rating the plant to a higher hydraulic capacity is to avoid a situation where the facility is considered hydraulically overloaded by the Pennsylvania Department of Environmental Protection (DEP) based on Chapter 94 criteria.

An October 2002 hydraulic analysis of the treatment facility determined that peak flows through the BASA plant are limited to 28 mgd by the capacity of the trickling filter rotary distributors. A one-year review of historical operating data also demonstrated that the plant produces an excellent quality effluent across a wide range of flows and is capable of meeting applicable discharge limits even during high flow periods.

A more detailed analysis of plant treatment performance from 2003 to 2007 was conducted as part of the recent Act 537 Plan update. This evaluation demonstrated that the facility is affected by elevated influent flows during wet weather periods but consistently exceeds the effluent limitations required by the NPDES permit. A separate analysis of effluent concentrations was also conducted on days where measured wastewater flows to the BASA treatment plant exceeded 10 mgd. The high flow effluent analysis showed that the facility is capable of meeting existing effluent limitations at flow rates up to 15 mgd.

The information presented in this report supports an increase in the hydraulic capacity of the BASA wastewater treatment plant based on the historic performance of the facility. A 10 percent increase is requested in the current 10.00 mgd permitted hydraulic capacity of the facility. The re-rated facility would have a permitted hydraulic capacity of 11.00 mgd and a peak hydraulic capacity of 27.50 mgd based on a 2.50 wet weather peaking factor.

If this request to increase the rated capacity of the plant is approved, modifications to the tricking filter distribution pumps will be needed so that two pumps can handle the 28 mgd peak hydraulic flow through the plant. Larger impellers are required for the pumps to handle additional flows.

BUTLER AREA SEWER AUTHORITY
WASTEWATER TREATMENT PLANT RE-RATING STUDY

INTRODUCTION

The Butler Area Sewer Authority (BASA) authorized Chester Engineers to prepare this re-rating study for their wastewater treatment plant. The purpose of re-rating the plant to a higher hydraulic capacity is to avoid a situation where the facility is considered hydraulically overloaded by the Pennsylvania Department of Environmental Protection (DEP) based on Chapter 94 criteria. Chapter 94 defines a hydraulic overload as "The condition that occurs when the monthly average flow entering a plant exceeds the hydraulic design capacity for 3-consecutive months out of the preceding 12 months."

The BASA wastewater treatment plant has a permitted hydraulic capacity of 10.0 million gallons per day (mgd) and a permitted organic capacity of 12,750 pounds of five-day biochemical oxygen demand (BOD_5) per day. Over the past five years, hydraulic loadings to the plant averaged 7.98 mgd or about 80 percent of the permitted capacity. During the same period, organic loadings averaged 8,143 pounds per day of BOD_5 or 64 percent of the permitted capacity. Monthly organic loadings to the BASA plant are relatively steady and did not exceed the permitted 12,750 pounds per day capacity between 2003 and 2008. However, hydraulic loadings to the plant are influenced by precipitation and monthly average flows exceed the permitted plant capacity during wet weather periods. Average flows exceeded 10.0 mgd during eight months between 2003 and 2007. Influent flows to the BASA facility came close to exceeding 10.00 mgd in three consecutive months during 2004. The monthly average influent flow in February 2004 was 10.44 mgd, followed by 10.76 mgd in March, and 9.97 mgd in April. Monthly flows also exceeded 10.00 mgd for two consecutive months during the first quarter of 2008, averaging 10.933 mgd in February and 13.255 mgd in March. The monthly average flow in April 2008 decreased to 6.885 mgd.

FACILITY DESCRIPTION

The Butler facility is a tertiary wastewater treatment plant utilizing a two-stage biological treatment system with high-rate trickling filters and a second-stage activated sludge nitrification process. Unit processes include preliminary treatment, primary settling, trickling filters, aeration tanks, final settling, reactor clarifier settling, and chlorine disinfection.

The wastewater treatment plant discharges its effluent to Connoquenessing Creek, a tributary of the Beaver River. Effluent discharge requirements for the Butler plant are listed in Table 1. The current National Pollutant Discharge Elimination System (NPDES) permit, No. PA0026697, became effective on November 1, 2006 and expires on October

Table 1

NPDES Effluent Limitations for the Butler Area Sewer Authority Wastewater Treatment Plant
Permit Number PA0026697

Discharge Parameter	Mass Units (lb/day)		Concentrations (mg/l)		
	Monthly Average	Average Weekly	Monthly Average	Average Weekly	Instant. Maximum
CBOD - 5 day - May 1 to Oct. 31	1,001	1,501	12	18	24
CBOD - 5 day - Nov. 1 to Apr. 30	2,001	3,002	24	36	48
Total Suspended Solids	2,502	3,753	30	45	60
Ammonia Nitrogen - May 1 to Oct. 31	167		2		4
Ammonia Nitrogen - Nov. 1 to Apr. 30	500		6		12
Phosphorus	167		2		4
Total Residual Chlorine			0.33		1.1
Fecal Coliform - May 1 to Sept. 30	200/100ml				
Fecal Coliform - Oct. 1 to Apr. 30	2,000/100ml				
Flow (mgd)	Monitor and Report				
Dissolved Oxygen	5.0 mg/l minimum				
pH	Not less than 6.0 nor greater than 9.0 Standard Units				

12, 2011. A requirement for chronic whole effluent toxicity (WET) testing on a quarterly basis was included when the permit was issued. However, Permit Amendment No. 1, dated January 14, 2008, removed the WET testing requirement from the NPDES permit.

A schematic diagram of the basic treatment processes at the Butler plant is presented as Figure 1. The facility includes the following treatment units:

- Two mechanically cleaned bar screens.
- Two aerated grit removal tanks.
- Five primary sedimentation tanks.
- Three recirculation pumps.
- Two trickling filters.
- Eight aeration tanks.
- Four final sedimentation tanks.
- One flash mix tank.
- Three reactor clarifier tanks.
- One recarbonation tank.
- Two chlorination tanks.
- One gravity sludge thickener.
- Two lime stabilization tanks.
- Two filter presses.

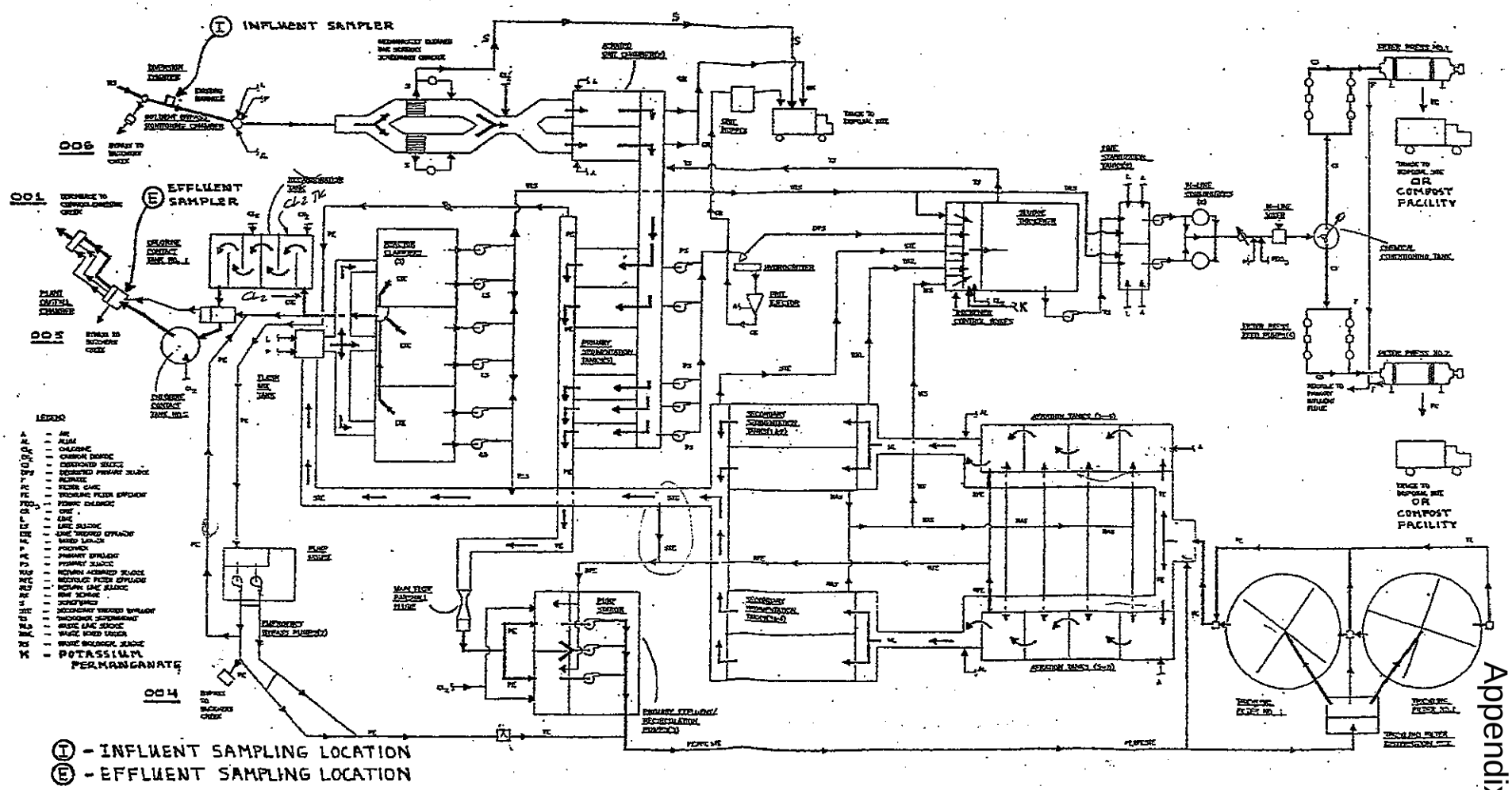
Appendix A contains design criteria for the BASA wastewater treatment process.

HYDRAULIC CAPACITY

A "Wastewater Treatment Plant Hydraulic Analysis and Capacity Evaluation" was prepared for the BASA facility in October 2002. A copy of this document is attached as Appendix B. The conclusions of this report are summarized below.

The hydraulic analysis determined that peak flows through the BASA plant are limited to 28 mgd by the capacity of the trickling filter rotary distributors. The remainder of the plant can hydraulically handle up to 33 mgd while maintaining a minimum freeboard of one foot in all open channels and tanks. However, the calculations show that weirs in the primary clarifiers, trickling filter distribution box, reactor clarifiers, and chlorine contact tank 710-2 would be slightly submerged at a 33 mgd flow rate.

The treatment capacity evaluation was based upon review of one year of plant operating data. The analysis showed that the plant consistently meets its discharge limits and produces an excellent quality effluent across a wide range of flows. An increase in



DRW. JS	Figure 1	**Butler Area Sewer Authority**	CHESTER ENGINEERS
APP. CS			
Scale None		Treatment Plant Flow Diagram	
File butlerflow 4/22/08			

effluent concentrations was observed when flows are higher than 13 mgd but the historical data review demonstrated that the plant is capable of meeting applicable discharge limits even during high flow periods.

TREATMENT PLANT PERFORMANCE

A more detailed analysis of plant treatment performance was conducted as part of the recent Act 537 Plan update. The ability of the BASA wastewater treatment facility to meet NPDES permit limits under various operating conditions was evaluated for the period from 2003 to 2007. Results of this evaluation are summarized below.

Flow

Flows during the 2003 to 2007 time period averaged 7.883 mgd and a maximum day flow of 29.506 mgd was recorded. There were 2 days where the flow rate exceeded the 28 mgd capacity of the trickling filter rotary distributors and 12 days where flows exceeded the 25 mgd design peak wet weather flow capacity of the facility. Influent flows exceeded the 10 mgd design average flow capacity of the BASA treatment facility on 289 days or 15.8 percent of the review period. Monthly average flows to the BASA wastewater treatment plant exceeded 10 mgd during 8 months of the 60-month review period.

$CBOD_5$

The NPDES permit for the BASA facility requires an average monthly $CBOD_5$ effluent concentration of 12 mg/l or less between May 1 and October 31 and specifies a 24 mg/l limit from November 1 to April 30. Effluent $CBOD_5$ concentrations averaged 3.3 mg/l during the 5-year review period and a maximum effluent concentration of 25 mg/l was recorded. All other $CBOD_5$ effluent results were less than the monthly average limits specified in the NPDES permit. The average 3.3 mg/l effluent concentration was only 28 percent of the permitted discharge limit during warm weather months and 14 percent of the limit during cold weather months.

Part A of the permit specifies that the 30-day average removal for $CBOD_5$ shall not be less than 85 percent. The minimum removal for $CBOD_5$ between 2003 and 2007 was 86 percent and the average removal rate was 97 percent. Table 2 presents monthly average removal rates for $CBOD_5$ and TSS.

TSS

The NPDES permit restricts total suspended solids (TSS) discharges from the BASA plant to 30 mg/l as a monthly average. The average TSS effluent concentration between 2003 and 2007 was 7.1 mg/l, equivalent to 24 percent of the monthly average permit limit. There were only 5 days on which the measured TSS exceeded the monthly average permit limit. Three of the days with TSS concentrations higher than 30 mg/l were in September 2004 and all were associated with extraordinary precipitation events. A

Table 2

CBOD-5 and TSS Removals 2003 to 2007

Month	Monthly Average Flow (mgd)	Monthly Average Influent CBOD-5 (mg/l)	Monthly Average Effluent CBOD-5 (mg/L)	CBOD-5 Percent Removal	Monthly Average Influent TSS (mg/l)	Monthly Average Effluent TSS (mg/l)	TSS Percent Removal
January 2003	8.233	140	3.0	97.9%	139	4.0	97.1%
February 2003	7.929	131	3.3	97.5%	125	6.4	94.9%
March 2003	9.861	108	3.3	96.9%	103	6.6	93.6%
April 2003	6.242	176	2.4	98.6%	180	5.9	96.7%
May 2003	7.455	142	2.1	98.5%	164	5.5	96.6%
June 2003	8.101	134	2.0	98.5%	155	4.6	97.0%
July 2003	8.019	115	2.5	97.8%	127	5.3	95.8%
August 2003	6.246	145	2.0	98.6%	177	5.8	96.7%
September 2003	8.450	118	2.0	98.3%	142	5.8	95.9%
October 2003	6.484	157	2.1	98.7%	170	4.5	97.4%
November 2003	8.400	146	2.6	98.2%	143	8.3	94.2%
December 2003	9.530	120	3.2	97.3%	118	7.1	94.0%
January 2004	8.944	97	3.1	96.8%	127	8.3	93.5%
February 2004	10.223	78	3.6	95.4%	94	8.4	91.1%
March 2004	10.610	90	3.3	96.3%	98	8.7	91.1%
April 2004	9.875	94	3.2	96.6%	114	8.7	92.4%
May 2004	7.625	137	2.5	98.2%	144	4.9	96.6%
June 2004	8.521	134	2.1	98.4%	142	4.6	96.8%
July 2004	6.419	159	1.8	98.9%	160	4.3	97.3%
August 2004	8.094	129	2.3	98.2%	152	4.0	97.4%
September 2004	10.600	101	3.6	96.4%	126	10.6	91.6%
October 2004	6.301	155	2.4	98.5%	152	5.2	96.6%
November 2004	6.891	150	2.4	98.4%	140	6.0	95.7%
December 2004	9.020	117	3.3	97.2%	106	6.4	94.0%
January 2005	12.686	99	10.8	89.1%	108	14.5	86.6%
February 2005	9.766	95	10.6	88.8%	106	13.2	87.5%
March 2005	8.835	98	13.7	86.0%	109	11.7	89.3%
April 2005	9.767	103	8.3	91.9%	121	9.3	92.3%
May 2005	6.354	155	2.5	98.4%	163	7.1	95.6%
June 2005	5.910	184	2.0	98.9%	212	4.5	97.9%
July 2005	5.668	163	1.8	98.9%	191	3.9	98.0%
August 2005	5.052	185	2.1	98.9%	236	6.1	97.4%
September 2005	5.140	187	2.0	98.9%	237	7.9	96.7%
October 2005	6.300	153	2.1	98.6%	175	5.7	96.7%
November 2005	6.848	172	2.7	98.4%	160	5.9	96.3%
December 2005	6.684	149	2.9	98.1%	152	7.4	95.1%

Table 2 (continued)

CBOD-5 and TSS Removals 2003 to 2007

Month	Monthly Average Flow (mgd)	Monthly Average Influent CBOD-5 (mg/l)	Monthly Average Effluent CBOD-5 (mg/L)	CBOD-5 Percent Removal	Monthly Average Influent TSS (mg/l)	Monthly Average Effluent TSS (mg/l)	TSS Percent Removal
January 2006	8.759	126	3.7	97.0%	129	9.2	92.9%
February 2006	7.964	148	4.2	97.2%	126	7.3	94.2%
March 2006	7.738	163	4.1	97.5%	140	5.7	95.9%
April 2006	7.221	156	3.7	97.6%	137	6.3	95.4%
May 2006	8.991	134	4.3	96.8%	117	7.0	94.0%
June 2006	6.947	154	2.5	98.4%	166	4.4	97.3%
July 2006	7.352	136	2.0	98.5%	159	4.0	97.5%
August 2006	6.254	163	2.3	98.6%	198	5.7	97.1%
September 2006	7.956	138	2.2	98.4%	169	7.5	95.6%
October 2006	10.117	116	2.9	97.5%	132	7.4	94.4%
November 2006	7.802	133	2.5	98.1%	142	6.1	95.7%
December 2006	6.630	167	2.8	98.3%	161	6.6	95.9%
January 2007	11.422	99	6.1	93.8%	106	11.4	89.2%
February 2007	7.003	139	4.6	96.7%	144	10.0	93.1%
March 2007	12.915	83	10.8	87.0%	94	16.4	82.6%
April 2007	8.668	108	7.3	93.2%	128	13.4	89.5%
May 2007	5.738	186	2.4	98.7%	211	6.2	97.1%
June 2007	5.593	245	2.3	99.1%	322	4.5	98.6%
July 2007	5.027	214	2.3	98.9%	256	5.4	97.9%
August 2007	7.122	159	2.8	98.3%	216	5.8	97.3%
September 2007	4.958	171	2.2	98.7%	244	4.7	98.1%
October 2007	4.940	203	2.4	98.8%	272	5.5	98.0%
November 2007	7.397	166	3.2	98.0%	177	9.5	94.6%
December 2007	11.415	92	7.4	91.9%	98	10.2	89.6%
Average	7.884	140	3.6	97.0%	155	7.1	94.7%
Maximum	12.915	245	13.7	99.1%	322	16.4	98.6%
Minimum	4.940	78	1.8	86.0%	94	3.9	82.6%

maximum concentration of 50 mg/l was recorded on September 16 as the remnants of Hurricane Ivan were moving through the area. A 40 mg/l TSS concentration was also measured the following day. One week earlier, a 47 mg/l reading was influenced by very heavy rainfall from Hurricane Katrina. No effluent TSS concentrations recorded during the review period exceeded the 60 mg/l instantaneous maximum discharge limit or caused the 45 mg/l weekly or 30 mg/l monthly permit limits to be exceeded.

Part A of the permit requires a minimum 85 percent removal for TSS as a 30-day average. TSS removal averaged 94.7 percent for the five-year review period but was only 82.6 percent in March 2007. Average TSS removal during all other months was 86.6 percent or higher and average removals were greater than 91 percent in 53 of the 60 months reviewed. Reduced TSS removals during March 2007 were caused by high flows that diluted the TSS influent concentration. The 16.4 mg/l average effluent TSS concentration in March 2007 was well within the 30 mg/l effluent limit but the 94 mg/l average influent concentration was only about 60 percent of the average TSS loading from 2003 to 2007. As a result, the calculated TSS removal rate was lower than normal.

Ammonia Nitrogen

Between May 1 and October 31, the NPDES discharge limitations for ammonia nitrogen are 2 mg/l as a monthly average and 4 mg/l as an instantaneous maximum. The permit limits are less stringent between November 1 and April 30, increasing to 6 mg/l as a monthly average and 12 mg/l as an instantaneous maximum.

From 2003 to 2007, effluent ammonia nitrogen concentrations averaged 1.23 mg/l. A peak effluent concentration of 12.59 mg/l was recorded. There were 10 days between 2003 and 2007 where measured ammonia nitrogen discharges from the BASA plant exceeded the instantaneous maximum discharge limits specified in the permit. The 12 mg/l instantaneous maximum limit was exceeded on the four days from April 19 to April 22, 2005. The recorded 8.31 mg/l monthly average for ammonia nitrogen during April 2005 also exceeded the 6 mg/l permit limit. Shortly thereafter, the 6 mg/l instantaneous maximum permit limit was exceeded on the six days from May 1 to May 6, 2005. However, the 1.82 mg/l monthly average for May 2005 was less than the 2 mg/l permit limit.

All of the ammonia nitrogen permit exceedances during April and May of 2005 were caused by a mechanical failure of the rotary distributor on the west trickling filter that occurred on March 4. The anchor bolts that connected the distributor bearing assembly to the concrete support column sheared off and caused the distributor to stop rotating. Upon further inspection, the concrete support column was also found to be cracked and deteriorated. A new concrete center column was poured and a new bearing and seal were installed to repair the damage. The rehabilitated tricking filter was started up on May 4 after the concrete and grout had been allowed a satisfactory curing period. Within a week of the trickling filter being placed back into service, effluent ammonia nitrogen

concentrations decreased to 2 mg/l. By May 16, ammonia nitrogen levels were down to 0.5 mg/l.

Fecal Coliform

The BASA NPDES permit requires a monthly geometric average fecal coliform concentration not greater than 200/100 ml during the swimming season (May 1 through September 30). During the period from October 1 to April 30, the fecal coliform concentration shall not exceed 2,000/100 ml as a geometric average. From 2003 to 2007, monthly fecal coliform effluent readings averaged 2.50 colonies per 100 ml and a maximum reading of 18 per 100 ml was recorded.

Phosphorus

NPDES effluent limitations for phosphorus at the BASA treatment plant are 2 mg/l as a monthly average and 4 mg/l as an instantaneous maximum. Between 2003 and 2007, the average effluent phosphorus concentration measured at the BASA plant was 1.00 mg/l or 50 percent of the permitted monthly average discharge limit. A maximum phosphorus concentration of 3.45 mg/l was recorded, which is less than the permitted 4 mg/l instantaneous maximum. The 2 mg/l monthly average discharge limit was exceeded on 21 individual days but there were no permit violations for monthly average phosphorus discharges during the 5-year period of review.

Total Residual Chlorine

The BASA NPDES permit limits total residual chlorine concentrations in the effluent to 0.33 mg/l as a monthly average and 1.1 mg/l as an instantaneous maximum. Total residual chlorine concentrations averaged 0.244 mg/l during the 2003 to 2007 time period and a maximum monthly average concentration of 0.293 mg/l was recorded.

Dissolved Oxygen

The NPDES permit requires the effluent leaving the BASA treatment plant to have a minimum dissolved oxygen (DO) content of 5 mg/l. During the 2003 to 2007 review period, effluent DO concentrations were 5 mg/l or higher on all but the four days listed below.

August 30, 2003	4.6 mg/l
June 14, 2004	3.9 mg/l
April 2, 2005	4.7 mg/l
August 31, 2005	4.6 mg/l

The low DO readings appear to have been caused by high flow events that flushed accumulated solids from the sanitary sewer system. The materials flushed from the system created additional oxygen demand at the treatment plant and caused the effluent DO concentration to drop below normal levels. The rainfall events that caused the low

DO measurements were all preceded by extended low flow periods ranging from three weeks to three months.

pH

The permit for the BASA wastewater treatment facility requires effluent pH in the range of 6 to 9 standard units at all times. During the 2003 to 2007 time period, the pH of the effluent discharged from the plant averaged 7.0 standard units. The maximum pH measured was 7.5 units and the minimum was 6.5 units.

Table 3 summarizes the findings of the performance review. The BASA wastewater treatment facility is affected by elevated influent flows during wet weather periods but consistently exceeds the effluent limitations required by the NPDES permit.

HIGH FLOW EFFLUENT ANALYSIS

A separate analysis of effluent concentrations was also conducted for 289 days between 2003 and 2007 where measured wastewater flows to the BASA treatment plant exceeded 10 mgd. The high flow effluent analysis was undertaken to determine how well the BASA wastewater treatment plant performs when flows exceed the current design average flow capacity of the facility. Appendix C contains a table with effluent concentration data arranged in descending order with respect to flow. It also contains graphs of the data points that identify trends between flow rates and effluent concentrations. Results of this evaluation are described below.

$CBOD_5$

Appendix C includes graphs that show measured $CBOD_5$ effluent concentrations relative to summer and winter discharge limitations. Effluent discharges demonstrate a direct correlation to influent flow rates and increase as the flow rate increases. A trend line was added to the graphs to show this relationship. However, the graphs also illustrate that the BASA wastewater treatment plant is capable of meeting effluent limitations for $CBOD_5$ at high flow rates under both summer and winter permit limits. No $CBOD_5$ effluent discharge concentrations even reached the monthly average permit limits until flow rates exceeded 15 mgd.

TSS

The graph for TSS effluent concentrations also shows a direct correlation to flow, as demonstrated by the trend line on the chart in Appendix C. However, the plant is capable of meeting current permitted discharge requirements for TSS regardless of the rate of flow. The 30 mg/l monthly average permit limit for TSS was not even reached until flows exceeded 15 mgd.

Table 3

Summary of BASA WWTP Performance, 2003 to 2007

Parameter	Average Value During Review Period	Monthly Average Effluent Limit *	Percent of Permit Limit	Number of Permit Exceedances	Reason for Permit Exceedance(s)
Flow	7.883 mgd	10.000	78.8%	8	High Flows During Wet Weather
CBOD-5	3.3 mg/l	12.0	27.9%	0	N/A
TSS	7.1 mg/l	30.0	23.7%	1	82.6% TSS Removal in March 2007
Ammonia Nitrogen	1.23 mg/l	2.0	61.5%	1	Trickling Filter Mechanical Failure
Fecal Coliform	2.5 per 100 ml	200	1.3%	0	N/A
Phosphorus	1.00 mg/l	2.0	50.1%	0	N/A
Total Residual Chlorine	0.244 mg/l	0.33	73.9%	0	N/A
DO	8.3 mg/l	5.0 min.	N/A	4	Four Days With DO < 5 mg/l
pH	7.01 Std. Units	6 to 9	N/A	0	N/A

* Minimum Effluent Permit Concentration Shown Where Seasonal Limits Apply

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Ammonia Nitrogen

The analysis for ammonia nitrogen was conducted by deleting the permit exceedances in March and April of 2005 that were caused by failure of the trickling filter rotary distributor. During high flow conditions, the concentration of ammonia nitrogen in the plant effluent only exceeded the monthly average permit limit on two days. A 2.09 mg/l effluent ammonia nitrogen concentration was recorded on May 11, 2006 and a 3.56 mg/l concentration was taken on August 30, 2005. The August 30 reading was preceded by a month-long period where influent flows to the plant were 5 mgd or less. This low-flow period began on July 29 and continued until August 30, when the daily plant flow reached 12.2 mgd. Effluent concentrations of ammonia nitrogen were less than 1 mg/l at the end of July but rose above 1 mg/l by mid-August. By the end of the month, effluent concentrations were in the 2 to 3 mg/l range, culminating in the 3.56 mg/l reading on August 30.

The graphs in Appendix C show that effluent ammonia nitrogen concentrations do not increase with higher flow rates. This relationship illustrates that the BASA plant is capable of meeting effluent limits for ammonia nitrogen regardless of the flow rate.

Phosphorus

The graph in Appendix C demonstrates that phosphorus discharges are not influenced by the amount of flow entering the BASA plant. Effluent phosphorus concentrations remain relatively constant at flows greater than 10 mgd. The BASA plant is capable of meeting the monthly average permit limit for phosphorus at all flow rates.

Dissolved Oxygen

Average DO concentrations exhibit a slight decrease as wastewater flow rates increase. However, the graph in Appendix C shows that effluent DO concentrations remain well above the 5 mg/l minimum permit limit at all flow rates. The only time that DO drops below the permit limit is when the plant receives a slug load of solids with high oxygen demand after a heavy storm.

pH

Effluent pH remains relatively constant regardless of the flow rate that enters the plant and stays within the 6 to 9 standard unit range specified in the NPDES permit.

INFLUENT LOADINGS

Table 4 presents monthly average influent loading data from 2003 to 2007 and compares historic plant loadings to design loading rates for the BASA treatment facility. Average BOD_5, TSS, and ammonia-nitrogen loadings are 10 to 20 percent lower than design values on a concentration basis and 35 to 45 percent lower than design values on a mass-loading basis. Influent phosphorus loadings are about 90 percent less than design values.

Table 4

Monthly Average Influent Loadings, 2003 to 2007

Month	Flow (mgd)	BOD-5 (mg/l)	BOD-5 (lbs/day)	TSS (mg/l)	TSS (lbs/day)	NH3-N (mg/l)	NH3-N (lbs/day)	P (mg/l)	P (lbs/day)
January 2003	8.233	140	8,042	139	7,887	13.16	765	3.30	190
February 2003	7.929	131	8,129	125	7,876	13.55	830	3.01	187
March 2003	9.861	108	8,364	103	8,060	10.09	784	2.28	180
April 2003	6.242	176	8,869	180	9,182	14.26	725	3.74	189
May 2003	7.455	142	8,427	164	9,676	11.93	700	3.20	188
June 2003	8.101	134	8,516	155	9,895	10.73	665	2.93	182
July 2003	8.019	115	6,983	127	7,701	10.12	618	2.67	164
August 2003	6.246	145	7,119	177	8,724	13.50	658	3.42	169
September 2003	8.450	118	7,633	142	9,118	10.61	673	2.79	181
October 2003	6.484	157	8,320	170	8,895	12.76	669	3.44	180
November 2003	8.400	146	8,908	143	9,094	10.71	665	2.95	185
December 2003	9.530	120	8,908	118	8,985	9.15	684	2.55	194
January 2004	8.944	97	5,996	127	8,134	11.28	686	2.90	183
February 2004	10.223	78	5,783	94	7,190	9.93	758	2.22	168
March 2004	10.610	90	7,304	98	7,958	8.95	736	2.25	184
April 2004	9.875	94	7,025	114	8,616	10.06	766	2.49	191
May 2004	7.625	137	8,065	144	8,476	11.95	692	2.97	175
June 2004	8.521	134	7,947	142	8,720	11.12	674	3.07	188
July 2004	6.419	159	8,093	160	7,992	12.86	635	3.29	163
August 2004	8.094	129	7,731	152	8,955	10.71	619	2.73	158
September 2004	10.600	101	7,313	126	9,409	8.89	616	2.25	164
October 2004	6.301	155	7,935	152	7,843	12.84	662	3.02	155
November 2004	6.891	150	8,441	140	7,869	12.14	678	3.02	169
December 2004	9.020	117	8,472	106	7,673	9.55	679	2.39	171
January 2005	12.686	99	7,833	108	8,747	8.13	642	2.17	176
February 2005	9.766	95	6,940	106	7,685	8.82	649	2.19	164
March 2005	8.835	98	7,143	109	7,889	9.36	671	2.48	179
April 2005	9.767	103	7,455	121	8,550	9.63	690	2.48	178
May 2005	6.354	155	8,022	163	8,557	12.82	671	3.51	183
June 2005	5.910	184	9,029	212	10,435	14.35	705	4.06	199
July 2005	5.668	163	7,639	191	8,997	14.27	671	3.73	176
August 2005	5.052	185	7,550	236	9,743	15.97	653	4.23	174
September 2005	5.140	187	8,004	237	10,122	15.70	660	4.16	176
October 2005	6.300	153	7,532	175	8,639	14.32	700	3.52	173
November 2005	6.848	172	9,086	160	8,449	13.27	701	3.47	184
December 2005	6.684	149	8,011	152	8,236	14.55	783	3.44	186
January 2006	8.759	126	8,993	129	9,124	10.71	760	2.71	192
February 2006	7.964	148	9,413	126	8,055	11.41	727	3.04	194
March 2006	7.738	163	9,867	140	8,326	13.28	767	3.35	196
April 2006	7.221	156	8,864	137	7,761	12.62	706	3.19	179
May 2006	8.991	134	8,762	117	7,801	11.20	718	2.78	183
June 2006	6.947	154	8,523	166	9,365	12.59	703	3.39	188
July 2006	7.352	136	7,998	159	9,323	11.34	664	2.84	166
August 2006	6.254	163	8,312	198	10,031	14.28	721	3.75	191
September 2006	7.956	138	8,807	169	10,610	11.19	699	3.23	206
October 2006	10.117	116	8,244	132	9,450	9.63	674	2.54	182
November 2006	7.802	133	8,118	142	8,680	11.64	705	3.08	190
December 2006	6.630	167	9,119	161	8,752	14.08	753	3.60	195

Table 4 (continued)

Monthly Average Influent Loadings, 2003 to 2007

Month	Flow (mgd)	BOD-5 (mg/l)	BOD-5 (lbs/day)	TSS (mg/l)	TSS (lbs/day)	NH3-N (mg/l)	NH3-N (lbs/day)	P (mg/l)	P (lbs/day)
January 2007	11.422	99	8,309	106	8,717	8.97	704	2.27	183
February 2007	7.003	139	7,853	144	8,105	13.81	771	3.45	192
March 2007	12.915	83	8,049	94	9,129	7.42	700	2.02	196
April 2007	8.668	108	7,532	128	9,082	9.91	691	2.70	190
May 2007	5.738	186	8,822	211	10,017	14.54	691	4.05	193
June 2007	5.593	245	11,337	322	14,996	14.36	667	5.36	249
July 2007	5.027	214	8,951	256	10,663	15.69	653	5.10	212
August 2007	7.122	159	8,246	216	11,233	12.86	665	4.17	215
September 2007	4.958	171	7,021	244	10,094	15.36	630	4.58	188
October 2007	4.940	203	8,195	272	10,970	16.42	666	4.98	202
November 2007	7.397	166	8,801	177	9,648	12.24	675	3.57	197
December 2007	11.415	92	7,884	98	8,332	7.95	669	2.08	178
Average	7.884	140	8,143	155	8,971	11.93	694	3.17	184
Maximum	12.915	245	11,337	322	14,996	16.42	830	5.36	249
Minimum	4.940	78	5,783	94	7,190	7.42	616	2.02	155
Design Values	10.000	153	12,750	180	15,000	15	1,251	30.7	2,560
Ave. vs. Design		-8.3%	-36.1%	-13.8%	-40.2%	-20.5%	-44.6%	-89.7%	-92.8%

SUMMARY AND CONCLUSIONS

The information presented in this report supports an increase in the capacity of the BASA wastewater treatment plant based on the hydraulic capacity and historic performance of the facility.

- The calculated peak hydraulic capacity of the BASA wastewater treatment facility is 28 mgd, approximately 12 percent higher than the 25 mgd design peak flow capacity.
- Average BOD_5, TSS, and ammonia-nitrogen influent loadings are 10 to 20 percent lower than design values on a concentration basis and 35 to 45 percent lower than design values on a mass-loading basis. Average influent phosphorus loadings to the plant are 90 percent less than design values.
- Average effluent concentrations for $CBOD_5$, TSS, phosphorous, and ammonia nitrogen range from 25 to 62 percent of the permitted discharge limits for these pollutants.
- Under high flow conditions, effluent concentrations of $CBOD_5$ and TSS do not reach the monthly average permit limits for these parameters until flow rates exceed 15 mgd. Effluent concentrations of ammonia nitrogen and phosphorous appear to be unaffected by high flow rates.

Based on the information in this report, a 10 percent increase is requested in the current 10.00 mgd permitted hydraulic capacity of the BASA WWTP. The re-rated facility would have a permitted hydraulic capacity of 11.00 mgd and a peak hydraulic capacity of 27.50 mgd based on a 2.50 wet weather peaking factor. Increasing the permitted hydraulic capacity of the BASA facility to 11.00 mgd will have no affect on plant performance because the treatment facility is already meeting its NPDES discharge limits at higher flow rates. However, a plant re-rating would help the Authority avoid a situation where the facility is considered hydraulically overloaded by Chapter 94 criteria.

If this request to increase the rated capacity of the plant is approved, modifications to the tricking filter distribution pumps will be needed so that two pumps can handle the 28 mgd peak hydraulic flow through the plant. Currently, two of the VFD controlled distribution pumps can send about 26 mgd of flow to the trickling filters but the third pump must be in operation to reach a 28 mgd flow rate. Replacing the existing impellers with the maximum size impeller would increase the output for two pumps to an estimated 28.8 mgd and leave the third pump as a back-up unit.

APPENDIX A
WWTP DESIGN CRITERIA

BUTLER AREA SEWER AUTHORITY
WATER POLLUTION CONTROL FACILITIES
TREATMENT PROCESS DESIGN CRITERIA

GENERAL		
1.	Population	70,000
2.	Design Year	2,000
HYDRAULIC LOADING		
3.	Average Day Weather Flow (mgd)	10.0
4.	Peak Wet Weather Flow (mgd)	25.0
ORGANIC LOADING		
5.	Biochemical Oxygen Demand, BOD_5 (mg/l)	153
6.	Biochemical Oxygen Demand, BOD_5 (lb/day)	12,750
7.	Suspended Solids, SS (mg/l)	180
8.	Suspended Solids, SS (lb/day)	15,000
9.	Ammonia Nitrogen (mg/l)	15
10.	Ammonia Nitrogen (lb/day)	1,251
11.	Total Phosphorus (mg/l)	30.7
12.	Total Phosphorus (lb/day)	2,560
SCREENING FACILITIES		
13.	Number of Units	2
14.	Type	Mechanically Cleaned Bar Screens
15.	Channel Width (ft)	2.5
16.	Bar Size (in)	2 x 3/8
17.	Clear Opening (in)	1.0
18.	Depth of Flow (ft)	
	Average Flow	3.4
	Peak Flow	4.1
19.	Screenings Storage Capacity (cu ft)	20
20.	Screenings Grinder Capacity	
	cu ft/hr	38
	lb/hr	2,500
21.	Minimum Wash Water Requirement (gpm)	20
AERATED GRIT REMOVAL		
22.	Number of Tanks	2
23.	Tank Length, Width, and Average Depth (ft)	32.5 x 15 x 10

24.	Surface Area (sq ft)	
	Per Tank	488
	Total	975
25.	Volume (gal)	
	Per Tank	36,500
	Total	73,000
26.	Surface Settling Rate (gpd/sq ft)	
	Average Flow	10,250
	Peak Flow	25,600
27.	Detention Time (min)	
	Average Flow	10.5
	Peak Flow	4.2
28.	Particle Size Removed w/Specific Gravity = 1.5 (diam. in mm)	
	Average Flow	0.18
	Peak Flow	0.42

PRIMARY SEDIMENTATION

29.	Number of Tanks	5
30.	Tank Length, Width, and Average Depth (ft)	
	Two Existing Tanks	100 x 39 x 9
	Three New Tanks	100 x 26 x 9
31.	Surface Area (sq ft)	
	Each Existing Tank	3,900
	Each New Tank	2,600
	Total	15,600
32.	Volume (gal)	
	Each Existing Tank	262,000
	Each New Tank	175,000
	Total	1,048,000
33.	Weir Length (ft), total	1,075
34.	Surface Settling Rate (gpd/sq ft)	
	Average Flow	640
	Peak Flow	1,600
35.	Detention Time (hrs)	
	Average Flow	2.52
	Peak Flow	1.01
36.	Weir Overflow Rate (gpd/ft)	
	Average Flow	9,300
	Peak Flow	23,270
37.	Estimated SS Removal (%)	60
38.	SS Removed (lb/day)	9,000
39.	Estimated BOD_5 Removal (%)	40
40.	BOD_5 Removed (lb/day)	5,100
41.	BOD_5 in Primary Effluent (mg/l)	92
42.	SS in Primry Effluent (mg/l)	72

PRIMARY EFFLUENT/RECIRCULATION PUMPS

43.	Number of Pumps	3
44.	Type	Variable Speed, Centrifugal
45.	Capacity of Each Pump (gpm)	8,700
46.	Capacity of Each Pump (mgd)	12.5
47.	Number of Pumps Operating	2
48.	Pump Control	Lead/Lag Cycle

TRICKLING FILTERS

49.	Number of Units	2
50.	Type	High-Rate
51.	Diameter (ft)	158
52.	Average Depth of Media (ft)	8.5
53.	Surface Area (sq ft)	
	Per Filter	19,610
	Total	39,220
54.	Volume (cu ft)	
	Per Filter	166,650
	Total	333,300
55.	Minimum Flow to Each Filter (gpm)	3,470
56.	Maximum Flow to Each Filter (gpm)	8,670
57.	Organic Loading (lb/day/1,000 cu ft)	
	Without Recycle	23
	With 1:1 Recycle	28
58.	Hydraulic Loading (gpd/sq ft)	
	Without Recycle	255
	With 1:1 Recycle	510
	Peak Flow without Recycle	637
59.	Design Average BOD_5 Removal (%)	70
60.	Average BOD_5 in Filter Effluent	
	a. mg/l	28
	b. lb/day	2,300

SECOND STAGE AERATION (NITRIFICATION)

61.	Number of Aeration Tanks	8
62.	Tank Length, Width, and Average Depth (ft)	43 x 43 x 15.4
63.	Volume (cu ft)	
	Each Tank	28,475
	Total	227,800
64.	Volume (gal)	
	Each Tank	212,500
	Total	1,700,000

65.	BOD_5 Applied (lb/day)	2,300
66.	BOD_5 Loading (lb/day/1,000 cu ft)	10.1
67.	Ammonia Nitrogen Applied (lb/day)	1,250
68.	Ammonia Nitrogen Loading (lb/day/1,000 cu ft)	5.5
69.	Ammonia Nitrogen Removed (lb/day)	1,085
70.	Percent Ammonia Nitrogen Removal (%)	87
71.	MLSS Concentration (mg/l)	1,500
72.	Return Sludge Solids Concentration (mg/l)	5,000
73.	Design Rate of Return Sludge Flow (%)	60
74.	Design Rate of Return Sludge Flow (mgd)	6.4

FINAL SEDIMENTATION

75.	Number of Tanks	4
76.	Tank Length, Width, and Average Depth (ft)	143 x 35 x 12
77.	Surface Area (sq ft)	
	Per Tank	5,000
	Total	20,000
78.	Volume (gal)	
	Per Tank	450,000
	Total	1,800,000
79.	Weir Length (ft)	
	Per Tank	306
	Total	1,222
80.	Surface Overflow Rate (gpd/sq ft)	
	Average Dry Weather Flow	500
	Peak Wet Weather Flow	1,250
81.	Detention Time (hr)	
	Average Dry Weather Flow	4.32
82.	Weir Overflow Rate (gpd/ft)	
	Average Dry Weather Flow	8,200

FLASH MIX TANK

83.	Number of Tanks	1
84.	Tank Length, Width, and Average Depth (ft)	15 x 11.75 x 15.6
85.	Effective Volume (gal)	19,960
86.	Detention Time (min)	
	Average Flow	2.9
	Peak Flow	1.2

REACTOR CLARIFIERS

87.	Number of Tanks	3
88.	Tank Length, Width, and Average Depth (ft)	67 x 67 x 15
89.	Surface Area (sq ft)	
	Per Tank	4,126
	Total	13,378

BUTLER AREA SEWER AUTHORITY
WATER POLLUTION CONTROL FACILITIES
SOLIDS HANDLING DESIGN CRITERIA

SOLIDS PRODUCTION

1.	Total SS in Raw Sewage (lb/day)	15,000
2.	Total BOD_5 in Raw Sewage (lb/day)	12,750
3.	Volatile SS in Raw Sewage (lb/day)	11,250
4.	Mineral SS in Raw Sewage (lb/day)	3,750
5.	BOD_5 Removed in Primary Tanks (lb/day)	5,100
6.	Total SS Removed in Primary Tanks (lb/day)	9,000
7.	Volatile SS Removed in Primary Tanks (lb/day)	6,750
8.	Mineral SS Removed in Primary Tanks (lb/day)	2,250
9.	Volatile SS Removed in Secondary Clarifiers (lb/day)	3,930
10.	Mineral SS Removed in Secondary Clarifiers (lb/day)	1,690
11.	Total Biological Sludge Removed in Secondary Clarifiers [9+10] (lb/day)	5,620
12.	Inorganic Lime Sludge (lb/day)	
	a. $Ca(OH)(PO_4)$	5,000
	b. $CaCO_3$	23,700
	c. $Mg(OH)_2$	4,670
13.	Total Solids to Thickener [6+9+10] (lb/day)	47,990
14.	Total Volatile Solids to Thickener (lb/day)	10,680

GRAVITY SLUDGE THICKENER

15.	Number of Units	1
16.	Tank Length, Width, and Average Depth (ft)	58 x 58 x 10
17.	Total Surface Area (sq ft)	3,364
18.	Total Volume (gal)	290,500
19.	Clear Overflow Depth (ft)	4
20.	Sludge Storage Available (gal)	190,300
21.	Sludge Storage Available (lbs)	1,591,200
22.	Probable Solids Concentration (%)	6
23.	Solids in Storage at 6% Solids (lbs)	95,500
24.	Solids Storage Time (days)	2.0
25.	Average Solids Loading (lb dry solids/sq ft/day)	14.3
26.	Design Hydraulic Loading (gpd/sq ft)	800
27.	Design Feed to Thickener (gpd)	2,691,200

LIME STABILIZATION

28.	Number of Tanks	2
29.	Top Dimensions; L x W (ft)	31.25 x 26.5
30.	Bottom Dimensions; L x W (ft)	31.25 x 5.0

31.	Tank Depth (ft)	21.5
32.	Volume (gal)	
	Per Tank	79,150
	Total	158,300
33.	Solids Applied	
	Thickened Sludge Dry Solids (lb/day)	47,990
	Thickened Sludge @ 6% (gpd)	92,870
34.	Storage Time in Each Tank (days)	0.85
35.	Total Storage Time (days)	1.70

FILTER PRESSES

36.	Number of Units	2
37.	Plates per Unit	80
38.	Number of Cakes Produced per Unit	79
39.	Cake Thickness (in)	1.25
40.	Volume per Unit (cu ft)	221
41.	Filtration Area per Unit (sq ft)	4,195
42.	Total Filter Area (sq ft)	8,390
43.	Filter Operation (hr/day)	16
44.	Filter Operation (days/wk)	5
45.	Minimum Solids Content in Cake (%)	43
46.	Maximum SS in Filtrate (mg/l)	50
47.	Sludge Production at Average Flow of 5.0 mgd	
	A. Total Weekly (lbs dry solids/wk)	167,965
	B. Total Daily (lbs dry solids/day)	23,995
	1. Primary Sludge	4,500
	2. Biological Sludge	2,810
	3. Lime Sludge	
	a. $Ca(OH)(PO_4)$	2,500
	b. $CaCO_3$	11,850
	c. $Mg(OH)_2$	2,335
	C. Daily Sludge Dewatered (5 day/wk), lb/day	35,593
	1. Primary Sludge	6,300
	2. Biological Sludge	3,934
	3. Lime Sludge	
	a. $Ca(OH)(PO_4)$	3,500
	b. $CaCO_3$	16,590
	c. $Mg(OH)_2$	3,269
48.	Sludge Production at Design Average Flow of 10.0 mgd	
	A. Total Weekly (lb dry solids/wk)	335,930
	B. Total Daily (lb dry solids/day)	47,990
	1. Primary Sludge	9,000
	2. Biological Sludge	5,620

3. Lime Sludge	
a. $Ca(OH)(PO_4)$	5,000
b. $CaCO_3$	23,700
c. $Mg(OH)_2$	4,670
C. Daily Sludge Dewatered (5 day/wk), lb/day	67,186
1. Primary Sludge	12,600
2. Biological Sludge	7,868
3. Lime Sludge	
a. $Ca(OH)(PO_4)$	7,000
b. $CaCO_3$	33,180
c. $Mg(OH)_2$	6,538

APPENDIX B
WWTP HYDRAULIC ANALYSIS AND CAPACITY EVALUATION

Butler Area Sewer Authority

Butler, Pennsylvania

Wastewater Treatment Plant Hydraulic Analysis and Capacity Evaluation

October 2002

Butler Area Sewer Authority
Butler, Pennsylvania

Wastewater Treatment Plan
Hydraulic Analysis and Capacity Evaluation

October 2002

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BUTLER AREA SEWER AUTHORITY

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BUTLER AREA SEWER AUTHORITY
WASTEWATER TREATMENT PLANT HYDRAULIC ANALYSIS AND CAPACITY EVALUATION

EXECUTIVE SUMMARY

The Butler Area Sewer Authority authorized Chester Engineers to conduct a hydraulic analysis and capacity evaluation of the existing wastewater treatment plant. The facility has a design average daily flow capacity of 10 million gallons per day (mgd) and a design maximum flow capacity of 25 mgd.

Hydraulic calculations in spreadsheet format were developed using the 25 mgd peak design flow for the plant. Flow rates in excess of 25 mgd were plugged into the spreadsheet to determine the peak flows that individual components are capable of passing. The peak plant flow is limited by the capacity of the settled sewage pumps and the trickling filter mechanism. The output of two settled sewage pumps discharging to the trickling filters is 26 mgd. The maximum capacity of the two trickling filter rotary distributors is slightly higher at 28 mgd. The calculations indicate the plant can hydraulically handle up to 33 mgd if flows in excess of the trickling filter capacity are bypassed to the aeration tanks. For flows significantly above this level, problems with channel overflows may result. For example, the calculations indicate that the freeboard in the channel downstream of the grit tanks would be less than 1 foot at a 35 mgd flow rate.

The treatment capacity evaluation showed that the plant consistently meets its discharge limits and produces an excellent quality effluent across a wide range of flows. An increase in effluent concentrations was noted when flows rise above 13 mgd. However, the historical data review demonstrates that the plant is capable of meeting the existing effluent discharge limits during high flow periods.

Due to the age and condition of the controls for the travelling bridges on the secondary clarifiers, installation of a new PLC based control system is recommended. A new control system would address problems with maintenance and parts availability that are currently being experienced. The new controls would also enable the traveling bridges to operate as originally designed and return sludge to the aeration tanks more efficiently. The Authority may also wish to consider the installation of motorized valve and gate operators for the activated sludge nitrification process to facilitate changes of operating mode during high flow periods.

BUTLER AREA SEWER AUTHORITY
WASTEWATER TREATMENT PLANT HYDRAULIC ANALYSIS AND CAPACITY EVALUATION

INTRODUCTION

The Butler Area Sewer Authority has undertaken a Corrective Action Plan (CAP) to identify extraneous flow sources and reduce sanitary sewer system overloading. In conjunction with the CAP, the Authority will be required to optimize the performance and efficiency of the wastewater treatment plant so that the maximum volume of wet weather flow can be handled. To facilitate this goal, the Authority authorized Chester Engineers to conduct a hydraulic analysis and capacity evaluation of the existing wastewater treatment plant. This report describes the work completed and summarizes the findings of the study.

DESIGN PARAMETERS

The existing treatment facility has a design and permitted average daily flow capacity of 10 million gallons per day (mgd) and a design maximum flow capacity of 25 mgd. Design influent loadings for the facility are listed below. Mass loadings were calculated using the influent concentrations in conjunction with the 10 mgd design average flow.

Parameter	Concentration (mg/l)	Mass Loading (lb/day)
Biochemical Oxygen Demand (BOD_5)	153	12,750
Suspended Solids (SS)	180	15,000
Ammonia Nitrogen (NH_3-N)	15	1,251
Total Phosphorus (P)	30.7	2,560

EFFLUENT LIMITS

The National Pollutant Discharge Elimination System (NPDES) permit for the Butler Area Sewer Authority wastewater treatment plant contains the following discharge limits:

Parameter	Monthly Average (mg/l)	Monthly Average (lb/day)	Max. Week Average (mg/l)	Max. Week Average (lb/day)
$CBOD_5$ - Nov. to April	24	2,002	36	3,002
$CBOD_5$ - May to Oct.	12	1,001	18	1,501
SS	30	2,502	45	3,753
NH_3-N - Nov. to April	6	500	N/A	N/A
NH_3-N - May to Oct.	2	167	N/A	N/A
P	2	167	N/A	N/A

TREATMENT CAPACITY EVALUATION

Daily operating records were reviewed for a one-year period from July 28, 2001 to July 27, 2002 to determine the range of influent loadings and corresponding plant performance. Operating data for this period is contained in Appendix A. Comparisons of design and actual loadings are summarized below.

Flow

During the period reviewed, influent flows averaged 6.68 mgd or 67% of the 10 mgd design flow. Daily flows exceeded 10 mgd on 34 days and exceeded 25 mgd on 2 days. A maximum day flow of 30.6 mgd was recorded during the period reviewed.

BOD_5

Influent BOD_5 averaged 106 mg/l or 70% of the 153 mg/l design concentration. The average mass loading was lower at 5,276 pounds per day or 41% of the 12,750 pound per day design load. The plant's design organic loading capacity was exceeded on 1 day when 13,951 pounds of BOD_5 were received.

Effluent BOD_5 averaged 2.5 mg/l for the year or 21% of the 12 mg/l monthly average NPDES limit for warm weather months. The mass discharge averaged 173 pounds per day or 17% of the 1,001 pounds per day monthly average summer limit. The maximum day effluent discharge of 3,535 pounds occurred when a flow of 24.9 mgd was received. The mass discharge on this date reduces to a concentration of 17 mg/l and was the only effluent reading in excess of 11 mg/l. Monthly average mass discharge limits were exceeded on 5 days during the period reviewed but no concentration exceedances were noted. Effluent concentrations were 3 mg/l or less on 92% of the days on which BOD_5 tests were performed.

The plant's design organic loading is based on BOD. During this evaluation, it was discovered that the reported influent BOD data for the plant were actually carbonaceous BOD. The plant laboratory had switched from testing influent BOD to testing influent

carbonaceous BOD per the instructions of a DEP inspector. Consequently, the data in Appendix A is lower than actual BOD loadings. An analysis of limited influent BOD and carbonaceous BOD test results on the same daily samples indicates that influent BOD concentrations are approximately 1.42 times higher than the reported influent carbonaceous BOD.

Using this factor, the average influent carbonaceous BOD concentration and loading of 106 mg/l and 5,276 pounds per day, respectively, are approximately equivalent to 150 mg/l and 7,492 pounds per day of BOD. The estimated average influent BOD of 150 mg/l is 98% of the 153 mg/l design concentration. The estimated average influent BOD loading of 7,492 pounds per day is about 59% of the monthly average daily design BOD load of 12,750 pound per day.

SS

Influent SS averaged 152 mg/l or 85% of the 180 mg/l design concentration. The mass loading for SS averaged 7,969 pounds per day or 51% of the 15,000 pound per day design load. The plant's design mass loading was exceeded on 9 days and a maximum day SS load of 33,154 pounds was recorded.

Effluent SS concentrations averaged 6 mg/l or 20% of the 30 mg/l monthly average permit limit. The mass discharge averaged 405 pounds per day or 16% of the 2,502 pounds per day monthly average discharge limit. A maximum day discharge of 6,862 pounds was recorded, equivalent to a concentration of 33 mg/l. SS effluent readings exceeded the 30 mg/l monthly average discharge limit on one day and were 10 mg/l or less on 92% of the days on which SS samples were analyzed. Mass discharges exceeded the monthly average discharge limit on 6 days.

NH_3-N

Influent NH_3-N averaged 12.9 mg/l or 86% of the 15 mg/l design concentration. Mass influent loadings averaged 642 pounds per day, equivalent to 51% of the 1,251 pounds per day design load. The design mass loading for NH_3-N was exceeded on 3 days and a maximum day loading of 1,889 pounds was recorded.

Effluent NH_3-N concentrations averaged 0.6 mg/l for the year, approximately one third of the 2 mg/l permit limit during warm weather months. The mass discharge averaged 38 pounds per day or 23% of the 167 pounds per day monthly average limit during warm weather. A maximum day discharge of 490 pounds was recorded. NH_3-N effluent readings exceeded monthly average concentration limits on 2 days and mass discharges exceeded the permitted discharge on 5 days.

Total P

Influent P averaged 3.18 mg/l or 10% of the 30.7 mg/l design concentration. Mass influent loadings averaged 159 pounds per day, equivalent to 6% of the 2,560 pounds per day design load. The design mass loading for P was not exceeded during the period of review and a maximum day loading of 564 pounds was recorded.

Effluent P concentrations averaged 1 mg/l for the year as compared to the 2 mg/l monthly average permit limit. The mass discharge averaged 56 pounds per day or 34% of the 167 pounds per day monthly average limit. A maximum day discharge of 261 pounds occurred, equivalent to a 6 mg/l concentration. Total P effluent discharges exceeded the 2 mg/l monthly average limit on 15 days and mass discharges exceeded the 167 pound per day limit on 7 days. In addition, there were 6 days on which the recorded effluent discharges for total P were higher than the influent loadings.

HIGH FLOW TREATMENT EVALUATION

Influent loadings and effluent discharges were evaluated during high flow periods by arranging the data points in descending order with respect to flow. Ordering the data in this fashion establishes trends that can be observed in graphical and tabular form. Tables of the data points at flows in excess of 10 mgd are contained in Appendix B.

The high flow evaluation indicates that influent concentrations for all pollutants decrease as the flow rate increases, which illustrates the effects of dilution caused by extraneous water that enters the sanitary sewer system during wet weather periods. At the same time, the graphs show that effluent concentrations of BOD_5, SS, and NH_3-N all increase as flows increase, which suggests a decrease in treatment efficiency at elevated flows. The effect is most pronounced when flows exceed 13 mgd. Total P is the exception to this trend. Historical data indicates that Total P effluent concentrations decrease slightly as the flow rate increases, just the opposite behavior of the other pollutants.

Trends for mass loadings relative to flow are similar for all parameters. Mass loadings gradually increase with increased flows while mass discharges are relatively constant until flows reach about 13 mgd. Above 13 mgd, mass discharges rise significantly as flows increase.

HYDRAULIC ANALYSIS

The purpose of the hydraulic analysis was to evaluate and identify specific treatment plant components that may limit peak flow capacity. A set of drawings from the 1978 expansion project was used to determine the configuration and dimensions of the tanks, channels, and pipes that comprise the treatment plant. Hydraulic calculations for the existing plant, prepared as part of the 1978 project, were also reviewed. Using the

available design data and shop drawing information as required, calculations were set up in spreadsheet format so that the hydraulics can be checked at different flow rates. Hydraulic calculations were prepared for both main (liquid) flows and sludge flows.

Pressure flows within pipes were calculated using the Hazen-Williams equation. Flows in open channels and gravity flows in pipes were calculated using the Manning equation. The analyses used a Hazen-Williams C factor of 100 for piping and a Manning's n factor of 0.013 for open channel flows. The calculations assumed that flows are equally divided between multiple tanks in a unit treatment process. Hydraulics were calculated by working backward from the component, typically a weir, that establishes a downstream water level. Calculations were prepared for the plant segments listed below.

Headworks

The headworks segment extends from the plant influent pipe to the grit tank overflow weirs and includes the open channels associated with the mechanical bar screens and grit chambers. Since the main concern of the analysis is high flows, the calculations assume that both bar screens and grit tanks are in operation.

Primary Clarifiers

This segment runs from the grit tanks to the primary clarifiers and includes open channel flow to the tank inlet ports. The water elevation in this segment is controlled by the v-notch weirs in the primary clarifiers.

Flow Measurement

Incoming plant flows are measured as they pass through a Parshall flume located downstream of the primary clarifiers. This flow segment extends from the primary clarifier launders to the Parshall flume. The water elevation in this segment is controlled by the amount of water passing through the throat of the flume.

Pump Station Wet Well

This segment runs from the box downstream of the Parshall flume to the pump station wet well and is comprised primarily of the 48-inch pipe and fittings that carry flow to the pump station wet well. The water elevation in this segment is controlled by the rate at which the pumps transfer the flow reaching the wet well.

Trickling Filters

The trickling filter segment stretches from the pump station wet well through the trickling filter distribution arms and includes the 36-inch pump discharge piping to the distribution box and the 24-inch feed lines to the trickling filters. Under normal operations, the head

on the settled sewage pumps is controlled by the water level passing over the weir in the trickling filter distribution box. However, there is a 36-inch pipe to the aeration tank inlet box that can be used to bypass the trickling filters. When the valve on the bypass line is opened, the head on the pumps is determined by the flow distribution between the two lines.

Secondary Treatment

This flow segment runs from the trickling filter collection boxes through the aeration tanks to the secondary clarifiers. Trickling filter effluent travels through a series of pipes and manholes to the aeration tank inlet box. At that point, the wastewater travels via open channels into the aeration tanks and subsequently to the secondary clarifiers. Sludge is wasted by gravity from the last two aeration tanks. The water elevation in this segment is controlled by the v-notch weirs in the secondary clarifiers.

Reactor Clarifiers

The reactor clarifier segment runs from the secondary clarifier launders to the reactor clarifiers. Wastewater travels via open channel flow to the flash mix tank and then by open channel to the reactor clarifiers. The water elevation in this segment is controlled by the weirs in the reactor clarifiers. Treated sewage is recycled back to the trickling filters via the pump station wet well through a line from the secondary effluent channel to maintain 10 mgd of flow to the trickling filters. The recycle rate is controlled by a pneumatic cylinder operated plug valve on the return line. When influent flows exceed 10 mgd, no recirculation to the trickling filters is required.

Chlorine Contact Tanks

This segment extends from the reactor clarifier launders to the outlet of chlorine contact tank 710-1. Flow is piped from the reactor clarifier collection box to contact tank 709, then flows through tank 709 to the discharge point for contact tank 710-1. The water elevation in these segments is controlled by weirs in Effluent Bypass Chamber 729 and in Chlorine Contact Tank 710-2.

Outfall

The final segment runs from the outlet of contact tank 710-1 to the receiving stream and includes the following structures and related piping:

Effluent Bypass Chamber 729
Chlorine Contact Tank 710-2
Plant Outfall Chamber 733
Collection Chamber 734
Effluent Pipe and Manholes

Effluent bypass chamber 729 can be used to bypass chlorine contact tank 710-2, send all flow to tank 710-2, or allow flow to travel to both locations. Plant outfall chamber 733 has a bypass to Butchers Creek, as well as an overflow weir that sends flow to collection chamber 734 and to Connoquenessing Creek via a 48-inch outfall pipe. Water elevations in this segment are controlled by the level of the receiving stream and the elevations of various weirs.

Several of the 48-inch CMP discharge pipe segments downstream of collection chamber 734 have calculated gravity flow capacities well in excess of the 25 mgd peak design flow for the plant. In certain situations, such as a free discharge condition at the receiving stream, some of these pipe segments may flow partially full. Determining upstream water elevations based on partially full discharge pipes complicates the calculation process because there are many factors that may impact the final results. Since the main thrust of the hydraulic analysis is high flow conditions, the spreadsheet assumes that the discharge pipe is submerged by the receiving stream and the 48-inch segments are modeled as pressure pipes.

Sludge

Calculations were also prepared for return sludge flows via the airlift pumps on the traveling bridges back to the aeration tanks. The treatment process design criteria lists the design rate of sludge return flow as being 60% or 6.00 mgd at the 10 mgd design flow. To approximate this recycle rate, return sludge flows were modeled at 20% of the influent flow rate.

MEETING WITH BASA PERSONNEL

A meeting was held at the plant with Authority management personnel on September 12, 2002 to discuss plant operating procedures and to take a tour of the facility. BASA personnel identified two problems with the existing facility:

1. If both travelling bridges are in operation, return sludge backs up and overflows into the clarifiers. When the equipment was new, the bridges used to cycle such that they would travel 25% of tank length on the first pass, 50% on the next pass, and travel the entire length on the final pass. The controls were also set up so that only one bridge could be in operation at a time. However, the existing controls no longer work properly and are difficult to maintain. Both bridges now travel the entire tank length on every pass. In addition, the bridges periodically operate concurrently when the independent timers "catch up" with one another.

2. During high flow periods, solids washout occurs in the activated sludge nitrification process. High flows flush the solids inventory out of the aeration tanks and travelling bridge clarifiers and the solids can not be returned to the process. Alternate operating modes for this process are available which could

minimize solids washout, but the existing manually operated gates and return sludge valves make it impossible to make short-term process changes quickly during high flow periods.

DISCUSSION

Spreadsheet calculations were developed using the 25 mgd peak design flow for the plant. To determine the peak flows that individual components are capable of passing, flow rates in excess of 25 mgd were plugged into the model until selected parameters were exceeded. The two parameters used for evaluation purposes were as follows:

1. Minimum 2-inch difference between weir elevation and downstream water level
2. Minimum 1-foot freeboard between water level and top of tank or channel

Flows rates of 28, 30, 33, 35, and 40 mgd were used to evaluate hydraulic capacities of the treatment processes and interconnecting channels / piping. Summary sheets from the different model runs can be found in Appendix C. These sheets list calculated water elevations, freeboard measurements, differential measurements between weir elevations and downstream water levels, and other information of interest. Modeling results are summarized below:

Flow Rate (mgd)	Observed Limitations
28	Three Pumps needed to match the capacity of the Trickling Filter rotary distributors
30	Exceeds Capacity of Trickling Filter Rotary Distributors
33	Primary Clarifier Weirs Submerged Exceeds Measurement Range of Parshall Flume Exceeds Capacity of Trickling Filter Rotary Distributors Reactor Clarifier Weirs Submerged Chlorine Contact Tank 710-2 Weir Submerged
35	Less Than 1-foot Freeboard at Grit Tank Outlet Channel Primary Clarifier Weirs Submerged Exceeds Measurement Range of Parshall Flume Exceeds Capacity of Trickling Filter Rotary Distributors Secondary Clarifier Weirs Submerged Reactor Clarifier Weirs Submerged Bypass Chamber 729 Weir Submerged Chlorine Contact Tank 710-2 Weir Submerged

At 40 mgd flow, the same limitations were noted as at 35 mgd but the freeboard at the grit tank outlet channel was reduced to less than 8-inches. In addition, a flow of this magnitude exceeds the combined 35.6 mgd capacity of the three trickling filter pumps. Additional information regarding hydraulic limitations is listed below:

Parshall Flume

The minimum and maximum recommended rates for free flows through Parshall flumes have been experimentally determined. A flume with a 3 foot throat width produces accurate flow measurements for depths ranging from 0.15 to 2.50 feet. The corresponding flow range for these depths is 0.40 to 32.60 mgd. Although flows in excess of the maximum value can pass through the flume, the resulting flow measurements will not be accurate because Parshall flumes are not calibrated for depths in excess of the recommended value.

Trickling Filters

As part of the hydraulic calculations, a system curve was developed for the trickling filter pumping system. The operating curves for the pumps were then plotted against the system curve to determine the pump operating points. Based on this information, the capacity of a single pump is 13.8 mgd, two pumps can put out 26 mgd, and three pump operation can produce a 35.6 mgd flow rate.

Shop drawing information was reviewed to determine the capacity of the existing trickling filter rotary distributors. The 1979 shop drawing information indicated that the maximum flow to each unit is 8,670 gpm or 12.485 mgd, resulting in a total flow of 24.97 mgd to both units. However, the hydraulic calculations showed there is unused head available from the trickling filter distribution box at a 25 mgd flow rate, suggesting that the distributors might be able to handle additional flows.

The equipment manufacturer was contacted to determine if the rotary distributors can accommodate flows in excess of 25 mgd. Per the manufacturer, the maximum allowable flow velocity through the trickling filter arms is 4 feet per second. Use of the allowable velocity and the flow area inside the trickling filter arms produces a maximum flow of 9,775 gpm per unit or 28.15 mgd for both trickling filters.

Effluent Bypass Chamber 729

The calculations indicate that effluent bypass chamber 729 sends a significant amount of flow around chlorine contact tank 710-2, bypassing it to plant outfall chamber 733. This bypass occurs because the top elevation of the 9-foot long adjustable straight weir in effluent bypass chamber 729 is only 0.20 foot higher than the crest of the flared 48-inch pipe that acts as an overflow weir in chlorine contact tank 710-2. Based on relative weir lengths, chlorine contact tank 710-2 would be expected to receive about 58% of the flow

if the depth of flow over both weirs was equal. However, the depth of flow over the flared pipe in tank 710-2 is greater than the head on the weir in bypass chamber 729 so more flow passes through the contact tank. At the 10 mgd design flow, approximately 80% of the flow goes to the contact tank. The percentage of flow through chlorine contact tank 710-2 decreases as the flow rate increases, dropping to about 65% at 25 mgd.

Bypassing flow around chlorine contact tank 710-2 does not produce any bottlenecks from a hydraulic standpoint. However, this bypass may negatively impact chlorine contact times at high flow rates. The DEP Domestic Wastewater Facilities Manual requires a minimum chlorine contact time of 15 minutes at peak hourly flow or maximum rate of pumpage. The three contact tanks at the Butler plant can provide a 15 minute contact time for a 35.60 mgd flow rate assuming all the flow passes through the tanks. The bypass around tank 710-2 reduces the flow to approximately 30 mgd for a 15 minute contact time.

CONCLUSIONS AND RECOMMENDATIONS

The treatment capacity evaluation shows that the wastewater treatment plant owned and operated by the Butler Area Sewer Authority consistently meets its discharge limits and produces an excellent quality effluent across a wide range of flows. The high flow treatment evaluation illustrates that influent pollutant concentrations during elevated flow periods are reduced by dilution and are often times not much higher than the effluent limits. The plant consistently meets and exceeds the NPDES Permit requirement for a minimum 30-day average percent removal of 85 percent (85%) for carbonaceous BOD and total suspended solids. The high flow operating results also indicate that the plant can achieve such removals on a daily basis for average daily flows up to 14-16 mgd. Daily percent removals decrease at higher daily flows due to low influent concentrations resulting from dilution.

The hydraulic calculations indicate that flows in excess of 25 mgd can be handled by the trickling filters. The rated output from two settled sewage pumps is 26 mgd and the maximum capacity of the trickling filter rotary distributors is 28 mgd. The calculations also indicate that the plant can hydraulically pass up to 33 mgd if flows in excess of the trickling filter capacity are diverted to the aeration tanks. At a 33 mgd flow rate, the calculations show weirs being submerged in the primary clarifiers, reactor clarifiers, and chlorine contact tank 710-2, but there is still at least 1 foot of freeboard at all locations. At 35 mgd, the freeboard in the channel downstream of the grit tanks drops to less than 1 foot.

It is recommended that the spreadsheet be calibrated by checking water elevations at various locations under different flow conditions. The roughness of pipes and channels may differ from the assumed values in the spreadsheet model, resulting in calculated hydraulics that do not match actual conditions. Similarly, slide gate positions and port

openings between tanks may not be the same as the modeled conditions and may cause flow distributions through process tanks to differ. These factors could cause the calculated results to be different from field conditions.

Due to the age and condition of the controls for the travelling bridges on the secondary clarifiers, it is also recommended that a new PLC based system be installed to replace the existing controls. A new control system would address problems with maintenance and parts availability that are currently being experienced. The new controls would also enable the traveling bridges to operate as originally designed and return sludge to the aeration tanks more efficiently. The Authority may also wish to consider the installation of motorized valve and gate operators for the activated sludge nitrification process to facilitate changes of operating mode during high flow periods.

APPENDIX A

Butler Pollution Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l)		TSS (mg/l)		NH3-N (mg/l)		Total P (mg/l)		CBOD-5 (lb/day)		TSS (lb/day)		NH3-N (lb/day)		Total P (lb/day)	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
07/28/01	4.140	109	1	238	3	13.54	0.55	4.08	2.02	3,764	35	8,218	104	468	19	141	70
07/29/01	4.229	193	1	236	3	13.62	0.25	4.06	0.76	6,807	35	8,324	106	480	9	143	27
07/30/01	4.145	115	1	236	1	14.62	0.26	4.00	0.94	3,975	35	8,158	35	505	9	138	32
07/31/01	4.342	119	1	208	1	14.00	0.33	4.13	1.04	4,309	36	7,532	36	507	12	150	38
08/01/01	4.401	101	1	220	2	13.62	0.35	4.81	1.00	3,707	37	8,075	73	500	13	177	37
08/02/01	4.413	114	1	244	3	14.62	0.31	4.06	0.98	4,196	37	8,980	110	538	11	149	36
08/03/01	4.477	150	1	232	5	15.52	0.35	4.06	0.95	5,601	37	8,662	187	579	13	152	35
08/04/01	4.222	79	1	232	2	14.00	0.30	4.09	0.93	2,782	35	8,169	70	493	11	144	33
08/05/01	4.156	129	2	292	3	13.54	0.31	4.42	1.01	4,471	69	10,121	104	469	11	153	35
08/06/01	4.061	110	2	228	1	15.19	0.32	4.13	1.00	3,726	68	7,722	34	514	11	140	34
08/07/01	4.238	104	1	253	5	14.15	0.43	4.24	1.05	3,676	35	8,942	177	500	15	150	37
08/08/01	4.282	102	2	232	4	15.68	0.36	4.09	0.94	3,643	71	8,285	143	560	13	146	34
08/09/01	4.323	114	1	232	1	13.92	0.37	4.06	0.91	4,110	36	8,364	36	502	13	146	33
08/10/01	4.468	140	1	244	3	15.92	0.44	4.15	0.95	5,217	37	9,092	112	593	16	155	35
08/11/01	3.916	91	1	246	1	16.00	0.39	4.35	0.93	2,972	33	8,034	33	523	13	142	30
08/12/01	4.251	162	1	248	28	16.24	0.37	4.81	1.05	5,743	35	8,792	993	576	13	171	37
08/13/01	4.201	214	2	236	6	16.73	0.39	4.88	1.07	7,498	70	8,269	210	586	14	171	37
08/14/01	4.325	142	1	216	3	16.97	0.38	4.28	1.04	5,122	36	7,791	108	612	14	154	38
08/15/01	4.122	120	1	216	3	16.48	0.37	3.95	1.02	4,125	34	7,426	103	567	13	136	35
08/16/01	4.426	75	1	142	25	14.00	0.73	3.16	2.08	2,768	37	5,242	923	517	27	117	77
08/17/01	4.241	127	1	192	2	16.65	0.30	4.02	0.99	4,492	35	6,791	71	589	11	142	35
08/18/01	4.201	209	1	200	1	16.32	0.32	4.17	1.06	7,323	35	7,007	35	572	11	146	37
08/19/01	4.030	46	2	298	3	14.79	0.35	2.62	1.05	1,546	67	10,016	101	497	12	88	35
08/20/01	4.173	197	1	276	2	16.65	0.25	4.77	1.06	6,856	35	9,606	70	579	9	166	37
08/21/01	4.032	125	2	214	4	16.57	0.33	4.35	1.27	4,203	67	7,196	135	557	11	146	43
08/22/01	4.246	177	2	214	3	15.52	0.32	4.75	1.25	6,268	71	7,578	106	550	11	168	44
08/23/01	4.447	106	1	152	3	15.60	0.35	4.38	1.24	3,931	37	5,637	111	579	13	162	46
08/24/01	4.152	126	1	184	5	16.65	0.45	3.99	0.96	4,363	35	6,371	173	577	16	138	33
08/25/01	3.960	73	2	176	5	16.81	0.41	4.02	0.98	2,411	66	5,813	165	555	14	133	32
08/26/01	3.973	114	1	264	6	16.00	0.35	4.18	1.03	3,777	33	8,748	199	530	12	139	34
08/27/01	4.108	86	1	200	3	15.76	0.40	4.02	0.96	2,946	34	6,852	103	540	14	138	33
08/28/01	4.934			244	4	14.23	0.57	4.04	0.98			10,040	165	586	23	166	40
08/29/01	4.277	118	2	192	5	15.84	0.34	4.20	0.91	4,209	71	6,849	178	565	12	150	32
08/30/01	3.939	116	1	148	4	15.92	0.41	3.05	0.74	3,811	33	4,862	131	523	13	100	24
08/31/01	13.172	72	4	140	7	10.36	1.97	2.53	0.90	7,910	439	15,380	769	1,138	216	278	99
09/01/01	4.661	103	3	148	6	12.30	0.35	2.53	0.70	4,004	117	5,753	233	478	14	98	27
09/02/01	4.398	140	1	144	3	14.87	0.24	3.06	0.68	5,135	37	5,282	110	545	9	112	25
09/03/01	4.611	130	3	192	5	15.03	0.28	3.57	0.76	4,999	115	7,384	192	578	11	137	29
09/04/01	4.414	122	1	212	3	15.76	0.25	4.02	0.90	4,491	37	7,804	110	580	9	148	33
09/05/01	3.456	119	1	168	2	15.84	0.32	3.57	0.78	3,430	29	4,842	58	457	9	103	22
09/06/01	3.609	121	1	168	7	16.00	0.34	3.91	0.92	3,642	30	5,057	211	482	10	118	28
09/07/01	3.600	157	1	208	6	15.84	1.19	3.55	2.08	4,714	30	6,245	180	476	36	107	62
09/08/01	3.407	81	1	100	5	15.92	1.10	2.65	0.73	2,302	28	2,841	142	452	31	75	21

Butler Pollutiion Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	CBOD-5 (mg/l) Effluent	TSS (mg/l) Influent	TSS (mg/l) Effluent	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	Total P (mg/l) Influent	Total P (mg/l) Effluent	CBOD-5 (lb/day) Influent	CBOD-5 (lb/day) Effluent	TSS (lb/day) Influent	TSS (lb/day) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
09/09/01	3.605	165	1	164	2	14.62	0.83	3.13	0.67	4,961	30	4,931	60	440	25	94	20
09/10/01	3.846	113	1	208	4	16.72	0.32	4.13	0.94	3,625	32	6,672	128	536	10	132	30
09/11/01	4.026	121	1	182	3	19.48	0.36	4.15	0.91	4,063	34	6,111	101	654	12	139	31
09/12/01	4.235	142	2	188	8	20.35	0.32	3.38	1.04	5,015	71	6,640	283	719	11	119	37
09/13/01	5.469	156	2	264	2	14.62	0.32	4.38	1.04	7,115	91	12,041	91	667	15	200	47
09/14/01	4.291	127	2	192	5	14.47	0.51	3.40	0.78	4,545	72	6,871	179	518	18	122	28
09/15/01	3.983	99	1	56	3	15.52	0.32	1.98	0.79	3,289	33	1,860	100	516	11	66	26
09/16/01	3.340	150	2	216	5	15.68	0.31	4.03	0.90	4,178	56	6,017	139	437	9	112	25
09/17/01	3.357	101	1	156	6	15.12	0.27	3.40	1.01	2,828	28	4,368	168	423	8	95	28
09/18/01	3.802	133	2	171	4	16.16	0.38	4.71	1.03	4,217	63	5,422	127	512	12	149	33
09/19/01	4.656	135	2	226	4	14.23	0.68	4.11	1.02	5,242	78	8,776	155	553	26	160	40
09/20/01	4.749	90	1	124	3	12.59	0.44	0.07	0.89	3,565	40	4,911	119	499	17	3	35
09/21/01	3.931	154	2	135	4	18.28	0.45	3.30	0.90	5,049	66	4,426	131	599	15	108	30
09/22/01	3.768	131	1	128	1	18.68	0.46	3.30	0.86	4,117	31	4,022	31	587	14	104	27
09/23/01	4.013	118	1	200	2	15.36	0.41	4.09	0.78	3,949	33	6,694	67	514	14	137	26
09/24/01	8.313	70	2	96	6	8.55	0.80	2.03	1.00	4,853	139	6,656	416	593	55	141	69
09/25/01	5.553	81	2	98	2	12.52	0.34	2.69	0.78	3,751	93	4,539	93	580	16	125	36
09/26/01	5.026	88	2	160	4	13.84	0.35	3.37	0.93	3,689	84	6,707	168	580	15	141	39
09/27/01	5.540	128	2	195	3	13.69	0.57	3.43	0.86	5,914	92	9,010	139	633	26	158	40
09/28/01	5.194	132	2	60	3	13.77	0.41	2.20	0.84	5,718	87	2,599	130	596	18	95	36
09/29/01	4.684	72	2	8	4	14.08	0.37	2.47	0.85	2,813	78	313	156	550	14	96	33
09/30/01	4.281	106	2	152	4	14.31	0.37	3.95	0.92	3,785	71	5,427	143	511	13	141	33
10/01/01	4.563	110	2	156	3	15.36	0.38	3.47	0.99	4,186	76	5,937	114	585	14	132	38
10/02/01	4.553	106	2	172	8	15.36	0.38	3.98	1.08	4,025	76	6,531	304	583	14	151	41
10/03/01	4.386	116	2	172	3	15.60	0.43	4.13	0.98	4,243	73	6,292	110	571	16	151	36
10/04/01	4.352	193	2	208	8	16.08	0.43	4.24	0.86	7,005	73	7,550	290	584	16	154	31
10/05/01	4.406	141	2	236	6	15.68	0.45	4.75	1.02	5,181	73	8,672	220	576	17	175	37
10/06/01	4.190			80	1	15.29	0.79	2.29	2.11			2,796	35	534	28	80	74
10/07/01	3.948	134	2	184	9	16.16	0.35	4.09	0.99	4,412	66	6,058	296	532	12	135	33
10/08/01	4.129	155	3	188	3	15.92	0.37	4.24	1.03	5,338	103	6,474	103	548	13	146	35
10/09/01	3.310	152	3	182	4	15.52	0.34	4.06	0.88	4,196	83	5,024	110	428	9	112	24
10/10/01	4.323	102	2	156	3	16.08	0.37	3.91	0.77	3,677	72	5,624	108	580	13	141	28
10/11/01	4.330	107	2	184	2	16.48	0.43	4.15	0.77	3,864	72	6,645	72	595	16	150	28
10/12/01	5.469	150	2	180	6	14.16	0.76	3.91	1.67	6,842	91	8,210	274	646	35	178	76
10/13/01	4.538	98	2	68	6	14.54	0.53	2.31	1.02	3,709	76	2,574	227	550	20	87	39
10/14/01	6.164	113	3	188	7	12.00	0.61	3.93	1.12	5,809	154	9,665	360	617	31	202	58
10/15/01	4.865	103	2	168	5	15.76	0.40	3.88	0.95	4,179	81	6,816	203	639	16	157	39
10/16/01	5.896	98	2	176	2	15.92	0.45	3.99	0.77	4,819	98	8,654	98	783	22	196	38
10/17/01	4.951	84	3	100	6	13.69	0.37	3.27	0.93	3,468	124	4,129	248	565	15	135	38
10/18/01	4.697	115	3	164	7	14.54	0.45	3.17	0.96	4,505	118	6,424	274	570	18	124	38
10/19/01	4.593	152	3	164	8	15.68	0.54	3.40	0.96	5,822	115	6,282	306	601	21	130	37
10/20/01	4.278	111	3	124	4	15.28	0.99	3.17	2.23	3,960	107	4,424	143	545	35	113	80
10/21/01	4.324	133	2	212	8	15.84	0.43	4.24	1.05	4,796	72	7,645	288	571	16	153	38

Butler Pollution Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l)		TSS (mg/l)		NH3-N (mg/l)		Total P (mg/l)		CBOD-5 (lb/day)		TSS (lb/day)		NH3-N (lb/day)		Total P (lb/day)	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
10/22/01	4.279	116	2	160	6	15.52	0.37	4.09	1.22	4,140	71	5,710	214	554	13	146	44
10/23/01	16.085	104	8	200	25	14.08	1.57	3.55	1.27	13,951	1,073	26,830	3,354	1,889	211	476	170
10/24/01	13.101	39	4	28	8	4.90	0.96	1.44	0.57	4,261	437	3,059	874	535	105	157	62
10/25/01	8.205	46	2	88	6	8.41	0.24	1.67	0.42	3,148	137	6,022	411	575	16	114	29
10/26/01	6.503	74	2	84	15	10.96	0.37	1.39	0.46	4,013	108	4,556	814	594	20	75	25
10/27/01	6.654	67	3	144	15	10.00	0.40	2.31	0.91	3,718	166	7,991	832	555	22	128	50
10/28/01	5.764	87	3	184	2	11.85	0.36	3.17	0.78	4,182	144	8,845	96	570	17	152	37
10/29/01	5.596	100	3	140	3	13.38	0.44	3.10	0.72	4,667	140	6,534	140	624	21	145	34
10/30/01	5.220	106	2	132	7	13.84	0.38	2.69	6.00	4,615	87	5,747	305	603	17	117	261
10/31/01	5.104	117	1	208	5	14.31	0.37	4.09	0.75	4,980	43	8,854	213	609	16	174	32
11/01/01	5.040	106	2	128	8	14.78	0.46	3.13	0.75	4,456	84	5,380	336	621	19	132	32
11/02/01	7.309	79	2							4,816	122						
11/03/01	6.041	77	2	124	3	10.43	0.49	2.25	0.89	3,879	101	6,247	151	525	25	113	45
11/04/01	5.529	98	2	148	1	11.93	0.29	3.32	0.61	4,519	92	6,825	46	550	13	153	28
11/05/01	5.182	18	2	120	4	13.69	0.37	3.11	0.66	778	86	5,186	173	592	16	134	29
11/06/01	5.337	85	2	120	1	14.31	0.37	2.69	0.56	3,783	89	5,341	45	637	16	120	25
11/07/01	5.189	104	2	112	1	14.16	0.43	2.72	0.67	4,501	87	4,847	43	613	19	118	29
11/08/01	5.804	60	2	90	11	13.84	0.91	2.53	2.18	2,904	97	4,356	532	670	44	122	106
11/09/01	4.819	106	2	116	1	14.16	0.45	2.71	0.77	4,260	80	4,662	40	569	18	109	31
11/10/01	4.845	135	2	148	1	14.08	0.42	4.28	0.75	5,455	81	5,980	40	569	17	173	30
11/11/01	4.534	117	2	104	3	14.78	0.41	4.20	0.75	4,424	76	3,933	113	559	16	159	28
11/12/01	4.622	100	3	136	3	15.36	0.42	3.16	0.75	3,855	116	5,242	116	592	16	122	29
11/13/01	4.555	115	3	120	6	15.52	0.45	3.13	0.76	4,369	114	4,559	228	590	17	119	29
11/14/01	4.483	122	3	172	2	15.68	0.48	3.95	0.77	4,561	112	6,431	75	586	18	148	29
11/15/01	4.740	111	2	108	10	15.68	0.58	2.65	0.76	4,388	79	4,269	395	620	23	105	30
11/16/01	4.485	127	2	166	5	16.32	0.54	3.47	0.67	4,750	75	6,209	187	610	20	130	25
11/17/01	4.512	118	2	164	2	16.00	0.56	3.95	0.72	4,440	75	6,171	75	602	21	149	27
11/18/01	4.525	58	2	228	6	15.60	0.55	3.88	0.75	2,189	75	8,604	226	589	21	146	28
11/19/01	7.450	79	3	224	8	13.30	0.84	3.54	0.74	4,909	186	13,918	497	826	52	220	46
11/20/01	5.438	62	2	146	8	11.63	0.43	5.25	0.69	2,812	91	6,622	363	527	20	238	31
11/21/01	5.141	101	2	248	11	13.84	0.54	4.26	0.68	4,330	86	10,633	472	593	23	183	29
11/22/01	4.540	157	3	200	5	14.47	0.42	4.83	0.78	5,945	114	7,573	189	548	16	183	30
11/23/01	4.818	134	2	240	6	16.65	0.66	4.22	1.02	5,384	80	9,644	241	669	27	170	41
11/24/01	11.206	100	2	168	9	15.68	0.65	2.65	1.10	9,346	187	15,701	841	1,465	61	248	103
11/25/01	11.518	62	5	48	15	7.72	1.45	1.95	0.78	5,956	480	4,611	1,441	742	139	187	75
11/26/01	6.682	66	2	88	1	10.36	1.45	1.93	2.02	3,678	111	4,904	56	577	81	108	113
11/27/01	8.523	56	2	88	7	8.63	0.67	1.81	0.74	3,981	142	6,255	498	613	48	129	53
11/28/01	8.056	61	3	68	6	9.71	0.47	1.95	0.76	4,098	202	4,569	403	652	32	131	51
11/29/01	8.680	34	2	160	10	11.40	0.56	2.41	0.86	2,461	145	11,583	724	825	41	174	62
11/30/01	12.954	47	3	40	7	6.27	0.62	1.18	0.64	5,078	324	4,321	756	677	67	127	69
12/01/01	8.381	60	2	100	12	9.28	0.38	1.99	0.68	4,194	140	6,990	839	649	27	139	48
12/02/01	7.182	57	2	228	8	10.65	0.41	1.70	0.64	3,414	120	13,657	479	638	25	102	38
12/03/01	6.495	101	3	108	2	10.58	0.43	3.16	0.70	5,471	163	5,850	108	573	23	171	38

Butler Pollutiion Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	CBOD-5 (mg/l) Effluent	TSS (mg/l) Influent	TSS (mg/l) Effluent	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	Total P (mg/l) Influent	Total P (mg/l) Effluent	CBOD-5 (lb/day) Influent	CBOD-5 (lb/day) Effluent	TSS (lb/day) Influent	TSS (lb/day) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
12/04/01	6.328	85	2	126	1	12.30	0.40	3.37	0.80	4,486	106	6,650	53	649	21	178	42
12/05/01	6.068	87	3	148	8	13.46	0.46	3.18	0.90	4,403	152	7,490	405	681	23	161	46
12/06/01	6.337	131	2	152	7	12.30	0.47	3.13	0.93	6,923	106	8,033	370	650	25	165	49
12/07/01	5.811	99	2	96	6	14.00	0.44	2.38	0.88	4,798	97	4,653	291	678	21	115	43
12/08/01	6.706	110	3	140	9	11.55	0.55	3.08	0.95	6,152	168	7,830	503	646	31	172	53
12/09/01	6.117	107	2	152	7	11.70	0.39	3.30	0.93	5,459	102	7,754	357	597	20	168	47
12/10/01	5.787	139	2	184	6	13.30	0.40	3.43	0.91	6,709	97	8,880	290	642	19	166	44
12/11/01	5.368	156	2	144	10	13.92	0.41	3.93	0.91	6,984	90	6,447	448	623	18	176	41
12/12/01	5.864	102	2	136	6	13.92	0.42	3.33	1.05	4,988	98	6,651	293	681	21	163	51
12/13/01	6.652	84	3	116	7	11.70	0.53	2.62	1.25	4,660	166	6,435	388	649	29	145	69
12/14/01	7.256	77	2	88	5	10.58	0.56	2.72	1.21	4,660	121	5,325	303	640	34	165	73
12/15/01	6.424	99	2	100	2	11.70	0.40	3.20	1.09	5,304	107	5,358	107	627	21	171	58
12/16/01	6.475	89	2	120	6	11.40	0.41	4.73	1.24	4,806	108	6,480	324	616	22	255	67
12/17/01	25.888	26	11	104	28	2.82	2.27	1.58	1.10	5,614	2,375	22,454	6,045	609	490	341	237
12/18/01	17.637	24	8	32	13	4.53	1.66	0.90	0.61	3,530	1,177	4,707	1,912	666	244	132	90
12/19/01	11.189	67	4	76	4	7.16	0.23	1.95	0.52	6,252	373	7,092	373	668	21	182	49
12/20/01	8.865	76	2	120	7	8.14	0.24	2.48	0.52	5,619	148	8,872	518	602	18	183	38
12/21/01	7.400	108	2	116	3	9.49	0.34	2.69	0.66	6,665	123	7,159	185	586	21	166	41
12/22/01	6.838	136	2	136	4	10.43	0.39	2.85	1.16	7,756	114	7,756	228	595	22	163	66
12/23/01	6.721	118	3	156	4	10.72	0.45	3.18	1.29	6,614	168	8,744	224	601	25	178	72
12/24/01	6.261	82	2	146	6	12.15	1.34	3.16	2.83	4,282	104	7,624	313	634	70	165	148
12/25/01	5.296	106	3	192	8	14.23	0.45	3.91	1.10	4,682	133	8,480	353	629	20	173	49
12/26/01	5.746	103	3	120	6	15.35	0.62	2.77	1.25	4,936	144	5,751	288	736	30	133	60
12/27/01	5.653	126	3	188	7	14.54	0.67	3.42	1.33	5,940	141	8,863	330	686	32	161	63
12/28/01	5.366	127	3	118	11	15.84	0.81	3.20	1.38	5,684	134	5,281	492	709	36	143	62
12/29/01	5.119	142	3	126	3	16.24	0.72	3.23	1.29	6,062	128	5,379	128	693	31	138	55
12/30/01	5.091	100	3	120	5	15.92	0.73	3.59	1.32	4,246	127	5,095	212	676	31	152	56
12/31/01	5.018	118	3	330	5	16.00	0.61	4.31	1.28	4,938	126	13,811	209	670	26	180	54
01/01/02	4.661	106	3	184	7	15.43	0.59	3.54	1.21	4,121	117	7,153	272	600	23	138	47
01/02/02	4.798	104	3	128	2	15.68	0.61	3.47	1.00	4,162	120	5,122	80	627	24	139	40
01/03/02	4.956	99	3	108	5	16.00	0.78	3.60	0.98	4,092	124	4,464	207	661	32	149	41
01/04/02	4.747	124	2	156	9	16.32	0.64	3.52	1.32	4,909	79	6,176	356	646	25	139	52
01/05/02	4.510	138	2	180	8	16.57	1.15	4.20	2.59	5,191	75	6,770	301	623	43	158	97
01/06/02	4.907	129	3	204	7	15.43	0.58	4.77	1.43	5,279	123	8,349	286	631	24	195	59
01/07/02	5.006	137	3	190	7	15.27	0.58	3.88	1.21	5,720	125	7,933	292	638	24	162	51
01/08/02	4.879	111	3	136	4	16.16	0.59	3.95	1.27	4,517	122	5,534	163	658	24	161	52
01/09/02	4.198	110	2	184	8	15.43	0.68	3.47	1.28	3,851	70	6,442	280	540	24	121	45
01/10/02	6.089	113	3	122	7	13.45	0.80	3.05	1.28	5,738	152	6,195	355	683	41	155	65
01/11/02	5.857	100	2	140	10	12.08	0.69	2.73	1.09	4,885	98	6,839	488	590	34	133	53
01/12/02	5.780	124	2	154	9	12.60	0.57	3.22	1.04	5,977	96	7,424	434	607	27	155	50
01/13/02	5.380	117	3	136	4	13.53	0.54	3.40	0.96	5,250	135	6,102	179	607	24	153	43
01/14/02	5.465	91	2	122	5	14.63	0.56	3.06	0.98	4,148	91	5,561	228	667	26	139	45
01/15/02	4.979	110	3	145	6	15.35	0.53	3.23	1.23	4,568	125	6,021	249	637	22	134	51

Butler Pollution Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l)		TSS (mg/l)		NH3-N (mg/l)		Total P (mg/l)		CBOD-5 (lb/day)		TSS (lb/day)		NH3-N (lb/day)		Total P (lb/day)	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
01/16/02	5.264			68	8	14.47	0.67	3.13	1.25			2,985	351	635	29	137	55
01/17/02	5.169	104	2	92	5	15.19	0.63	2.67	1.07	4,483	86	3,966	216	655	27	115	46
01/18/02	4.929	147	3	156	3	16.00	0.61	3.99	1.08	6,043	123	6,413	123	658	25	164	44
01/19/02	4.884	174	2	172	1	16.48	0.74	5.39	1.64	7,087	81	7,006	41	671	30	220	67
01/20/02	5.071	121	3	160	2	15.52	0.61	4.15	1.33	5,117	127	6,767	85	656	26	176	56
01/21/02	5.533	106	3	106	2	15.92	0.63	4.06	1.32	4,891	138	4,891	92	735	29	187	61
01/22/02	5.449	95	3	166	8	14.81	0.65	3.10	1.25	4,317	136	7,544	364	673	30	141	57
01/23/02	5.679	113	3	138	11	14.16	0.63	3.60	1.36	5,352	142	6,536	521	671	30	171	64
01/24/02	8.833	92	3	104	6	9.28	0.92	2.44	1.25	6,777	221	7,661	442	684	68	180	92
01/25/02	6.973	79	3	116	4	11.70	0.65	2.28	0.98	4,594	174	6,746	233	680	38	133	57
01/26/02	6.310	112	3	96	8	12.08	0.50	2.59	1.11	5,894	158	5,052	421	636	26	136	58
01/27/02	6.028	111	2	200	4	12.00	0.53	3.30	1.07	5,580	101	10,055	201	603	27	166	54
01/28/02	5.904	78	3	140	6	13.76	0.53	2.69	1.09	3,841	148	6,894	295	678	26	132	54
01/29/02	7.134	139	3	151	8	12.08	0.73	3.20	1.25	8,270	178	8,984	476	719	43	190	74
01/30/02	14.254	40	6	54	9	5.66	1.31	1.30	0.97	4,755	713	6,419	1,070	673	156	155	115
01/31/02	12.176	42	3	74	10	5.32	0.54	1.31	0.73	4,265	305	7,515	1,015	540	55	133	74
02/01/02	10.672	44	3	40	6	6.55	1.15	1.31	2.09	3,916	267	3,560	534	583	102	117	186
02/02/02	8.345	92	3	118	5	8.56	0.53	2.12	0.86	6,403	209	8,212	348	596	37	148	60
02/03/02	6.028	111	2	200	4	12.00	0.53	3.30	1.07	5,580	101	10,055	201	603	27	166	54
02/04/02	5.904	78	3	140	6	13.76	0.53	2.69	1.09	3,841	148	6,894	295	678	26	132	54
02/05/02	7.134	139	3	151	8	12.08	0.73	3.20	1.25	8,270	178	8,984	476	719	43	190	74
02/06/02	14.259	40	6	54	9	5.66	1.31	1.30	0.97	4,757	714	6,422	1,070	673	156	155	115
02/07/02	12.176	42	3	74	10	5.32	0.54	1.31	0.73	4,265	305	7,515	1,015	540	55	133	74
02/08/02	10.672	44	3	40	6	6.55	1.15	1.31	2.09	3,916	267	3,560	534	583	102	117	186
02/09/02	8.345	92	3	118	5	8.56	0.53	2.12	0.86	6,403	209	8,212	348	596	37	148	60
02/10/02	7.260	124	3	180	13	11.39	0.94	4.89	1.53	7,508	182	10,899	787	690	57	296	93
02/11/02	6.861	110	3	100	3	11.85	0.79	2.00	1.24	6,294	172	5,722	172	678	45	114	71
02/12/02	6.505	94	4	113	12	12.30	0.64	2.53	1.08	5,100	217	6,130	651	667	35	137	59
02/13/02	5.711	86	4	72	11	13.53	0.60	2.64	1.06	4,096	191	3,429	524	644	29	126	50
02/14/02	5.803	124	3	92	7	14.00	0.62	2.64	1.28	6,001	145	4,453	339	678	30	128	62
02/15/02	5.801	127	3	60	10	11.39	0.59	2.56	1.36	6,144	145	2,903	484	551	29	124	66
02/16/02	5.818	115	3	156	1	12.30	0.97	3.36	1.33	5,580	146	7,569	49	597	47	163	65
02/17/02	5.417	169	3	144	6	14.95	0.47	3.30	1.31	7,635	136	6,506	271	675	21	149	59
02/18/02	5.350	107	2	174	6	15.52	0.49	3.48	1.24	4,774	89	7,764	268	692	22	155	55
02/19/02	5.293	149	3	201	5	15.27	0.56	4.59	1.27	6,577	132	8,873	221	674	25	203	56
02/20/02	7.524	98	3	156	12	12.30	0.82	2.86	1.37	6,150	188	9,789	753	772	51	179	86
02/21/02	8.508	67	2	84	6	8.98	0.79	1.95	1.09	4,754	142	5,960	426	637	56	138	77
02/22/02	10.304	62	2	102	9	10.14	0.56	2.04	0.99	5,328	172	8,765	773	871	48	175	85
02/23/02	6.895	108	4	112	6	10.29	1.21	2.21	2.28	6,210	230	6,440	345	592	70	127	131
02/24/02	6.923	109	3	174	11	11.24	0.47	2.56	1.11	6,293	173	10,046	635	649	27	148	64
02/25/02	7.248	109	3	128	8	12.00	0.53	2.72	1.09	6,589	181	7,737	484	725	32	164	66
02/26/02	7.578	82	2	99	5	11.39	0.52	2.56	1.05	5,182	126	6,257	316	720	33	162	66
02/27/02	6.878	86	3	122	5	11.92	0.45	2.71	0.98	4,933	172	6,998	287	684	26	155	56

Butler Pollution Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l)		TSS (mg/l)		NH3-N (mg/l)		Total P (mg/l)		CBOD-5 (lb/day)		TSS (lb/day)		NH3-N (lb/day)		Total P (lb/day)	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
02/28/02	6.667	164	3	160	4	12.53	0.51	3.22	1.01	9,119	167	8,896	222	697	28	179	56
03/01/02	5.713	108	3	116	9	12.91	0.47	2.76	1.09	5,146	143	5,527	429	615	22	132	52
03/02/02	8.306	112	3	176	12	11.39	0.51	3.26	1.33	7,758	208	12,192	831	789	35	226	92
03/03/02	8.838	87	3	130	10	8.28	0.43	2.24	1.01	6,413	221	9,582	737	610	32	165	74
03/04/02	7.269	88	3	106	9	10.29	0.37	2.48	0.93	5,335	182	6,426	546	624	22	150	56
03/05/02	7.081	77	3	101	7	11.16	0.44	2.15	1.04	4,547	177	5,965	413	659	26	127	61
03/06/02	6.833	89	3	124	8	12.15	0.45	2.56	1.05	5,072	171	7,066	456	692	26	146	60
03/07/02	6.674	92	3	118	9	13.21	0.47	2.72	1.06	5,121	167	6,568	501	735	26	151	59
03/08/02	6.443	164	1	134	4	13.37	0.49	3.19	1.04	8,812	54	7,200	215	718	26	171	56
03/09/02	6.431	122	3	132	10	12.61	0.46	3.29	1.28	6,543	161	7,080	536	676	25	176	69
03/10/02	5.944	133	2	136	5	13.69	0.43	3.25	1.27	6,593	99	6,742	248	679	21	161	63
03/11/02	5.966	206	3	190	5	14.39	0.47	3.91	1.33	10,250	149	9,454	249	716	23	195	66
03/12/02	5.914	138	4	220	8	14.16	0.56	4.03	1.32	6,807	197	10,851	395	698	28	199	65
03/13/02	5.764	126	3	178	7	14.16	0.60	3.48	1.30	6,057	144	8,557	337	681	29	167	62
03/14/02	5.767	128	3	232	9	14.63	0.56	3.94	1.31	6,156	144	11,158	433	704	27	190	63
03/15/02	6.548	123	2	134	2	14.55	0.56	3.30	1.41	6,717	109	7,318	109	795	31	180	77
03/16/02	6.356	122	2	140	8	12.61	0.47	3.11	1.36	6,467	106	7,421	424	668	25	165	72
03/17/02	6.283	126	3	184	7	12.68	0.43	3.97	1.37	6,602	157	9,642	367	664	23	208	72
03/18/02	6.026	121	3	152	8	14.00	0.43	3.36	1.33	6,081	151	7,639	402	704	22	169	67
03/19/02	6.242	123	2	171	5	13.84	0.45	3.35	1.32	6,403	104	8,902	260	720	23	174	69
03/20/02	10.207	86	4	180	5	8.70	1.00	2.59	1.27	7,321	341	15,323	426	741	85	220	108
03/21/02	8.597	95	3	120	6	9.71	0.49	2.46	0.99	6,811	215	8,604	430	696	35	176	71
03/22/02	7.925	106	3	122	7	10.44	0.49	2.60	1.03	7,006	198	8,064	463	690	32	172	68
03/23/02	7.705	96	3	110	6	10.59	0.43	2.56	1.09	6,169	193	7,069	386	681	28	165	70
03/24/02	7.742	86	3	124	9	10.07	0.42	2.72	1.25	5,553	194	8,006	581	650	27	176	81
03/25/02	10.415	94	3	182	7	11.55	0.98	3.17	1.09	8,165	261	15,809	608	1,003	85	275	95
03/26/02	24.932	35	17	84	33	3.60	2.14	1.31	1.11	7,278	3,535	17,466	6,862	749	445	272	231
03/27/02	17.594	49	9	72	16	4.20	1.66	0.89	0.57	7,190	1,321	10,565	2,348	616	244	131	84
03/28/02	12.610	42	4	68	6	6.48	0.42	1.45	0.43	4,417	421	7,151	631	681	44	152	45
03/29/02	11.321	72	3	76	8	7.37	0.41	1.44	0.44	6,798	283	7,176	755	696	39	136	42
03/30/02	9.863	73	3	78	7	7.65	0.45	1.78	0.57	6,005	247	6,416	576	629	37	146	47
03/31/02	8.757	70	3	100	4	8.84	0.49	2.05	0.61	5,112	219	7,303	292	646	36	150	45
04/01/02	8.547	90	3	124	7	10.44	0.65	2.42	0.74	6,415	214	8,839	499	744	46	173	53
04/02/02	8.417	78	3	101	8	10.81	0.77	2.15	0.89	5,475	211	7,090	562	759	54	151	62
04/03/02	8.283	74	3	98	7	10.15	0.77	2.48	0.94	5,112	207	6,770	484	701	53	171	65
04/04/02	7.476	74	3	100	6	11.85	0.79	2.50	0.99	4,614	187	6,235	374	739	49	156	62
04/05/02	7.177	86	3	110	9	12.30	0.86	2.64	1.22	5,148	180	6,584	539	736	51	158	73
04/06/02	6.453	112	4	140	15	12.75	0.76	3.13	1.30	6,028	215	7,535	807	686	41	168	70
04/07/02	6.676	100	3	162	13	12.08	0.63	3.36	1.33	5,568	167	9,020	724	673	35	187	74
04/08/02	6.823	88	3	146	10	13.38	0.73	2.84	1.31	5,008	171	8,308	569	761	42	162	75
04/09/02	7.622	75	3	134	7	11.70	0.76	2.73	1.27	4,768	191	8,518	445	744	48	174	81
04/10/02	6.868	68	3	106	5	12.30	0.65	2.17	1.06	3,895	172	6,072	286	705	37	124	61
04/11/02	6.576	92	3	152	7	13.53	0.53	2.80	1.27	5,046	165	8,336	384	742	29	154	70

Butler Pollutiion Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	CBOD-5 (mg/l) Effluent	TSS (mg/l) Influent	TSS (mg/l) Effluent	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	Total P (mg/l) Influent	Total P (mg/l) Effluent	CBOD-5 (lb/day) Influent	CBOD-5 (lb/day) Effluent	TSS (lb/day) Influent	TSS (lb/day) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
04/12/02	6.643	131	3	124	6	14.00	0.65	2.77	1.12	7,258	166	6,870	332	776	36	153	62
04/13/02	9.164	81	3	136	7	9.64	0.83	2.53	1.28	6,191	229	10,394	535	737	63	193	98
04/14/02	30.579	41	7	130	17	6.27	1.57	2.21	1.00	10,456	1,785	33,154	4,335	1,599	400	564	255
04/15/02	16.122	32	5	42	10	4.80	1.22	1.13	0.69	4,303	672	5,647	1,345	645	164	152	93
04/16/02	11.348	39	3	65	7	6.61	0.32	1.47	0.65	3,691	284	6,152	662	626	30	139	62
04/17/02	9.684	50	2	92	6	7.86	0.34	1.80	0.65	4,038	162	7,430	485	635	27	145	52
04/18/02	8.583	68	3	102	6	8.91	0.41	2.07	0.78	4,868	215	7,301	429	638	29	148	56
04/19/02	7.996	82	2	112	7	10.66	0.42	2.51	0.94	5,468	133	7,469	467	711	28	167	63
04/20/02	7.360	87	2	118	8	10.81	0.41	2.20	1.06	5,340	123	7,243	491	664	25	135	65
04/21/02	7.195	104	2	184	6	11.56	0.43	2.80	1.02	6,241	120	11,041	360	694	26	168	61
04/22/02	6.785	85	3	124	4	13.69	0.45	2.61	0.95	4,810	170	7,017	226	775	25	148	54
04/23/02	6.441	112	11	142	5	14.00	0.57	2.88	0.82	6,016	591	7,628	269	752	31	155	44
04/24/02	6.541	120	8	208	11	13.84	0.53	3.45	0.93	6,546	436	11,347	600	755	29	188	51
04/25/02	6.338	118	3	226	5	13.69	0.49	3.39	1.08	6,237	159	11,946	264	724	26	179	57
04/26/02	6.031	122	3	148	8	13.77	0.46	3.39	0.93	6,136	151	7,444	402	693	23	171	47
04/27/02	6.387	119	2	160	9	12.75	0.43	3.26	0.97	6,339	107	8,523	479	679	23	174	52
04/28/02	8.867	86	3	192	10	9.42	0.61	3.19	0.99	6,360	222	14,199	740	697	45	236	73
04/29/02	7.259	99	1	144	6	11.55	0.35	2.72	0.70	5,993	61	8,718	363	699	21	165	42
04/30/02	7.366	79	2	136	6	8.14	0.43	2.53	0.77	4,853	123	8,355	369	500	26	155	47
05/01/02	7.660	76	2	194	6	11.70	0.46	2.72	0.75	4,855	128	12,394	383	747	29	174	48
05/02/02	9.668			104	5	8.70	0.54	2.06	0.88			8,386	403	701	44	166	71
05/03/02	7.515	92	2	126	10	11.25	0.41	2.64	0.71	5,766	125	7,897	627	705	26	165	44
05/04/02	6.810	192	3	128	7	11.85	0.45	2.65	0.87	10,905	170	7,270	398	673	26	151	49
05/05/02	6.626	90	2	192	9	11.55	0.47	3.38	0.90	4,973	111	10,610	497	638	26	187	50
05/06/02	6.487	124	2	188	6	12.75	0.49	3.28	0.89	6,709	108	10,171	325	690	27	177	48
05/07/02	6.713	92	2	142	7	13.53	0.54	2.81	0.94	5,151	112	7,950	392	757	30	157	53
05/08/02	7.073	89	1	194	3	11.93	0.72	3.35	0.95	5,250	59	11,444	177	704	42	198	56
05/09/02	7.020	78	3	134	6	12.60	0.54	3.41	1.03	4,567	176	7,845	351	738	32	200	60
05/10/02	6.324	124	2	150	5	10.38	0.47	3.19	0.93	6,540	105	7,911	264	547	25	168	49
05/11/02	5.477	119	2	115	6	12.15	0.45	2.86	1.03	5,436	91	5,253	274	555	21	131	47
05/12/02	12.795	73	3	152	7	7.65	0.66	2.56	1.08	7,790	320	16,220	747	816	70	273	115
05/13/02	23.857	30	11	38	24	3.33	2.43	0.91	0.71	5,969	2,189	7,561	4,775	663	483	181	141
05/14/02	17.703	24	5	40	9	3.87	0.74	0.92	0.47	3,543	738	5,906	1,329	571	109	136	69
05/15/02	11.575	41	3	52	4	5.66	0.33	1.32	0.42	3,958	290	5,020	386	546	32	127	41
05/16/02	9.967	46	2	68	6	7.44	0.37	1.54	0.47	3,824	166	5,652	499	618	31	128	39
05/17/02	14.725	50	4	48	12	6.69	0.81	1.88	0.57	6,140	491	5,895	1,474	822	99	231	70
05/18/02	18.217	33	5	58	11	3.72	1.65	1.13	0.63	5,014	760	8,812	1,671	565	251	172	96
05/19/02	11.940	41	3	52	8	5.14	0.41	1.24	0.58	4,083	299	5,178	797	512	41	123	58
05/20/02	9.970	42	3	56	6	7.03	0.40	1.46	0.54	3,492	249	4,656	499	585	33	121	45
05/21/02	8.769	50	3	79	5	8.66	0.57	1.86	0.58	3,657	219	5,778	366	633	42	136	42
05/22/02	7.980	13	2	88	6	9.41	0.68	2.15	0.56	865	133	5,857	399	626	45	143	37
05/23/02	7.987	77	2	164	7	10.00	0.79	2.80	0.61	5,129	133	10,924	466	666	53	187	41
05/24/02	7.007	91	2	134	8	11.85	0.76	2.77	0.63	5,318	117	7,831	468	692	44	162	37

Butler Pollution Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	CBOD-5 (mg/l) Effluent	TSS (mg/l) Influent	TSS (mg/l) Effluent	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	Total P (mg/l) Influent	Total P (mg/l) Effluent	CBOD-5 (lb/day) Influent	CBOD-5 (lb/day) Effluent	TSS (lb/day) Influent	TSS (lb/day) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
05/25/02	6.677	98	2	124	3	11.70	0.65	2.67	0.69	5,457	111	6,905	167	652	36	149	38
05/26/02	6.365			112	3	11.78	0.68	2.61	0.71			5,945	159	625	36	139	38
05/27/02	6.170	78	2	138	4	12.00	0.60	2.72	0.68	4,014	103	7,101	206	617	31	140	35
05/28/02	6.956	74	2	121	7	11.63	0.49	2.56	0.75	4,293	116	7,020	406	675	28	149	44
05/29/02	6.300	94	2	186	6	12.60	0.53	3.48	0.77	4,939	105	9,773	315	662	28	183	40
05/30/02	6.960	90	2	174	4	11.18	0.48	3.22	0.71	5,224	116	10,100	232	649	28	187	41
05/31/02	8.918	52	2	172	4	9.42	0.74	2.01	0.73	3,868	149	12,793	298	701	55	149	54
06/01/02	7.434	68	2	120	7	9.42	0.45	1.98	0.65	4,216	124	7,440	434	584	28	123	40
06/02/02	6.256	86	2	136	6	11.70	0.37	2.80	0.68	4,487	104	7,096	313	610	19	146	35
06/03/02	6.064	70	2	128	5	13.53	0.40	2.75	0.80	3,540	101	6,473	253	684	20	139	40
06/04/02	6.467	86	2	128	4	12.45	0.46	3.19	0.80	4,638	108	6,904	216	671	25	172	43
06/05/02	7.886	87	2	176	4	9.71	0.53	3.16	0.93	5,722	132	11,575	263	639	35	208	61
06/06/02	23.100	25	8	44	13	3.07	2.01	1.15	0.78	4,816	1,541	8,477	2,505	591	387	222	150
06/07/02	13.470	38	2	56	7	5.39	0.62	1.25	0.41	4,269	225	6,291	786	606	70	140	46
06/08/02	9.510	46	2	78	5	6.68	0.32	1.45	0.46	3,648	159	6,186	397	530	25	115	36
06/09/02	8.089	61	2	138	3	8.28	0.37	2.48	0.51	4,115	135	9,310	202	559	25	167	34
06/10/02	7.417	72	2	112	2	10.72	0.48	2.13	0.61	4,454	124	6,928	124	663	30	132	38
06/11/02	6.966	46	2	138	9	11.33	0.93	2.78	0.64	2,672	116	8,017	523	658	54	162	37
06/12/02	6.631	101	2	174	5	12.15	0.47	3.16	0.68	5,586	111	9,623	277	672	26	175	38
06/13/02	6.793	126	2	222	7	12.45	0.49	3.80	0.80	7,138	113	12,577	397	705	28	215	45
06/14/02	7.986	95	2	172	5	10.51	0.46	3.33	0.89	6,327	133	11,456	333	700	31	222	59
06/15/02	7.985	78	2	106	9	10.58	0.47	2.51	0.92	5,194	133	7,059	599	705	31	167	61
06/16/02	6.989	93	2	186	7	10.65	0.41	3.16	0.91	5,421	117	10,842	408	621	24	184	53
06/17/02	6.551			164	5	13.22	0.44	4.00	0.89			8,960	273	722	24	219	49
06/18/02	6.076	110	3	166	6	13.38	0.49	3.27	0.89	5,574	152	8,412	304	678	25	166	45
06/19/02	5.922	92	2	180	5	13.22	0.55	3.33	0.99	4,544	99	8,890	247	653	27	164	49
06/20/02	5.701	142	2	214	2	13.14	0.43	4.02	0.99	6,752	95	10,175	95	625	20	191	47
06/21/02	5.574	94	2	170	11	14.81	0.55	3.80	1.06	4,370	93	7,903	511	688	26	177	49
06/22/02	5.429	162	2	152		14.00	0.88	3.45	2.40	7,335	91	6,882		634	40	156	109
06/23/02	4.825	133	2	238	3	14.16	0.59	4.67	1.25	5,352	80	9,577	121	570	24	188	50
06/24/02	5.941	117	2	254	3	14.00	0.80	4.02	1.24	5,797	99	12,585	149	694	40	199	61
06/25/02	5.592	100	2	188	4	14.16	0.65	4.11	1.29	4,664	93	8,768	187	660	30	192	60
06/26/02	5.583	117	2	180	5	15.52	0.65	3.42	1.21	5,448	93	8,381	233	723	30	159	56
06/27/02	6.311	94	2	168	6	13.69	0.62	3.25	1.21	4,948	105	8,842	316	721	33	171	64
06/28/02	5.916	147	2	208	4	14.31	0.63	4.06	1.27	7,253	99	10,263	197	706	31	200	63
06/29/02	5.255	138	2	162	2	14.47	0.58	3.52	1.28	6,048	88	7,100	88	634	25	154	56
06/30/02	5.271	126	2	216	3	15.35	0.53	4.18	1.33	5,539	88	9,495	132	675	23	184	58
07/01/02	5.350	114	1	206	2	15.43	0.53	4.02	1.31	5,087	45	9,192	89	688	24	179	58
07/02/02	5.303	151	2	176	3	15.68	0.60	4.04	1.30	6,678	88	7,784	133	693	27	179	57
07/03/02	5.296	156	2	268	4	15.68	0.53	4.22	1.33	6,890	88	11,837	177	693	23	186	59
07/04/02	4.891	164	2	212	3	14.62	0.48	3.98	1.33	6,690	82	8,648	122	596	20	162	54
07/05/02	4.929	176	1	224	3	15.84	0.51	4.33	1.39	7,235	41	9,208	123	651	21	178	57
07/06/02	4.690	169	2	202	4	15.35	0.53	4.15	1.61	6,610	78	7,901	156	600	21	162	63

Butler Pollutiion Control Plant
Daily Operating Results - 7/28/01 to 7/27/02

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	CBOD-5 (mg/l) Effluent	TSS (mg/l) Influent	TSS (mg/l) Effluent	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	Total P (mg/l) Influent	Total P (mg/l) Effluent	CBOD-5 (lb/day) Influent	CBOD-5 (lb/day) Effluent	TSS (lb/day) Influent	TSS (lb/day) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
07/07/02	4.790	165	2	216	4	15.52	0.52	4.31	1.59	6,592	80	8,629	160	620	21	172	64
07/08/02	5.054	235	2	240	2	18.17	0.58	5.83	1.60	9,905	84	10,116	84	766	24	246	67
07/09/02	5.415	189	1	232	2	14.54	0.56	5.04	1.36	8,535	45	10,477	90	657	25	228	61
07/10/02	4.951	178	2	184	3	16.08	0.55	4.31	1.43	7,350	83	7,598	124	664	23	178	59
07/11/02	4.943	176	2	256	4	16.48	0.53	4.76	1.41	7,256	82	10,554	165	679	22	196	58
07/12/02	4.779	199	2	216	3	16.08	0.50	5.00	1.40	7,932	80	8,609	120	641	20	199	56
07/13/02	4.757	174	1	216	1	15.68	0.46	4.28	1.43	6,903	40	8,569	40	622	18	170	57
07/14/02	4.764	180	2	224	2	15.60	0.43	4.42	1.43	7,152	79	8,900	79	620	17	176	57
07/15/02	5.098	229	2	184	5	16.48	0.65	4.80	1.41	9,736	85	7,823	213	701	28	204	60
07/16/02	4.577	174	2	220	4	16.56	0.55	4.37	1.35	6,642	76	8,398	153	632	21	167	52
07/17/02	4.818	181	2	216	8	16.56	0.52	4.72	1.37	7,273	80	8,679	321	665	21	190	55
07/18/02	4.841	177	2	218	6	17.58	0.51	4.82	1.41	7,146	81	8,802	242	710	21	195	57
07/19/02	5.059	162	1	196	1	15.92	0.59	4.39	1.59	6,835	42	8,270	42	672	25	185	67
07/20/02	4.628	165	1	164	4	15.44	0.81	4.15	2.46	6,369	39	6,330	154	596	31	160	95
07/21/02	4.565	141	1	156	1	15.52	0.45	3.54	1.62	5,368	38	5,939	38	591	17	135	62
07/22/02	4.778	157	1	186	3	15.84	0.52	4.13	1.59	6,256	40	7,412	120	631	21	165	63
07/23/02	4.830	152	1	207	4	16.40	0.48	4.28	1.62	6,123	40	8,338	161	661	19	172	65
07/24/02	4.728	152	1	218	3	16.48	0.45	4.35	1.59	5,994	39	8,596	118	650	18	172	63
07/25/02	4.925	145	2	216	3	16.16	0.43	4.39	1.39	5,956	82	8,872	123	664	18	180	57
07/26/02	5.677	167	1	228	4	14.16	0.55	4.18	1.40	7,907	47	10,795	189	670	26	198	66
07/27/02	4.896	180	2	220	7	14.86	0.43	4.24	1.39	7,350	82	8,983	286	607	18	173	57
Ave	6.678	106	2.51	152	6.1	12.85	0.58	3.18	1.06	5,276	173	7,696	405	642	38	159	56
Max	30.579	235	17	330	33	20.35	2.43	5.83	6.00	13,951	3,535	33,154	6,862	1,889	490	564	261
Min	3.310	13	1	8	1	2.82	0.23	0.07	0.41	778	28	313	31	423	8	3	20
Design	10.000	153		180		15		30.7		12,750		15,000		1,251		2,560	
NPDES Limit																	
May to Oct.	10.000		12		30		2		2		1001		2502		167		167
Nov. to April	10.000		24		30		6		2		2002		2502		500		167
Average as % of Design	67%	70%		85%		86%		10%		41.4%		51.3%	16.2%	51.3%		6.2%	
Days Exceeded	34									1		9		3		0	
% Exceeded	9.32%									0.27%		2.47%		0.82%		0.00%	

APPENDIX B

Butler Pollution Control Plant
High Flow Operating Results for CBOD-5

Date	Flow (mgd)	CBOD-5 (mg/l) Influent	Effluent	CBOD-5 (lb/day) Influent	Effluent	Percent Removal
04/14/02	30.579	41	7	10,456	1,785	82.9%
12/17/01	25.888	26	11	5,614	2,375	57.7%
03/26/02	24.932	35	17	7,278	3,535	51.4%
05/13/02	23.857	30	11	5,969	2,189	63.3%
06/06/02	23.100	25	8	4,816	1,541	68.0%
05/18/02	18.217	33	5	5,014	760	84.8%
05/14/02	17.703	24	5	3,543	738	79.2%
12/18/01	17.637	24	8	3,530	1,177	66.7%
03/27/02	17.594	49	9	7,190	1,321	81.6%
04/15/02	16.122	32	5	4,303	672	84.4%
10/23/01	16.085	104	8	13,951	1,073	92.3%
05/17/02	14.725	50	4	6,140	491	92.0%
02/06/02	14.259	40	6	4,757	714	85.0%
01/30/02	14.254	40	6	4,755	713	85.0%
06/07/02	13.470	38	2	4,269	225	94.7%
08/31/01	13.172	72	4	7,910	439	94.4%
10/24/01	13.101	39	4	4,261	437	89.7%
11/30/01	12.954	47	3	5,078	324	93.6%
05/12/02	12.795	73	3	7,790	320	95.9%
03/28/02	12.610	42	4	4,417	421	90.5%
01/31/02	12.176	42	3	4,265	305	92.9%
02/07/02	12.176	42	3	4,265	305	92.9%
05/19/02	11.940	41	3	4,083	299	92.7%
05/15/02	11.575	41	3	3,958	290	92.7%
11/25/01	11.518	62	5	5,956	480	91.9%
04/16/02	11.348	39	3	3,691	284	92.3%
03/29/02	11.321	72	3	6,798	283	95.8%
11/24/01	11.206	100	2	9,346	187	98.0%
12/19/01	11.189	67	4	6,252	373	94.0%
02/01/02	10.672	44	3	3,916	267	93.2%
02/08/02	10.672	44	3	3,916	267	93.2%
03/25/02	10.415	94	3	8,165	261	96.8%
02/22/02	10.304	62	2	5,328	172	96.8%
03/20/02	10.207	86	4	7,321	341	95.3%

Butler Pollution Control Plant
High Flow Operating Results for Suspended Solids

Date	Flow (mgd)	SS (mg/l) Influent	SS (mg/l) Effluent	SS (lb/day) Influent	SS (lb/day) Effluent	Percent Removal
04/14/02	30.579	130	17	33,154	4,335	86.9%
12/17/01	25.888	104	28	22,454	6,045	73.1%
03/26/02	24.932	84	33	17,466	6,862	60.7%
05/13/02	23.857	38	24	7,561	4,775	36.8%
06/06/02	23.100	44	13	8,477	2,505	70.5%
05/18/02	18.217	58	11	8,812	1,671	81.0%
05/14/02	17.703	40	9	5,906	1,329	77.5%
12/18/01	17.637	32	13	4,707	1,912	59.4%
03/27/02	17.594	72	16	10,565	2,348	77.8%
04/15/02	16.122	42	10	5,647	1,345	76.2%
10/23/01	16.085	200	25	26,830	3,354	87.5%
05/17/02	14.725	48	12	5,895	1,474	75.0%
02/06/02	14.259	54	9	6,422	1,070	83.3%
01/30/02	14.254	54	9	6,419	1,070	83.3%
06/07/02	13.470	56	7	6,291	786	87.5%
08/31/01	13.172	140	7	15,380	769	95.0%
10/24/01	13.101	28	8	3,059	874	71.4%
11/30/01	12.954	40	7	4,321	756	82.5%
05/12/02	12.795	152	7	16,220	747	95.4%
03/28/02	12.610	68	6	7,151	631	91.2%
01/31/02	12.176	74	10	7,515	1,015	86.5%
02/07/02	12.176	74	10	7,515	1,015	86.5%
05/19/02	11.940	52	8	5,178	797	84.6%
05/15/02	11.575	52	4	5,020	386	92.3%
11/25/01	11.518	48	15	4,611	1,441	68.8%
04/16/02	11.348	65	7	6,152	662	89.2%
03/29/02	11.321	76	8	7,176	755	89.5%
11/24/01	11.206	168	9	15,701	841	94.6%
12/19/01	11.189	76	4	7,092	373	94.7%
02/01/02	10.672	40	6	3,560	534	85.0%
02/08/02	10.672	40	6	3,560	534	85.0%
03/25/02	10.415	182	7	15,809	608	96.2%
02/22/02	10.304	102	9	8,765	773	91.2%
03/20/02	10.207	180	5	15,323	426	97.2%

Butler Pollutiion Control Plant
High Flow Operating Results for Ammonia Nitrogen

Date	Flow (mgd)	NH3-N (mg/l) Influent	NH3-N (mg/l) Effluent	NH3-N (lb/day) Influent	NH3-N (lb/day) Effluent
04/14/02	30.579	6.27	1.57	1,599	400
12/17/01	25.888	2.82	2.27	609	490
03/26/02	24.932	3.60	2.14	749	445
05/13/02	23.857	3.33	2.43	663	483
06/06/02	23.100	3.07	2.01	591	387
05/18/02	18.217	3.72	1.65	565	251
05/14/02	17.703	3.87	0.74	571	109
12/18/01	17.637	4.53	1.66	666	244
03/27/02	17.594	4.20	1.66	616	244
04/15/02	16.122	4.80	1.22	645	164
10/23/01	16.085	14.08	1.57	1,889	211
05/17/02	14.725	6.69	0.81	822	99
02/06/02	14.259	5.66	1.31	673	156
01/30/02	14.254	5.66	1.31	673	156
06/07/02	13.470	5.39	0.62	606	70
08/31/01	13.172	10.36	1.97	1,138	216
10/24/01	13.101	4.90	0.96	535	105
11/30/01	12.954	6.27	0.62	677	67
05/12/02	12.795	7.65	0.66	816	70
03/28/02	12.610	6.48	0.42	681	44
01/31/02	12.176	5.32	0.54	540	55
02/07/02	12.176	5.32	0.54	540	55
05/19/02	11.940	5.14	0.41	512	41
05/15/02	11.575	5.66	0.33	546	32
11/25/01	11.518	7.72	1.45	742	139
04/16/02	11.348	6.61	0.32	626	30
03/29/02	11.321	7.37	0.41	696	39
11/24/01	11.206	15.68	0.65	1,465	61
12/19/01	11.189	7.16	0.23	668	21
02/01/02	10.672	6.55	1.15	583	102
02/08/02	10.672	6.55	1.15	583	102
03/25/02	10.415	11.55	0.98	1,003	85
02/22/02	10.304	10.14	0.56	871	48
03/20/02	10.207	8.70	1.00	741	85

Butler Pollution Control Plant
High Flow Operating Results for Total Phosphorus

Date	Flow (mgd)	Total P (mg/l) Influent	Total P (mg/l) Effluent	Total P (lb/day) Influent	Total P (lb/day) Effluent
04/14/02	30.579	2.21	1.00	564	255
12/17/01	25.888	1.58	1.10	341	237
03/26/02	24.932	1.31	1.11	272	231
05/13/02	23.857	0.91	0.71	181	141
06/06/02	23.100	1.15	0.78	222	150
05/18/02	18.217	1.13	0.63	172	96
05/14/02	17.703	0.92	0.47	136	69
12/18/01	17.637	0.90	0.61	132	90
03/27/02	17.594	0.89	0.57	131	84
04/15/02	16.122	1.13	0.69	152	93
10/23/01	16.085	3.55	1.27	476	170
05/17/02	14.725	1.88	0.57	231	70
02/06/02	14.259	1.30	0.97	155	115
01/30/02	14.254	1.30	0.97	155	115
06/07/02	13.470	1.25	0.41	140	46
08/31/01	13.172	2.53	0.90	278	99
10/24/01	13.101	1.44	0.57	157	62
11/30/01	12.954	1.18	0.64	127	69
05/12/02	12.795	2.56	1.08	273	115
03/28/02	12.610	1.45	0.43	152	45
01/31/02	12.176	1.31	0.73	133	74
02/07/02	12.176	1.31	0.73	133	74
05/19/02	11.940	1.24	0.58	123	58
05/15/02	11.575	1.32	0.42	127	41
11/25/01	11.518	1.95	0.78	187	75
04/16/02	11.348	1.47	0.65	139	62
03/29/02	11.321	1.44	0.44	136	42
11/24/01	11.206	2.65	1.10	248	103
12/19/01	11.189	1.95	0.52	182	49
02/01/02	10.672	1.31	2.09	117	186
02/08/02	10.672	1.31	2.09	117	186
03/25/02	10.415	3.17	1.09	275	95
02/22/02	10.304	2.04	0.99	175	85
03/20/02	10.207	2.59	1.27	220	108

APPENDIX C

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate 25.00 mgd 1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:
1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:
1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:
1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.20	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.80	feet	OK
2	Grit Tank Water Elevation	976.73	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	975.33	feet	
	Difference Between Water Elevations	1.40	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	1.42	feet	OK
3	Primary Clarifier Water Elevation	974.74	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.21	feet	
	Difference Between Weir and Trough Elevations	0.39	feet	OK
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	2.01	feet	OK
4	Water Elevation Downstream of Parshall Flume	971.36	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	0.94	feet	
	Ha Depth	2.11	feet	
	Submergence (Hb / Ha)	44.6%		OK

	Water Elevation Upstream of Parshall Flume	972.53	feet	
	Parshall Flume Channel Top of Wall Elevation	976.75	feet	
	Freeboard in Parshall Flume Channel	4.22	feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.04	feet	
	TF Distribution Box Water Elevation - DS of Weir	999.44	feet	
	TF Distribution Box Weir Elevation	1,001.00	feet	
	Difference Between Weir and Water Elevations	1.56	feet	OK
	TF Distribution Box Top of Wall Elevation	1,003.50	feet	
	Freeboard in TF Distribution Box	1.46	feet	OK
6	Aeration Tank 705-4 Water Elevation	982.12	feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00	feet	
	Freeboard in Aeration Tanks	3.88	feet	OK
6	Secondary Clarifier Water Elevation	981.92	feet	
	Secondary Clarifier Weir Elevation - Apex	981.79	feet	
	Water Elevation in Weir Trough	981.22	feet	
	Difference Between Weir and Water Elevations	0.57	feet	OK
	Secondary Clarifier Top of Wall Elevation	986.00	feet	
	Freeboard in Secondary Clarifiers	4.08	feet	OK
7	Reactor Clarifier Water Elevation	980.29	feet	
	Reactor Clarifier Weir Elevation - Apex	980.17	feet	
	Water Elevation in Weir Trough	979.72	feet	
	Difference Between Weir and Water Elevations	0.45	feet	OK
	Reactor Clarifier Top of Wall Elevation	985.00	feet	
	Freeboard in Reactor Clarifiers	4.71	feet	OK
8	Chlorine Contact Tank 709 Water Elevation	977.96	feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 709	2.74	feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	977.89	feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-1	2.81	feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.66	feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	975.09	feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08	feet	
	Difference Between Weir and Water Elevations	1.99	feet	OK
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00	feet	
	Freeboard in Effluent Bypass Chamber 729	7.34	feet	OK
	Flow to Chlorine Contact Tank 710-2	65.43%		
	Bypass Flow to Plant Outfall Chamber 733	34.57%		
11	Chlorine Contact Tank 710-2 Water Elevation	977.50	feet	

	Water Elevation in Discharge Pipe - DS of Weir	975.26	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	1.62	feet	OK
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.20	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	975.04	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	9.96	feet	OK
	Flow Through 24-inch Pipe	19.01%		
	Flow Through 30-inch Pipe	32.10%		
	Flow Through 36-inch Pipe	48.90%		
13	Effluent Collection Chamber 734 Water Elevation	974.50	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	10.75	feet	OK

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate 28.15 mgd 1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:

1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:

1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:

1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.35	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.65	feet	OK
2	Grit Tank Water Elevation	976.77	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	975.48	feet	
	Difference Between Water Elevations	1.30	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	1.27	feet	OK
3	Primary Clarifier Water Elevation	974.74	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.34	feet	
	Difference Between Weir and Trough Elevations	0.26	feet	OK
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	2.01	feet	OK
4	Water Elevation Downstream of Parshall Flume	971.52	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	1.10	feet	
	Ha Depth	2.28	feet	
	Submergence (Hb / Ha)	48.1%		OK

	Water Elevation Upstream of Parshall Flume	972.70	feet	
	Parshall Flume Channel Top of Wall Elevation	976.75	feet	
	Freeboard in Parshall Flume Channel	4.05	feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.12	feet	
	TF Distribution Box Water Elevation - DS of Weir	1,000.26	feet	
	TF Distribution Box Weir Elevation	1,001.00	feet	
	Difference Between Weir and Water Elevations	0.74	feet	OK
	TF Distribution Box Top of Wall Elevation	1,003.50	feet	
	Freeboard in TF Distribution Box	1.38	feet	OK
6	Aeration Tank 705-4 Water Elevation	982.17	feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00	feet	
	Freeboard in Aeration Tanks	3.83	feet	OK
6	Secondary Clarifier Water Elevation	981.93	feet	
	Secondary Clarifier Weir Elevation - Apex	981.79	feet	
	Water Elevation in Weir Trough	981.38	feet	
	Difference Between Weir and Water Elevations	0.41	feet	OK
	Secondary Clarifier Top of Wall Elevation	986.00	feet	
	Freeboard in Secondary Clarifiers	4.07	feet	OK
7	Reactor Clarifier Water Elevation	980.29	feet	
	Reactor Clarifier Weir Elevation - Apex	980.17	feet	
	Water Elevation in Weir Trough	979.84	feet	
	Difference Between Weir and Water Elevations	0.33	feet	OK
	Reactor Clarifier Top of Wall Elevation	985.00	feet	
	Freeboard in Reactor Clarifiers	4.71	feet	OK
8	Chlorine Contact Tank 709 Water Elevation	978.11	feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 709	2.59	feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	978.02	feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-1	2.68	feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.73	feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	975.63	feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08	feet	
	Difference Between Weir and Water Elevations	1.45	feet	OK
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00	feet	
	Freeboard in Effluent Bypass Chamber 729	7.27	feet	OK
	Flow to Chlorine Contact Tank 710-2	63.62%		
	Bypass Flow to Plant Outfall Chamber 733	36.38%		
11	Chlorine Contact Tank 710-2 Water Elevation	977.54	feet	

	Water Elevation in Discharge Pipe - DS of Weir	975.82	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	1.06	feet	OK
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.16	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	975.56	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	9.44	feet	OK
	Flow Through 24-inch Pipe	19.02%		
	Flow Through 30-inch Pipe	32.10%		
	Flow Through 36-inch Pipe	48.88%		
13	Effluent Collection Chamber 734 Water Elevation	974.88	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	10.37	feet	OK

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate 30.00 mgd 1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:
1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:
1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:
1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.43	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.57	feet	OK
2	Grit Tank Water Elevation	976.80	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	975.57	feet	
	Difference Between Water Elevations	1.23	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	1.18	feet	OK
3	Primary Clarifier Water Elevation	974.75	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.42	feet	
	Difference Between Weir and Trough Elevations	0.18	feet	OK
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	2.00	feet	OK
4	Water Elevation Downstream of Parshall Flume	971.61	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	1.19	feet	
	Ha Depth	2.37	feet	
	Submergence (Hb / Ha)	50.4%		OK

	Water Elevation Upstream of Parshall Flume	972.79	feet	
	Parshall Flume Channel Top of Wall Elevation	976.75	feet	
	Freeboard in Parshall Flume Channel	3.96	feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.17	feet	
	TF Distribution Box Water Elevation - DS of Weir	1,000.54	feet	
	TF Distribution Box Weir Elevation	1,001.00	feet	
	Difference Between Weir and Water Elevations	0.46	feet	OK
	TF Distribution Box Top of Wall Elevation	1,003.50	feet	
	Freeboard in TF Distribution Box	1.33	feet	OK
6	Aeration Tank 705-4 Water Elevation	982.21	feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00	feet	
	Freeboard in Aeration Tanks	3.79	feet	OK
6	Secondary Clarifier Water Elevation	981.94	feet	
	Secondary Clarifier Weir Elevation - Apex	981.79	feet	
	Water Elevation in Weir Trough	981.47	feet	
	Difference Between Weir and Water Elevations	0.32	feet	OK
	Secondary Clarifier Top of Wall Elevation	986.00	feet	
	Freeboard in Secondary Clarifiers	4.06	feet	OK
7	Reactor Clarifier Water Elevation	980.29	feet	
	Reactor Clarifier Weir Elevation - Apex	980.17	feet	
	Water Elevation in Weir Trough	979.95	feet	
	Difference Between Weir and Water Elevations	0.22	feet	OK
	Reactor Clarifier Top of Wall Elevation	985.00	feet	
	Freeboard in Reactor Clarifiers	4.71	feet	OK
8	Chlorine Contact Tank 709 Water Elevation	978.21	feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 709	2.49	feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	978.10	feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-1	2.60	feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.77	feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	975.98	feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08	feet	
	Difference Between Weir and Water Elevations	1.10	feet	OK
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00	feet	
	Freeboard in Effluent Bypass Chamber 729	7.23	feet	OK
	Flow to Chlorine Contact Tank 710-2	62.64%		
	Bypass Flow to Plant Outfall Chamber 733	37.36%		
11	Chlorine Contact Tank 710-2 Water Elevation	977.56	feet	

	Water Elevation in Discharge Pipe - DS of Weir	976.18	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	0.70	feet	OK
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.14	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	975.90	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	9.10	feet	OK
	Flow Through 24-inch Pipe	19.02%		
	Flow Through 30-inch Pipe	32.10%		
	Flow Through 36-inch Pipe	48.88%		
13	Effluent Collection Chamber 734 Water Elevation	975.12	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	10.13	feet	OK

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate | 33.00 | mgd | 1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:

1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:

1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:

1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.57	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.43	feet	OK
2	Grit Tank Water Elevation	976.84	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	975.73	feet	
	Difference Between Water Elevations	1.11	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	1.02	feet	OK
3	Primary Clarifier Water Elevation	974.75	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.56	feet	
	Difference Between Weir and Trough Elevations	0.04	feet	WARNING - WEIR SUBMERGED
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	2.00	feet	OK
4	Water Elevation Downstream of Parshall Flume	971.79	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	1.37	feet	
	Ha Depth	2.52	feet	
	Submergence (Hb / Ha)	54.2%		OK

	Water Elevation Upstream of Parshall Flume	972.94 feet	
	Parshall Flume Channel Top of Wall Elevation	976.75 feet	
	Freeboard in Parshall Flume Channel	3.81 feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.25 feet	
	TF Distribution Box Water Elevation - DS of Weir	1,001.04 feet	
	TF Distribution Box Weir Elevation	1,001.00 feet	
	Difference Between Weir and Water Elevations	(0.04) feet	WARNING - WEIR SUBMERGED
	TF Distribution Box Top of Wall Elevation	1,003.50 feet	
	Freeboard in TF Distribution Box	1.25 feet	OK
6	Aeration Tank 705-4 Water Elevation	982.27 feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00 feet	
	Freeboard in Aeration Tanks	3.73 feet	OK
6	Secondary Clarifier Water Elevation	981.94 feet	
	Secondary Clarifier Weir Elevation - Apex	981.79 feet	
	Water Elevation in Weir Trough	981.62 feet	
	Difference Between Weir and Water Elevations	0.17 feet	OK
	Secondary Clarifier Top of Wall Elevation	986.00 feet	
	Freeboard in Secondary Clarifiers	4.06 feet	OK
7	Reactor Clarifier Water Elevation	980.30 feet	
	Reactor Clarifier Weir Elevation - Apex	980.17 feet	
	Water Elevation in Weir Trough	980.21 feet	
	Difference Between Weir and Water Elevations	(0.04) feet	WARNING - WEIR SUBMERGED
	Reactor Clarifier Top of Wall Elevation	985.00 feet	
	Freeboard in Reactor Clarifiers	4.70 feet	OK
8	Chlorine Contact Tank 709 Water Elevation	978.36 feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70 feet	
	Freeboard in Chlorine Contact Tank 709	2.34 feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	978.24 feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70 feet	
	Freeboard in Chlorine Contact Tank 710-1	2.46 feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.84 feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	976.59 feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08 feet	
	Difference Between Weir and Water Elevations	0.49 feet	OK
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00 feet	
	Freeboard in Effluent Bypass Chamber 729	7.16 feet	OK
	Flow to Chlorine Contact Tank 710-2	61.16%	
	Bypass Flow to Plant Outfall Chamber 733	38.84%	
11	Chlorine Contact Tank 710-2 Water Elevation	977.59 feet	

	Water Elevation in Discharge Pipe - DS of Weir	976.80	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	0.08	feet	WARNING - WEIR SUBMERGED
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.11	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	976.48	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	8.52	feet	OK
	Flow Through 24-inch Pipe	19.04%		
	Flow Through 30-inch Pipe	32.12%		
	Flow Through 36-inch Pipe	48.85%		
13	Effluent Collection Chamber 734 Water Elevation	975.54	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	9.71	feet	OK

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate 35.00 mgd 1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:
1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:
1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:
1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.68	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.32	feet	OK
2	Grit Tank Water Elevation	976.86	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	975.83	feet	
	Difference Between Water Elevations	1.03	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	0.92	feet	WARNING - LESS THAN 1-FOOT FR
3	Primary Clarifier Water Elevation	974.76	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.67	feet	
	Difference Between Weir and Trough Elevations	(0.07)	feet	WARNING - WEIR SUBMERGED
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	1.99	feet	OK
4	Water Elevation Downstream of Parshall Flume	971.91	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	1.49	feet	
	Ha Depth	2.62	feet	
	Submergence (Hb / Ha)	56.9%		OK

	Water Elevation Upstream of Parshall Flume	973.04	feet	
	Parshall Flume Channel Top of Wall Elevation	976.75	feet	
	Freeboard in Parshall Flume Channel	3.71	feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.30	feet	
	TF Distribution Box Water Elevation - DS of Weir	1,001.39	feet	
	TF Distribution Box Weir Elevation	1,001.00	feet	
	Difference Between Weir and Water Elevations	(0.39)	feet	WARNING - WEIR SUBMERGED
	TF Distribution Box Top of Wall Elevation	1,003.50	feet	
	Freeboard in TF Distribution Box	1.20	feet	OK
6	Aeration Tank 705-4 Water Elevation	982.32	feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00	feet	
	Freeboard in Aeration Tanks	3.68	feet	OK
6	Secondary Clarifier Water Elevation	981.94	feet	
	Secondary Clarifier Weir Elevation - Apex	981.79	feet	
	Water Elevation in Weir Trough	981.72	feet	
	Difference Between Weir and Water Elevations	0.07	feet	WARNING - WEIR SUBMERGED
	Secondary Clarifier Top of Wall Elevation	986.00	feet	
	Freeboard in Secondary Clarifiers	4.06	feet	OK
7	Reactor Clarifier Water Elevation	980.30	feet	
	Reactor Clarifier Weir Elevation - Apex	980.17	feet	
	Water Elevation in Weir Trough	980.42	feet	
	Difference Between Weir and Water Elevations	(0.25)	feet	WARNING - WEIR SUBMERGED
	Reactor Clarifier Top of Wall Elevation	985.00	feet	
	Freeboard in Reactor Clarifiers	4.70	feet	OK
8	Chlorine Contact Tank 709 Water Elevation	978.47	feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 709	2.23	feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	978.33	feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-1	2.37	feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.88	feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	977.02	feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08	feet	
	Difference Between Weir and Water Elevations	0.06	feet	WARNING - WEIR SUBMERGED
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00	feet	
	Freeboard in Effluent Bypass Chamber 729	7.12	feet	OK
	Flow to Chlorine Contact Tank 710-2	60.24%		
	Bypass Flow to Plant Outfall Chamber 733	39.76%		
11	Chlorine Contact Tank 710-2 Water Elevation	977.61	feet	

	Water Elevation in Discharge Pipe - DS of Weir	977.24	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	(0.36)	feet	WARNING - WEIR SUBMERGED
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.09	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	976.89	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	8.11	feet	OK
	Flow Through 24-inch Pipe	19.05%		
	Flow Through 30-inch Pipe	32.11%		
	Flow Through 36-inch Pipe	48.85%		
13	Effluent Collection Chamber 734 Water Elevation	975.85	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	9.40	feet	OK

Butler WWTP Hydraulic Analysis

Enter Influent Flow Rate [40.00] mgd

1.00 foot min. freeboard for ta

To use this spreadsheet, follow the instructions below.

A Go to the Headworks sheet and do the following:

1. Enter Assumed Head Loss Through Bar Screen in Cell B 69
2. Adjust Value in Cell B 69 as Required to Match Calculated Head Loss in Cell B 75

B Go to the Flow Meas. sheet and do the following:

1. Enter Value in Cell B8 to Match Flows in Cell B10 and Cell D10

C Go to the TF sheet and do the following:

1. Enter head loss for TF mechanism in Cell H117

D Go to the Outfall sheet and do the following:

1. Enter Creek Water Elevation in Cell H24
2. Adjust percentages in Cells B30 anf B31 to equalize losses through pipes
3. Enter Percentage in Cell I63 and Check Cell I87 for Match: Adjust Cell I63 as Required to Match Values

Summary of Results

1	Water Elevation Upstream of Bar Screens	977.92	feet	
	Top of Wall Elevation at Bar Screens	979.00	feet	
	Freeboard Upstream of Bar Screens	1.08	feet	OK
2	Grit Tank Water Elevation	976.93	feet	
	Grit Tank Weir Elevation	976.20	feet	
	Water Elevation in Channel DS of Grit Tank	976.12	feet	
	Difference Between Water Elevations	0.81	feet	OK
	Channel Top of Wall Elevation	976.75	feet	
	Freeboard at Grit Tank Outlet Channel	0.63	feet	WARNING - LESS THAN 1-FOOT FR
3	Primary Clarifier Water Elevation	974.77	feet	
	Primary Clarifier Weir Elevation - Apex	974.60	feet	
	Water Elevation in Weir Trough	974.97	feet	
	Difference Between Weir and Trough Elevations	(0.37)	feet	WARNING - WEIR SUBMERGED
	Primary Clarifier Top of Wall Elevation	976.75	feet	
	Freeboard at Primary Clarifier Effluent Channel	1.98	feet	OK
4	Water Elevation Downstream of Parshall Flume	972.25	feet	(at Maximum Wet Well Level)
	Parshall Flume Floor Elevation	970.42	feet	
	Hb Depth	1.83	feet	
	Ha Depth	2.85	feet	
	Submergence (Hb / Ha)	64.1%		OK

	Water Elevation Upstream of Parshall Flume	973.27	feet	
	Parshall Flume Channel Top of Wall Elevation	976.75	feet	
	Freeboard in Parshall Flume Channel	3.48	feet	OK
5	TF Distribution Box Water Elevation - US of Weir	1,002.42	feet	
	TF Distribution Box Water Elevation - DS of Weir	1,002.35	feet	
	TF Distribution Box Weir Elevation	1,001.00	feet	
	Difference Between Weir and Water Elevations	(1.35)	feet	WARNING - WEIR SUBMERGED
	TF Distribution Box Top of Wall Elevation	1,003.50	feet	
	Freeboard in TF Distribution Box	1.08	feet	OK
6	Aeration Tank 705-4 Water Elevation	982.44	feet	
	Aeration Tank 705-4 Top of Wall Elevation	986.00	feet	
	Freeboard in Aeration Tanks	3.56	feet	OK
6	Secondary Clarifier Water Elevation	981.95	feet	
	Secondary Clarifier Weir Elevation - Apex	981.79	feet	
	Water Elevation in Weir Trough	981.98	feet	
	Difference Between Weir and Water Elevations	(0.19)	feet	WARNING - WEIR SUBMERGED
	Secondary Clarifier Top of Wall Elevation	986.00	feet	
	Freeboard in Secondary Clarifiers	4.05	feet	OK
7	Reactor Clarifier Water Elevation	980.31	feet	
	Reactor Clarifier Weir Elevation - Apex	980.17	feet	
	Water Elevation in Weir Trough	981.06	feet	
	Difference Between Weir and Water Elevations	(0.89)	feet	WARNING - WEIR SUBMERGED
	Reactor Clarifier Top of Wall Elevation	985.00	feet	
	Freeboard in Reactor Clarifiers	4.69	feet	OK
8	Chlorine Contact Tank 709 Water Elevation	978.75	feet	
	Chlorine Contact Tank 709 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 709	1.95	feet	OK
9	Chlorine Contact Tank 710-1 Water Elevation	978.57	feet	
	Chlorine Contact Tank 710-1 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-1	2.13	feet	OK
10	Eff. Bypass Chamber 729 Water Elevation - US of Weir	977.99	feet	
	Eff. Bypass Chamber 729 Water Elevation - DS of Weir	978.21	feet	
	Eff. Bypass Chamber 729 Adjustable Weir Elevation	977.08	feet	
	Difference Between Weir and Water Elevations	(1.13)	feet	WARNING - WEIR SUBMERGED
	Effluent Bypass Chamber 729 Top of Wall Elevation	985.00	feet	
	Freeboard in Effluent Bypass Chamber 729	7.01	feet	OK
	Flow to Chlorine Contact Tank 710-2	58.12%		
	Bypass Flow to Plant Outfall Chamber 733	41.88%		
11	Chlorine Contact Tank 710-2 Water Elevation	977.66	feet	

	Water Elevation in Discharge Pipe - DS of Weir	978.45	feet	
	Chlorine Contact Tank 710-2 Weir Elevation	976.88	feet	
	Difference Between Weir and Water Elevations	(1.57)	feet	WARNING - WEIR SUBMERGED
	Chlorine Contact Tank 710-2 Top of Wall Elevation	980.70	feet	
	Freeboard in Chlorine Contact Tank 710-2	3.04	feet	OK
12	Plant Outfall Chamber 733 Water Elevation	978.03	feet	
	Plant Outfall Chamber 733 Top of Wall Elevation	985.00	feet	
	Freeboard in Plant Outfall Chanber 733	6.97	feet	OK
	Flow Through 24-inch Pipe	19.06%		
	Flow Through 30-inch Pipe	32.11%		
	Flow Through 36-inch Pipe	48.83%		
13	Effluent Collection Chamber 734 Water Elevation	976.67	feet	
	Effluent Collection Chamber 734 Top of Wall Elevation	985.25	feet	
	Freeboard in Effluent Collection Chamber 734	8.58	feet	OK

APPENDIX C
HIGH FLOW EFFLUENT ANALYSIS

BASA WWTP
2003 to 2007 Analysis of Effluent Concentrations on Days With Flows > 10 mgd

Date	Daily Flow (mgd)	Effluent CBOD-5 (mg/L)	Effluent TSS (mg/L)	Effluent NH3-N (mg/L)	Effluent P (mg/L)	Effluent D.O. (mg/L)	Effluent pH (Std. Units)
1/6/2005	29.506	14	34	1.31	0.89	6.8	7
9/17/2004	28.4	8	40	1.87	0.91	7.8	7.1
1/5/2005	27.968	12	25	1.45	0.88	7.6	6.8
1/4/2004	27.092	6	17	1.2	0.78	8.5	6.8
1/15/2007	27.037	7	19	0.91	0.67	7.9	6.8
9/9/2004	26.991	10	25	0.87	0.78	6.1	7
9/18/2004	26.733	8	14	1.21	0.49	5.9	6.8
3/2/2007	26.496	9	19	1.64	0.89	8.8	6.8
2/6/2004	26.495	4	19	1.33	0.65	8.2	6.8
1/1/2003	25.986	9	7	1.43	0.69	8.4	6.7
12/13/2007	25.897	9	17	1.28	0.66		
11/19/2003	25.353	5	22	0.85	1.29	8.4	7.1
10/20/2006	24.64	3	13	0.6	0.43	7.5	6.9
1/5/2004	24.32	4	12	0.61	0.52	7.2	6.9
3/1/2007	24.269	13	22	2.12	0.79	9.3	7
1/12/2005	24.231	14	17	1.31	0.69	8.9	6.9
9/8/2004	23.604	10	47	1.13	1.56	7.5	7
10/17/2006	23.308	7	20	1.57	1.08	8.8	7.1
8/21/2004	23.243	3	4	0.61	0.75	5.9	6.9
4/2/2005	23.041	14	12	4.64	0.96	4.7	6.9
1/5/2007	22.537	10	21	1.92	1.31	8.3	6.8
6/15/2004	22.326	4	8	0.68	0.48	5.5	7
1/11/2005	22.199	24	24	1.86	0.93	9.3	6.9
3/20/2004	22.143	9	18	3.08	0.97	9.3	7
4/13/2004	22.02	7	21	2.52	1.01	7.2	7
5/18/2006	21.876	8	17	1.44	0.76	5.8	6.9
4/3/2005	21.576	15	15	3.27	0.75	8.1	6.9
1/14/2007	21.573	8	14	1.23	0.76	7.6	6.9
2/14/2005	21.229	19	29	2.34	1.11	10.2	7
1/7/2005	21.109	15	16	1.9	0.6	9.5	7.3
11/26/2007	21.105	7	17	1.93	1.02		
1/3/2005	20.809	8	14	1.71	1.12	8.2	6.9
1/13/2005	20.723	13	19	1.48	0.72	9.3	6.9
8/21/2007	20.689	6	8	1.06	0.56	6.8	6.9
3/23/2007	20.667	11	15	2.57	0.77	9	6.9
8/20/2004	20.371	7	13	0.85	0.59	6.7	7
7/26/2004	20.35	6	14	1.77	0.98	5.8	6.9
12/11/2003	20.335	5	11	0.44	0.58	7.6	7.2
3/20/2007	20.049	14	20	2.03	0.77	10.5	7.2
6/14/2004	19.975	4	21	1.09	0.69	3.9	7
6/13/2003	19.953	3	8	0.55	0.6	5.9	7
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12/16/2007	19.173	13	19	1.52	0.73		
1/14/2005	19.144	17	18	1.83	0.72	9.2	7
3/21/2004	18.831	6	15	1.89	0.48	8.6	7
11/29/2005	18.463	7	16	1.58	1.11	8.4	7
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1/13/2007	18.226	8	15	1.55	0.97	7.6	6.8
12/10/2003	18.218	5	20	1.07	1.04	8.8	6.9
3/1/2007	18.163	6	14	2.08	1.07	8.9	6.9
1/4/2005	18.061	9	14	1.59	0.74	7.2	7
5/21/2004	18.017	4	8	1	0.93	6.8	6.9
3/3/2007	17.917	13	20	2.29	0.92	10	6.8
5/15/2006	17.758	8	16	1.71	0.95	6.2	6.8
5/17/2006	17.749	7	13	1.47	0.79	6.1	6.9
3/13/2003	17.523	6	9	2.39	0.74	8.3	6.9
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12/14/2007	16.945	11	13	1.75	0.65		
6/12/2003	16.791	4	11	0.98	0.96	7.7	7
4/14/2004	16.68	5	11	1.81	0.56	7.2	6.9
2/7/2004	16.552	4	7	1.45	0.48	9.4	6.7
3/16/2007	16.534	13	20	2.4	0.8	10.5	6.9
1/7/2007	16.454	7	10	0.99	0.71	8.2	6.8
10/25/2005	16.436	6	19	1.49	0.99	7.8	7.2
2/9/2005	16.408	19	21	2.01	1.01	9.7	7
1/8/2007	16.384	8	11	1.28	0.61	7.6	6.9
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2/15/2005	16.27	16	17	1.89	0.86	10.2	6.8
11/20/2003	16.25	3	10	0.33	0.61	8.2	7
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2/21/2004	15.874	7	7	2.75	0.64	8.3	6.8
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3/21/2007	15.348	13	16	2.45	0.92	10.5	6.9
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7/10/2003	15.264	2	8	0.35	0.36	7	7

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9/1/2003	14.978	3	4	0.57	0.58	7.3	7
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4/23/2006	14.485	3	5	0.68	1.12	6.6	6.9
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6/16/2004	14.361	2	4	0.34	0.47	6.3	7
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3/12/2006	14.209	7	3	2.04	1.63	8.6	6.7
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4/23/2005	13.495	9	9	6.8	1.02	5	7
1/18/2006	13.48	3	10	1.21	1.22	8.1	6.9
4/26/2004	13.446	3	5	1.22	0.73	6.2	7
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12/17/2007	13.273	12	14	1.6	0.72		
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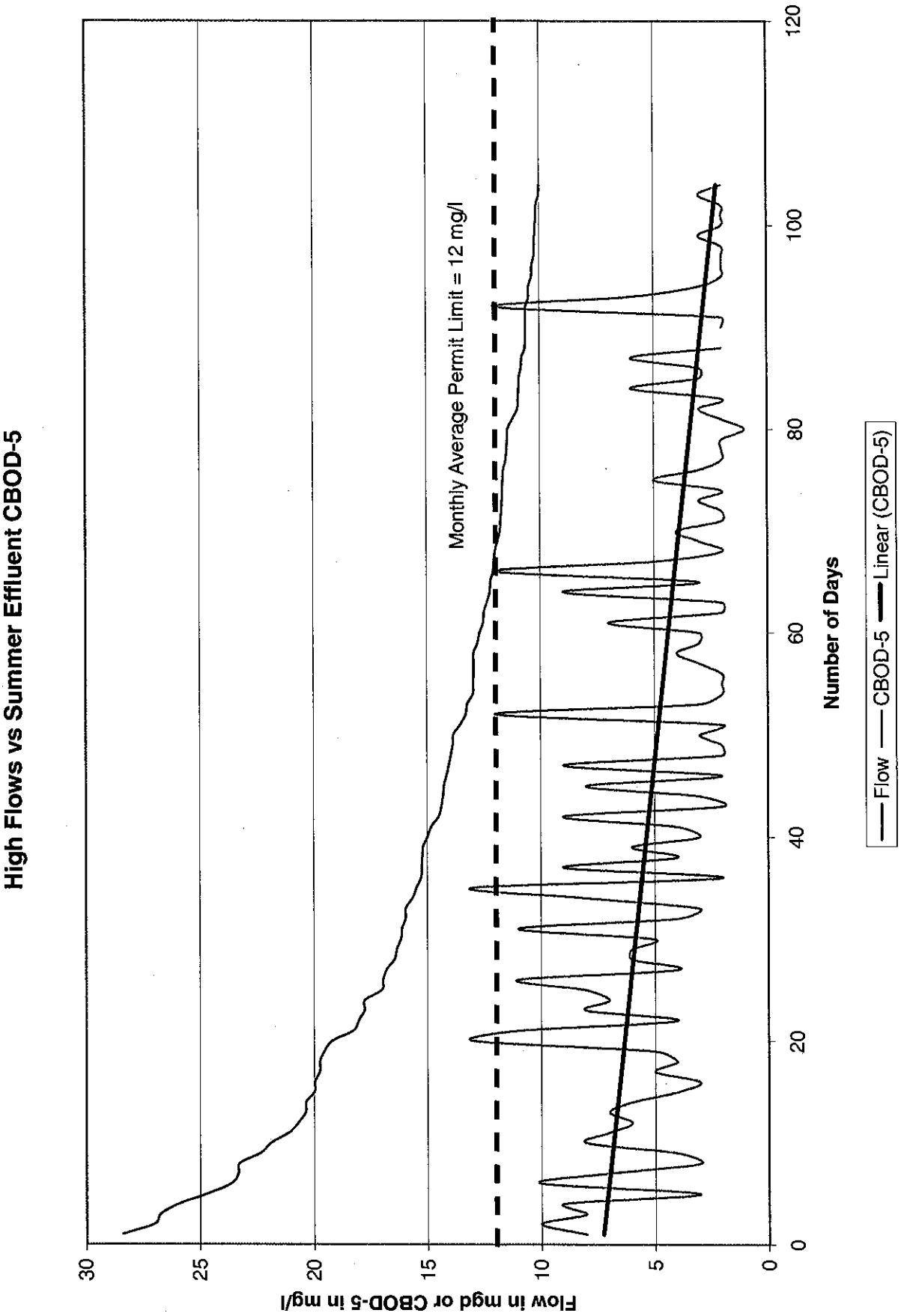
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4/16/2007	12.667	10	23	1.82	1.24	9.4	7
2/5/2004	12.653	6	12	2.96	0.92	10.1	7.2
4/15/2007	12.638	15	18	2.54	1.35	8.8	6.5
8/27/2006	12.511	7	13	1.63	1.03	7.3	7
12/24/2003	12.503	2	4	1.12	0.66	7.9	6.9
1/2/2004	12.476	2	6	1.37	0.86	8.3	6.9
6/14/2003	12.473	2	9	0.4	0.38	7.1	6.9
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3/5/2004	12.345	2	10	2.69	0.63	8.8	6.8
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11/15/2005	12.254	6	10	0.92	0.93	6.8	6.9
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1/4/2003	12.081	3	2	0.4	0.51	9.1	7
12/24/2007	12.057	12	13	2	0.87		
9/20/2004	12.023	5	9	0.77	0.41	7	6.9
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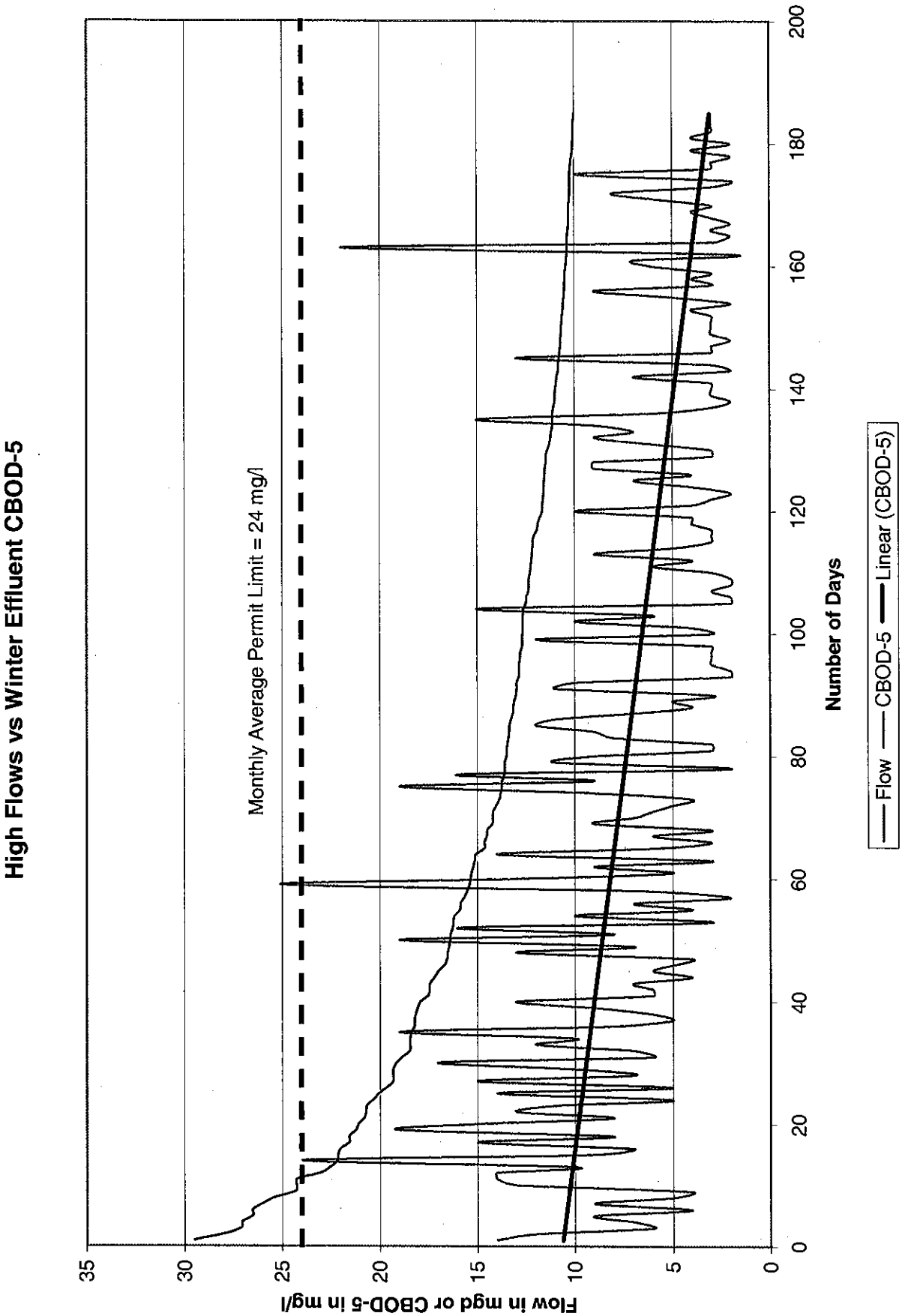
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2/22/2004	11.402	3	7	1.95	0.53	8.8	7
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10/22/2006	11.195	2	6	0.31	0.44	7.5	6.9
1/16/2005	11.14	9	13	1.01	0.69	9.9	6.7
4/6/2005	11.131	15	19	5.36	0.99	7.8	6.9
12/22/2006	11.123	6	15	1.78	1.59		
3/16/2003	11.084	3	7	2.5	0.63	8.8	6.9
11/21/2003	11.007	2	16	0.39	0.56	8.6	7.1
11/29/2003	11.007	3	18	0.48	0.7	8.5	7
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5/24/2003	10.975	3	5	0.44	0.75	7.2	6.6
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2/21/2005	10.914	7	16	1.83	1.11	9.7	6.8
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9/11/2004	10.809	3	4	0.4	0.42	7.8	6.9
2/17/2005	10.785	13	23	1.78	1.03	10.7	6.9
8/20/2007	10.776	6	23	1.27	0.96	7.3	6.9
3/31/2004	10.761	3	8	4.54	0.94	8.5	7
3/10/2003	10.726	3	6	1.97	0.58	9.4	6.9
2/24/2004	10.716	2	7	2.67	0.63	9	7
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3/6/2003	10.656	3	6	1.83	0.71	8.8	7
5/9/2003	10.636	2	5	1.35	0.89	8	7
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1/5/2003	10.591	2	3	0.33	0.56	9.4	6.9
2/21/2007	10.534	5	15	3.04	1.33	9.4	7
3/24/2005	10.521	9	10	6.65	0.77	6.8	7
3/23/2004	10.519	3	6	1.98	0.57	9.1	7
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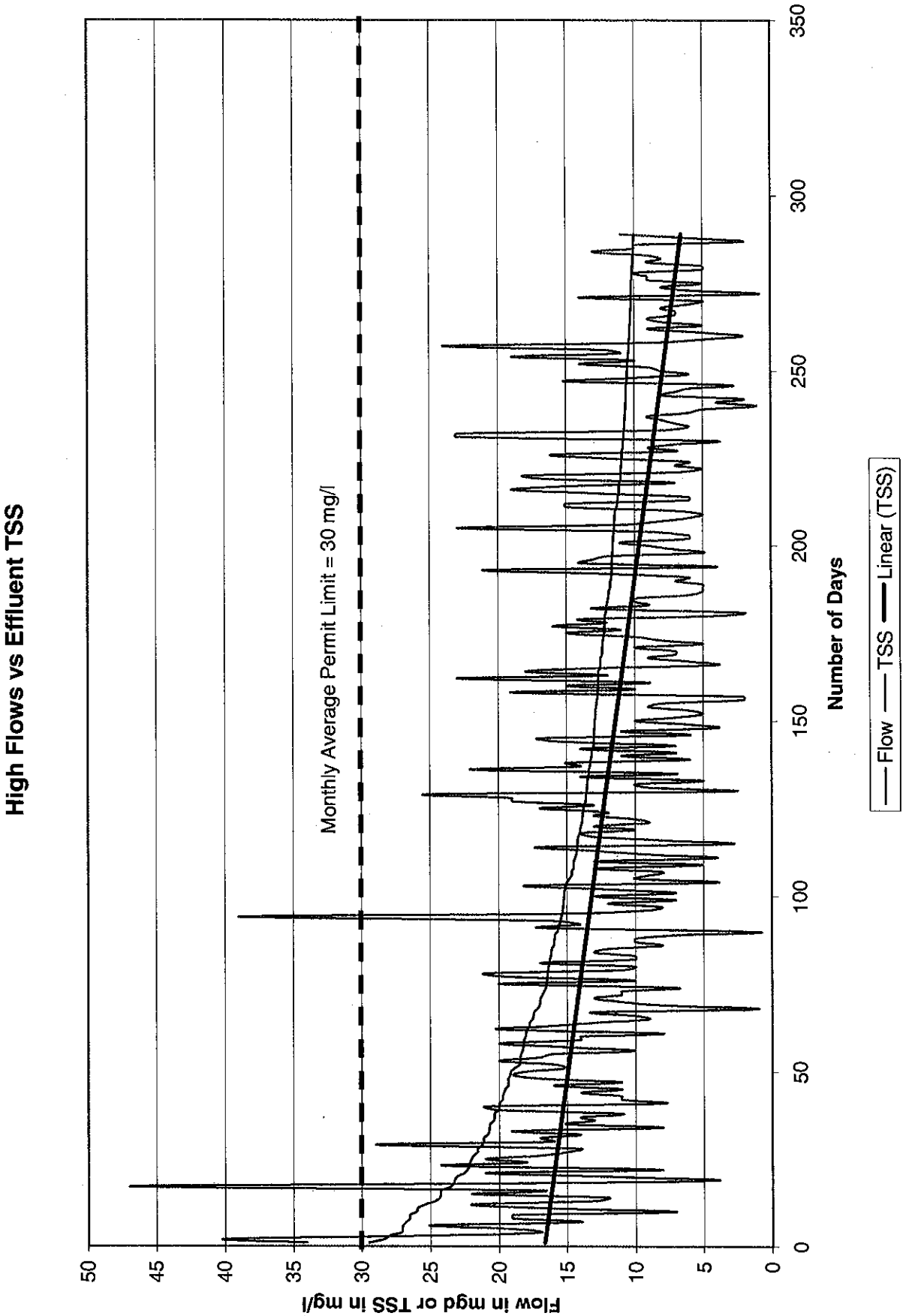
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10/15/2003	10.017	3	2	0.45	0.61	7.6	7
7/23/2003	10.006	2	6	0.37	0.54	6.4	6.9
4/27/2004	10.004	3	11	0.82	0.71	7.9	6.9
Max.	29.506	25	47	8.32	2.45	10.8	7.3
Min.	10.004	1	1	0.24	0.36	3.9	6.5

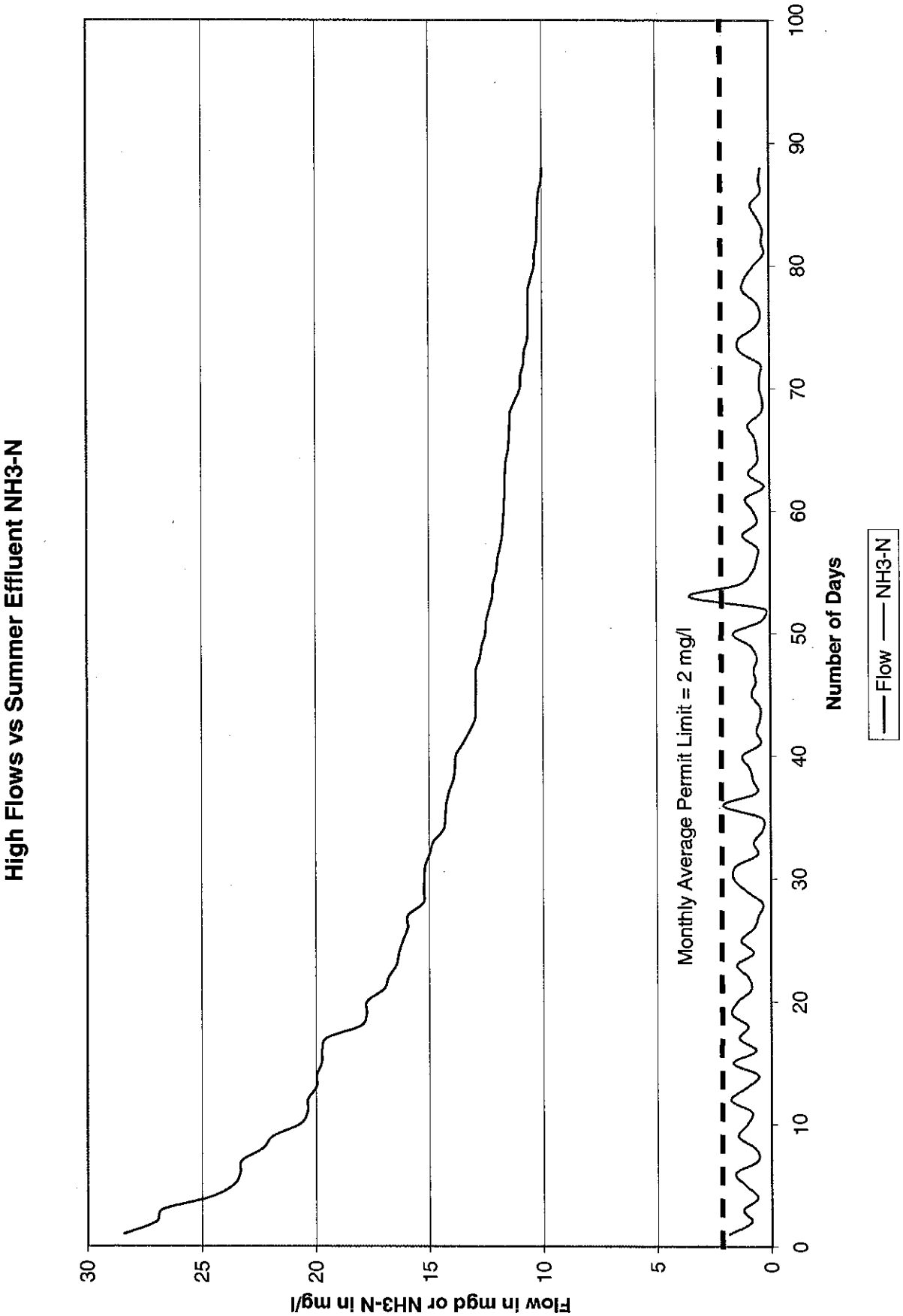
Average Effluent Concentrations

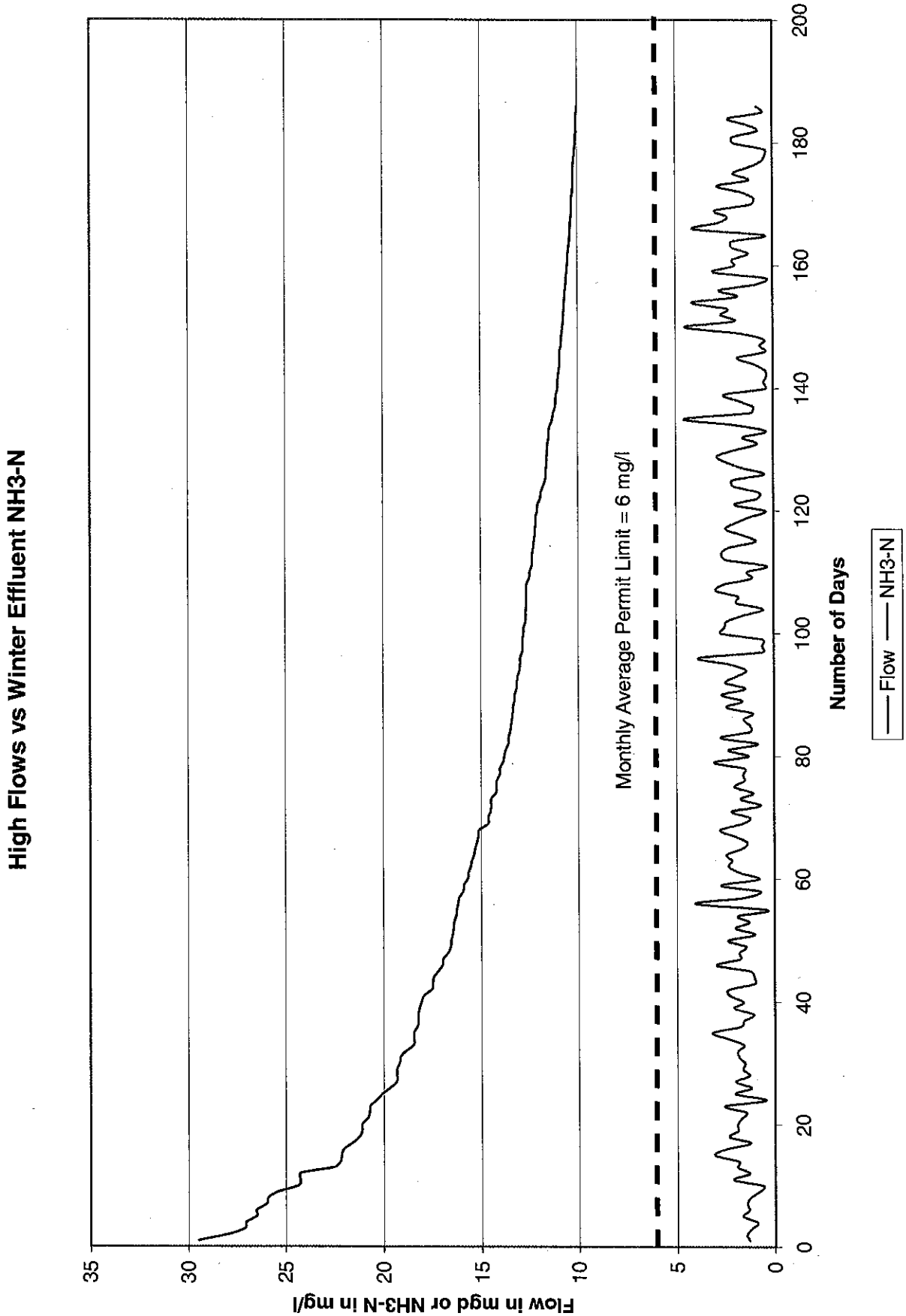
Flow Range	Effluent CBOD-5 (mg/L)	Effluent TSS (mg/L)	Effluent NH3-N (mg/L)	Effluent P (mg/L)	Effluent D.O. (mg/L)	Effluent pH
0 to 10 mgd	2.8	6.3	1.15	1.06	9.4	7.0
10 to 15 mgd	4.7	9.6	1.65	0.81	8.2	7.0
15 to 20 mgd	8.0	13.2	1.66	0.80	7.9	6.9
20 to 25 mgd	9.8	17.1	1.73	0.84	7.9	7.0
Over 25 mgd	8.4	21.5	1.28	0.80	7.7	6.9

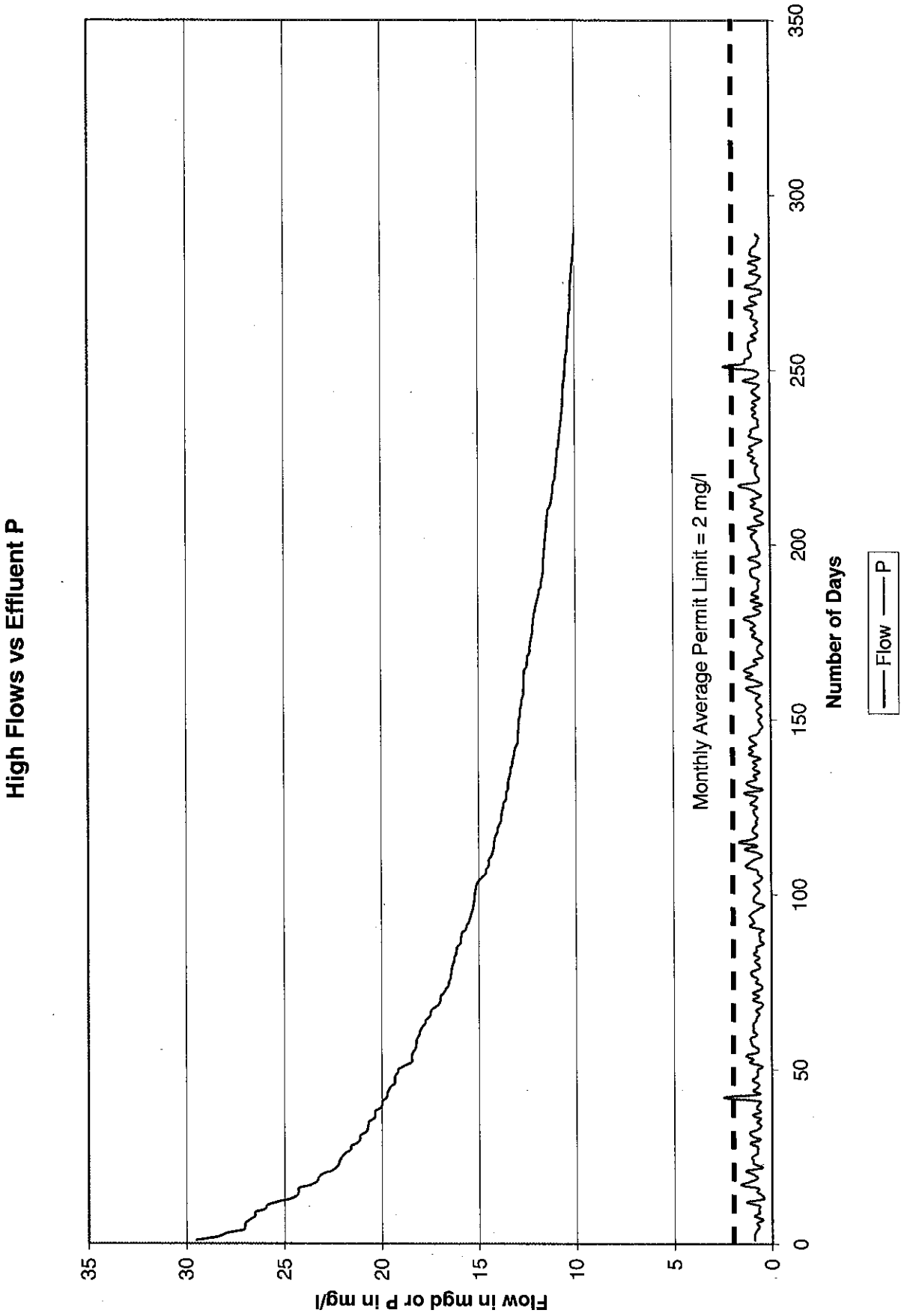

High Flows vs Summer Effluent CBOD-5
Monthly Average Permit Limit = 12 mg/l
Flow in mgd or CBOD-5 in mg/l
Number of Days
Flow
CBOD-5
Linear (CBOD-5)
0
5
10
15
20
25
30
0
20
40
60
80
100
120

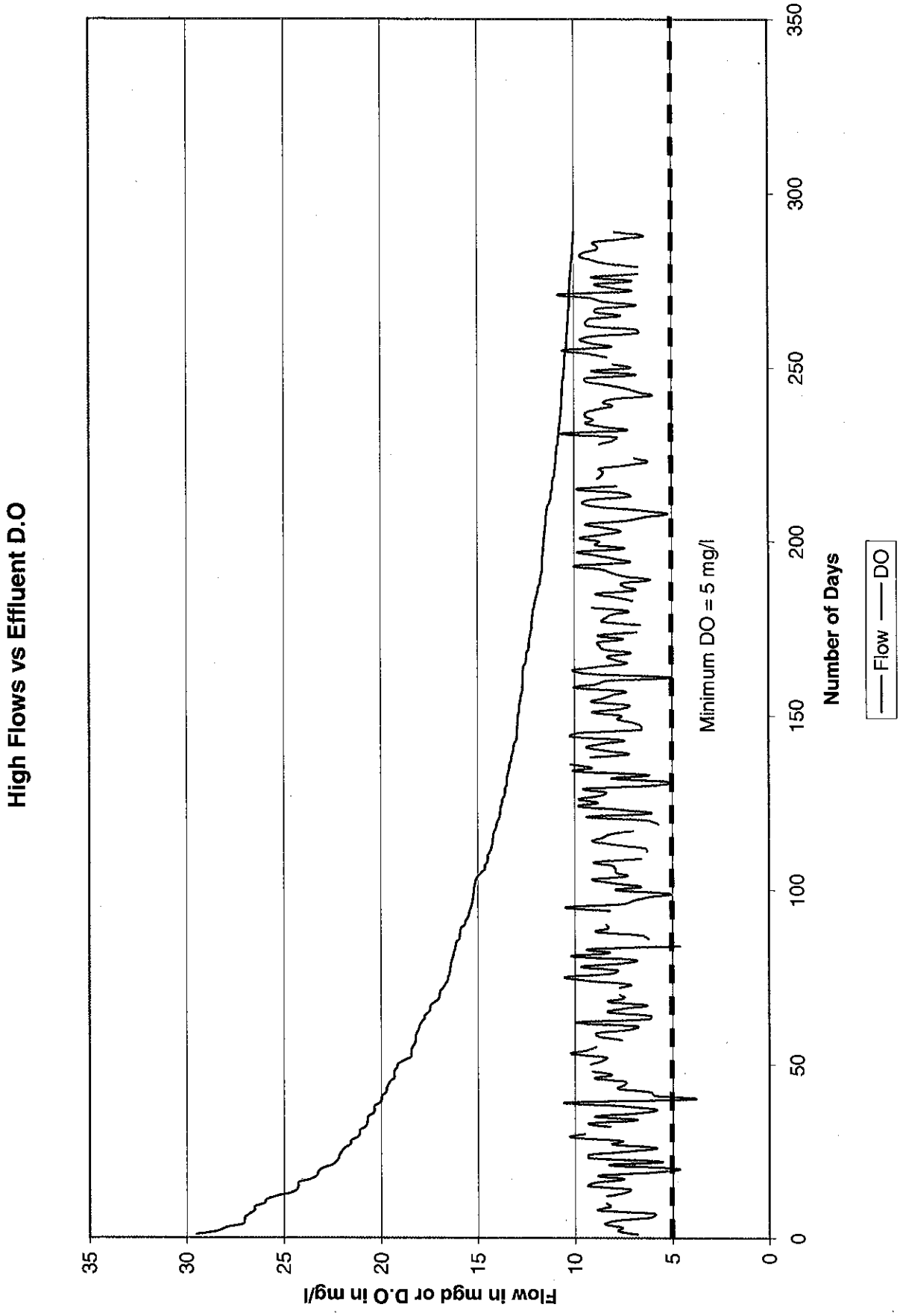

High Flows vs Winter Effluent CBOD-5
Monthly Average Permit Limit = 24 mg/l
Flow in mgd or CBOD-5 in mg/l
Number of Days
Flow
CBOD-5
Linear (CBOD-5)
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200

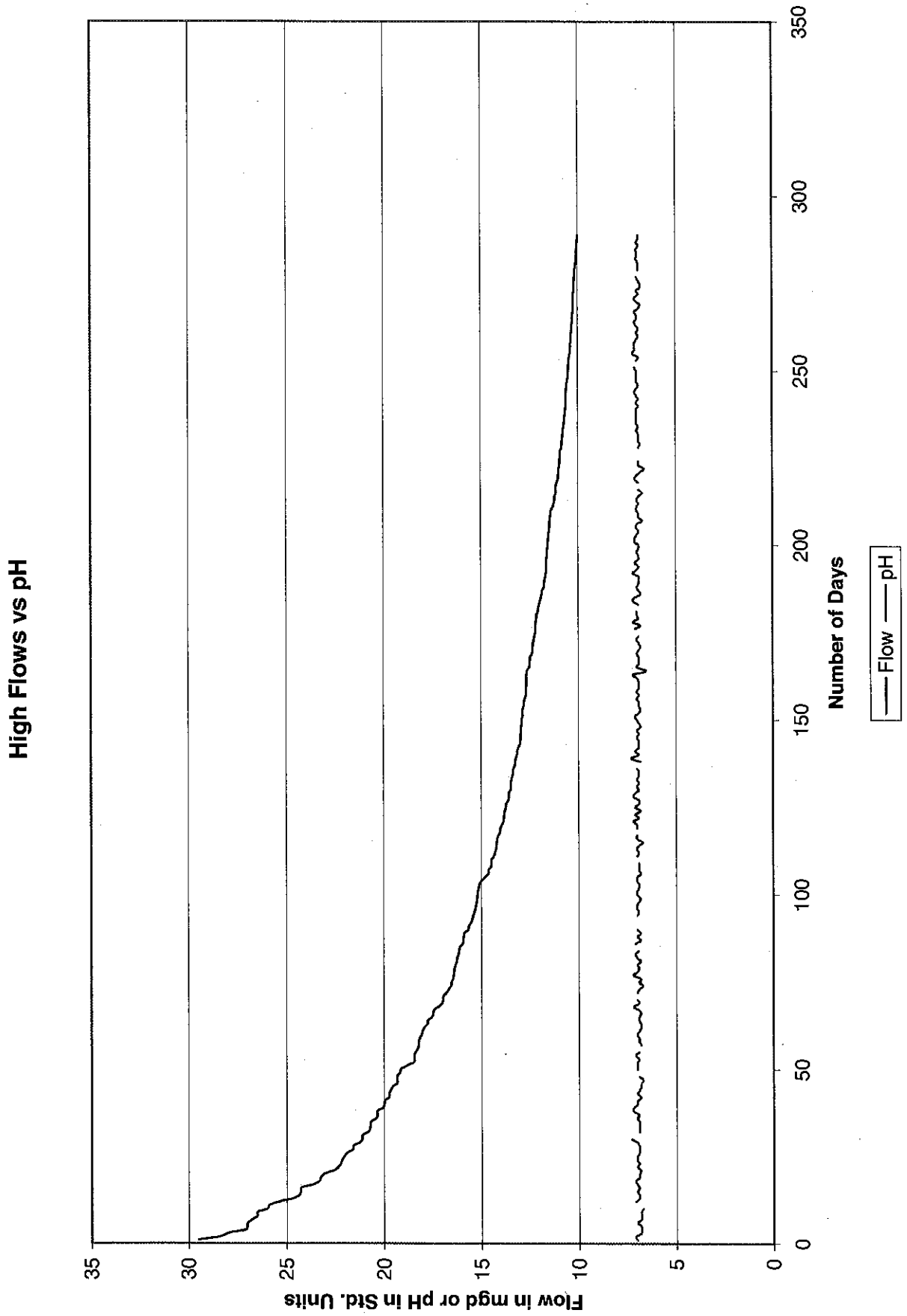

High Flows vs Effluent TSS
Monthly Average Permit Limit = 30 mg/l
Flow in mgd or TSS in mg/l
Number of Days
Flow
TSS
Linear (TSS)
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350


High Flows vs Summer Effluent NH3-N
Flow in mgd or NH3-N in mg/l
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Number of Days
Monthly Average Permit Limit = 2 mg/l
Flow
NH3-N

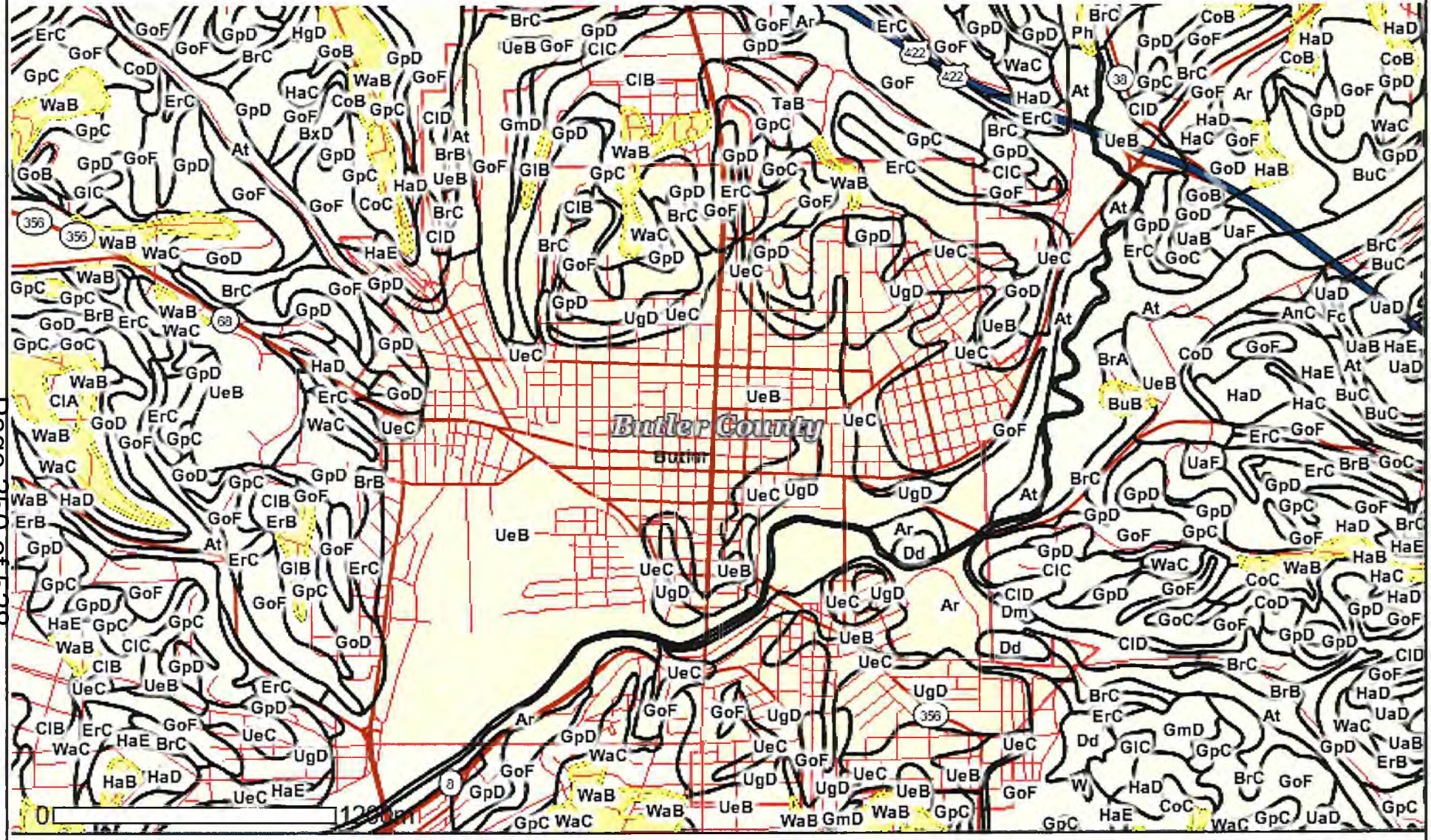

High Flows vs Winter Effluent NH3-N
Flow in mgd or NH3-N in mg/l
Number of Days
Monthly Average Permit Limit = 6 mg/l
Flow
NH3-N
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200


High Flows vs Effluent P
Flow in mgd or P in mg/l
Number of Days
Monthly Average Permit Limit = 2 mg/l
Flow
P
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350

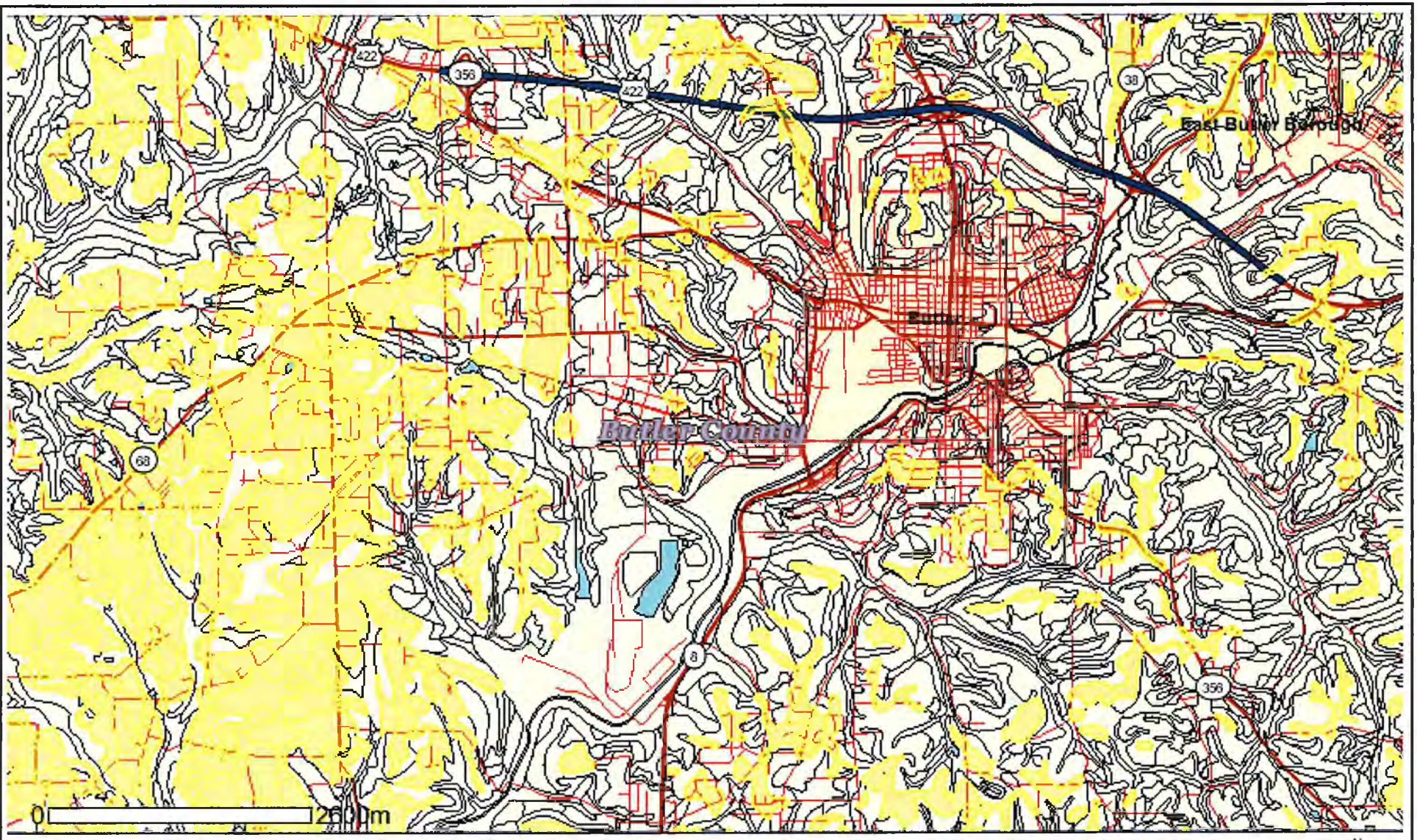

High Flows vs Effluent D.O
Flow in mgd or D.O in mg/l
Number of Days
Minimum DO = 5 mg/l
Flow
DO
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350


High Flows vs pH
Flow in mgd or pH in Std. Units
Number of Days
Flow
pH
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350

APPENDIX I
MAPS OF PRIME FARMLAND



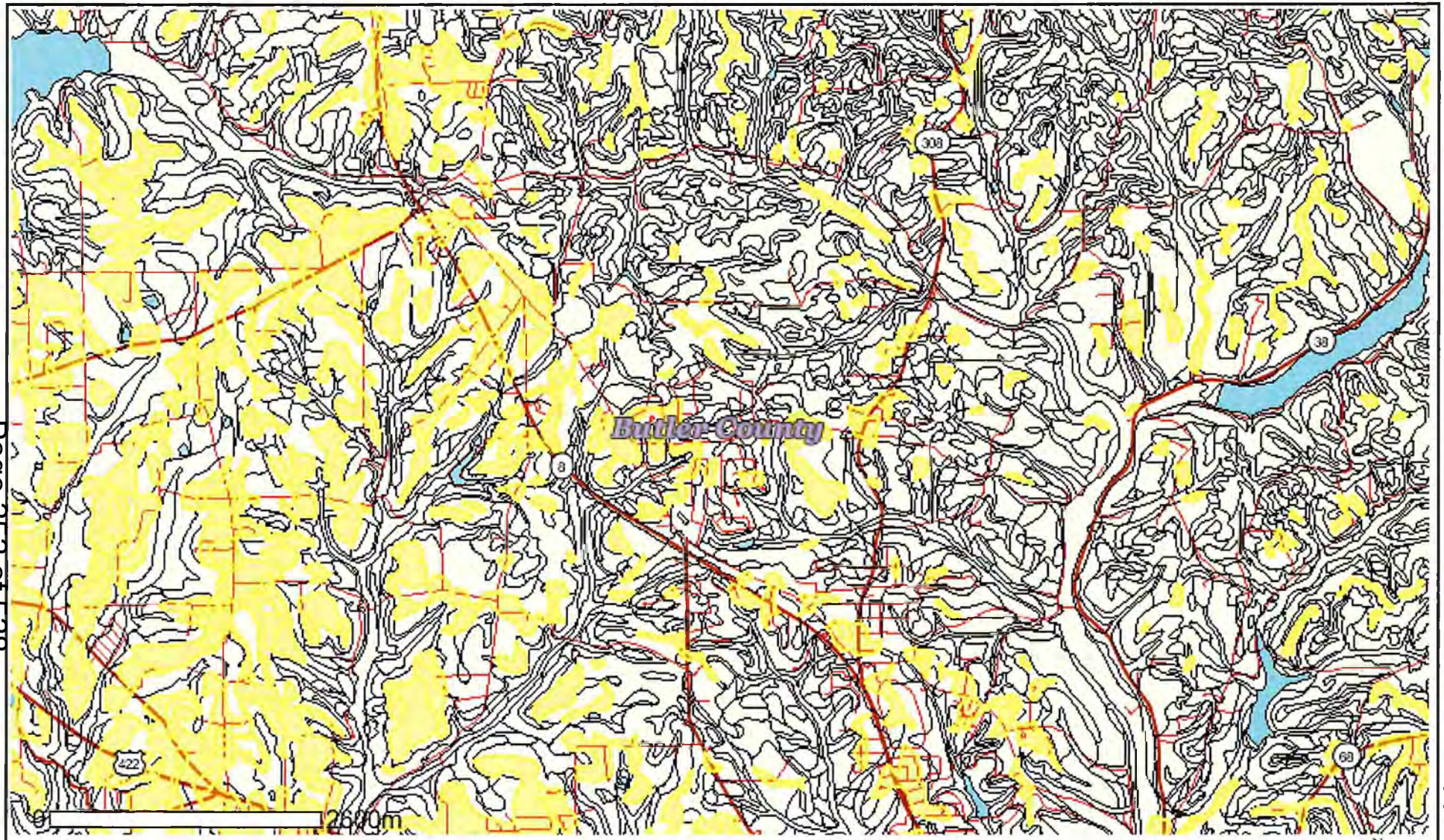
DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmlands In City of Butler	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA VII 4/25/08			



KEY

Prime Farmland

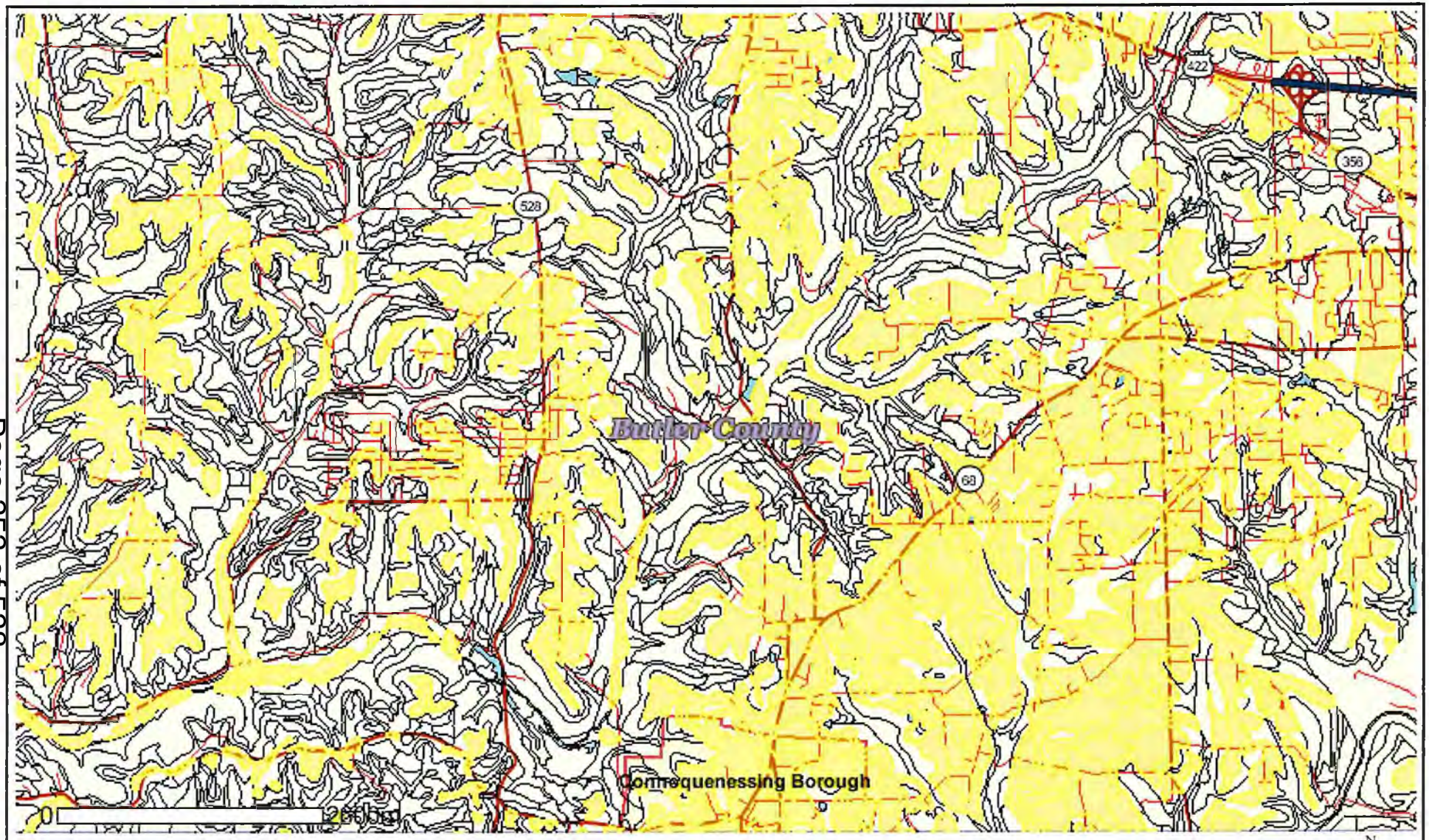
DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In Butler Township	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA III 4/25/08			



KEY

Prime Farmland

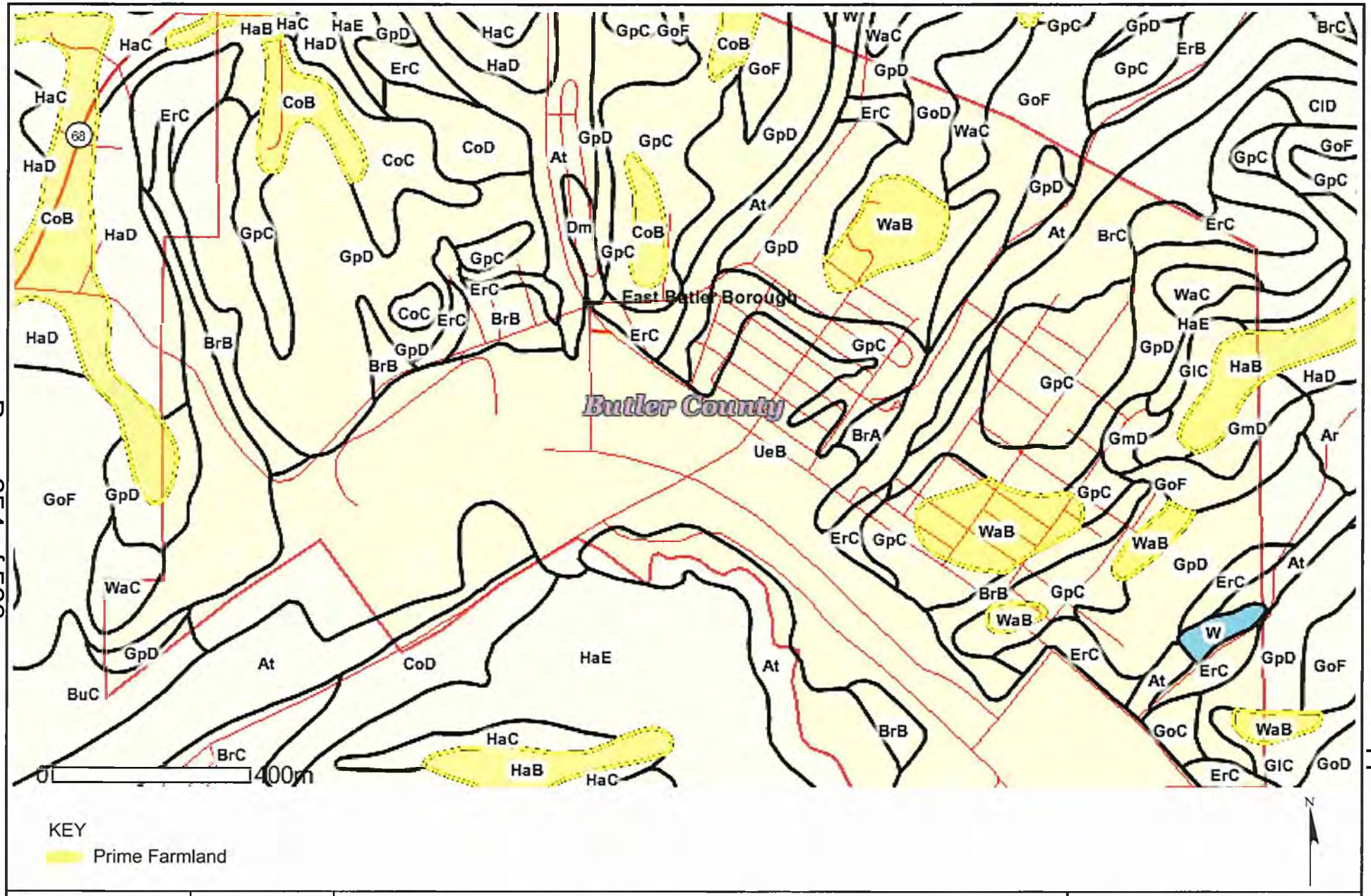
DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM			
Scale As Shown		Prime Farmland In Center Township	
File BASA I 4/25/08			



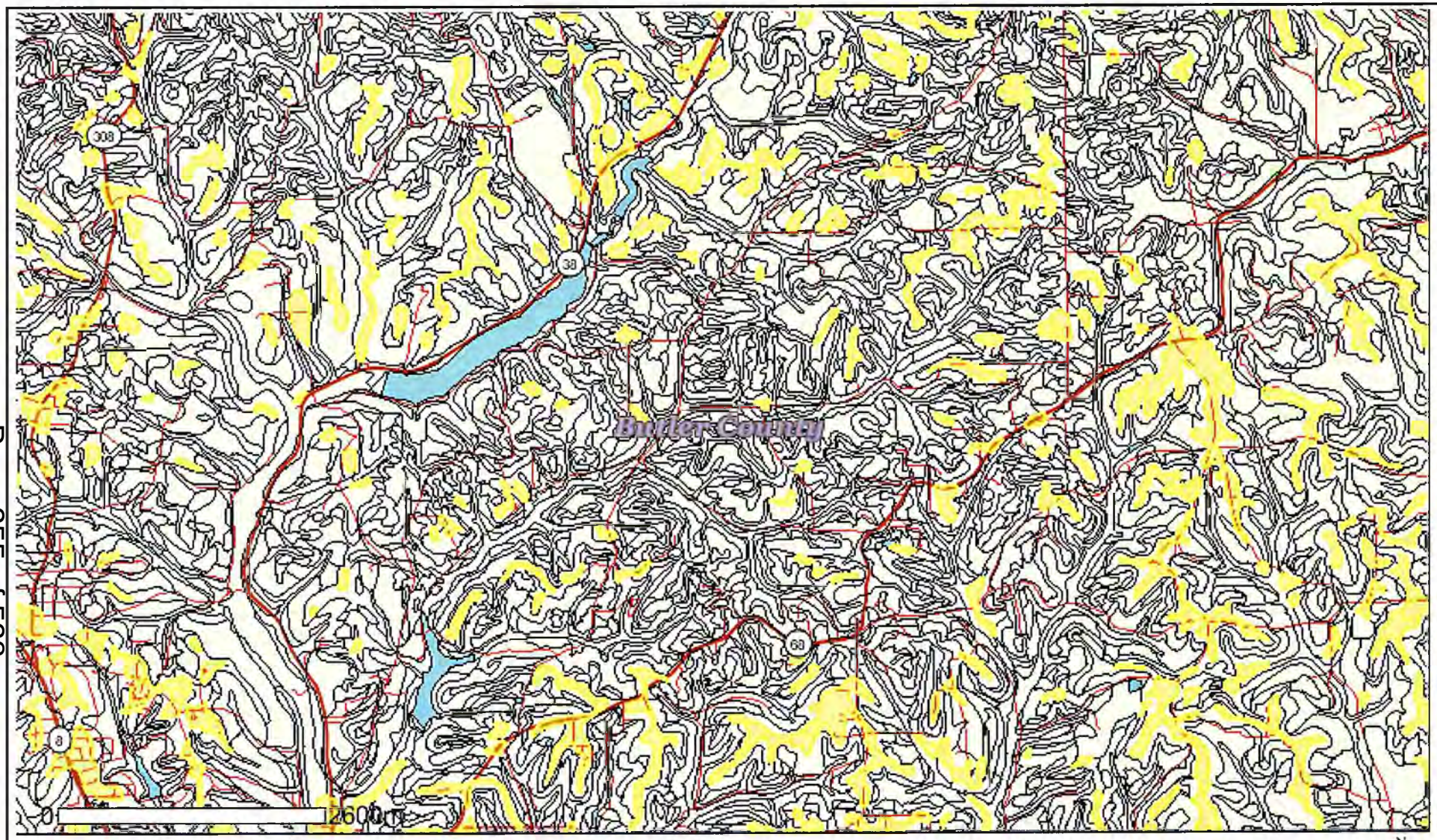
KEY

Prime Farmland

DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In Connoquenessing Township	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA IV 4/25/08			



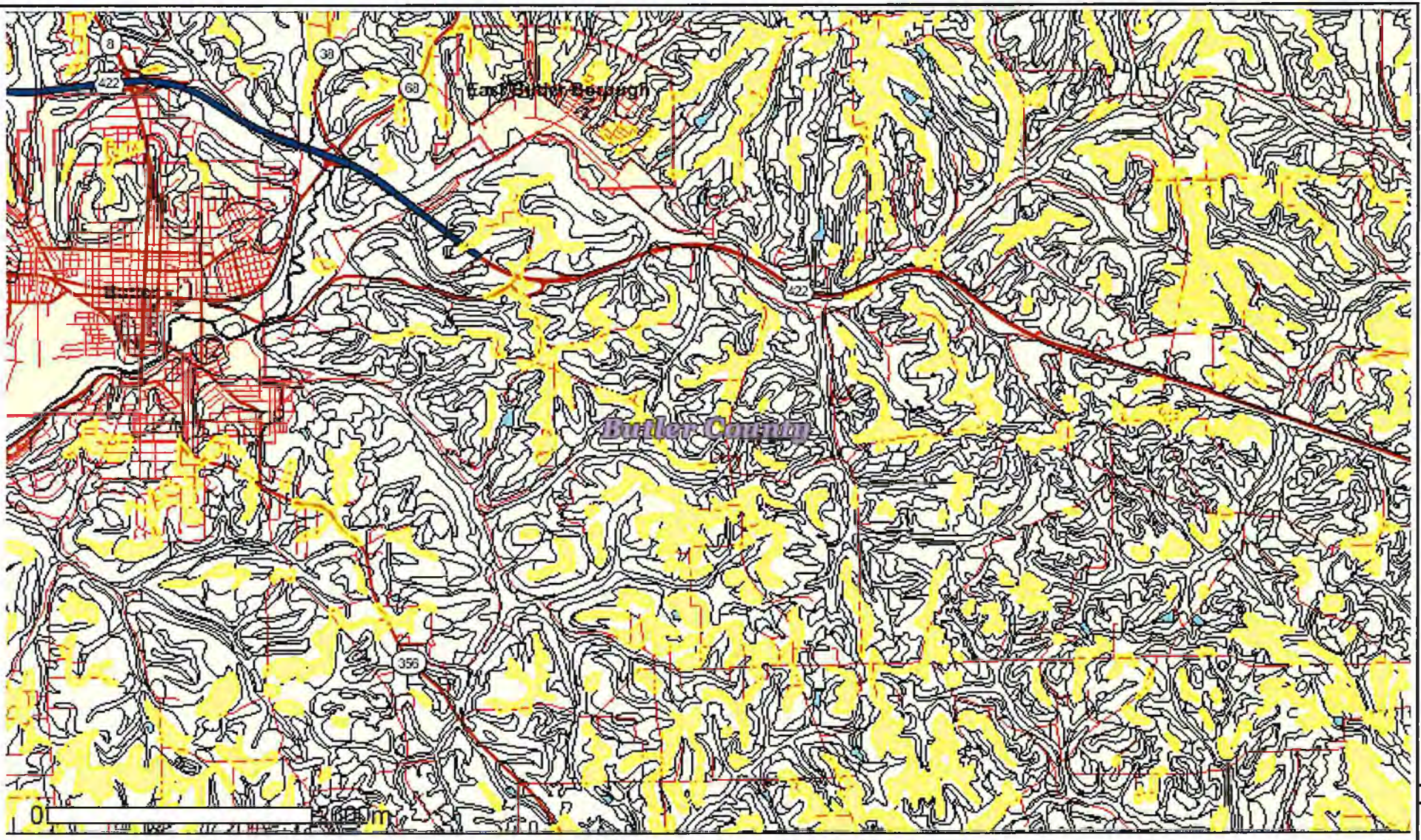
DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In East Butler Borough	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA VI 4/25/08			



KEY

Prime Farmland

DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In Oakland Township	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA II 4/25/08			



KEY

Prime Farmland

DRW.		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In Summit Township	CHESTER ENGINEERS
APP. JS MM			
Scale As Shown			
File BASA V 4/25/08			

APPENDIX J
PNDI SEARCH RESPONSE LETTERS

Pennsylvania Department of Conservation and Natural Resources

Bureau of Forestry

May 1, 2008

Chrysa A. Stanislaw
Chester Engineers
260 Airside Drive
Moon Township, PA 15108

Pennsylvania Natural Diversity Inventory Review, PNDI Number **019609**
Butler Area Sewer Authority Diversion and Storage Locations
Butler Twp.; Butler County

Dear Ms. Stanislaw,

This responds to your request about a Pennsylvania Natural Diversity Inventory (PNDI) ER Tool "Potential Impact" or a species of special concern impact review. **We screened this project for potential impacts to species and resources of special concern under the Department of Conservation and Natural Resources' responsibility, which includes plants, natural communities, terrestrial invertebrates and geologic features only.**

☒ ***NO PROJECT IMPACT ANTICIPATED***

☒ PNDI records indicate that no known occurrences of species or resources of special concern under DCNR's jurisdiction occur in the vicinity of the project. Therefore, we do not anticipate the project referenced above will impact plants, natural communities, terrestrial invertebrates and geologic features of special concern. No further coordination with DCNR is needed for this project.

☐ PNDI records indicate special concern species or resources are located in the vicinity of the project. However, based on the information submitted to us concerning the nature of the project, the immediate location, and our detailed resource information, we determined that no impact is likely. No further coordination with DCNR is needed for this project.

COMMENTS:

This response represents the most up-to-date summary of the PNDI data files and is good for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. A field survey of any site may reveal previously unreported populations. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

This finding applies to impacts to plants, natural communities, terrestrial invertebrates and geologic features only. To complete your review of state and federally-listed species of special concern, please be sure the U.S. Fish and Wildlife Service, the PA Game Commission and the Fish and Boat Commission has been contacted regarding this project either directly or by performing a search with the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Rebecca H. Bowen

Rebecca H. Bowen, Environmental Review Specialist
DCNR/BOF/PNDI, PO Box 8552, Harrisburg, PA 17105 ~ Ph: 717-772-0258 ~ F: 717-772-0271 ~ c-rbowen@state.pa.us

Pennsylvania Fish & Boat Commission

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5237 Fax: (814) 359-5175

established 1866

December 16, 2008

IN REPLY REFER TO
SIR # 30394

MICHAEL MCKEE
CHESTER COUNTY CONSERVATION DISTRICT
AIRSIDE BUSINESS PARK
260 AIRSIDE DRIVE
MOON TOWNSHIP, PA 15108

RE: Species Impact Review (SIR) - Rare, Candidate, Threatened and Endangered Species
BUTLER
BUTLER County, Pennsylvania

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A Species Impact Review is valid for one year only.

_X_ ***NO ADVERSE IMPACTS EXPECTED FROM THE PROPOSED PROJECT***

___ Except for occasional transient species, rare, candidate, threatened or endangered species under our jurisdiction are not known to exist in the vicinity of the project area. Therefore, no biological assessment or further consultation regarding rare species is needed with the Commission. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

_X_ An element occurrence of a rare, candidate, threatened, or endangered species under our jurisdiction is known from the vicinity of the proposed project. However, given the nature of the proposed project, the immediate location, or the current status of the nearby element occurrence(s), no adverse impacts are expected to the species of special concern.

If you have any questions regarding this review, please contact the biologist indicated below:

___	Jeff Schmid	814-359-5236	___	Tina Walther	814-359-5186
_X_	Nevin Welte	412-586-2334	___	Bob Morgan	814-359-5129

I am enclosing a copy of our "SIR Request Form", which is to be used for all future species impact review requests. Please make copies of the attached form and use with all future project reviews. Thank you in advance for your cooperation and attention to this important matter of species conservation and habitat protection.

SIGNATURE: _____ DATE: December 16, 2008
Christopher A. Urban
Chief, Natural Diversity Section

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA GAME COMMISSION
2001 ELMERTON AVENUE, HARRISBURG, PA 17110-9797

December 11, 2008

Mr. Michael F. McKee
Chester Engineers
Airside Business Park
260 Airside Drive
Moon Township, PA 15108

In re: PNDI Database Search/Review
Butler Area Sewer Authority
Act 537 Sewage Facilities Planning Study Update
City of Butler, Butler County, PA

Dear Mr. McKee:

This is in response to your letter dated November 17, 2008 regarding the potential impacts of your project on special concern species of birds or mammals and State Game Lands.

Our office review has determined that your project should not cause any adverse impacts to any special concern species of birds or mammals recognized by the Pennsylvania Game Commission or State Game Lands. This determination may be reconsidered if project plans change or extend beyond the present study area, or if additional information becomes available on state-listed species or State Game Lands.

If you have any questions, please contact me at (717) 783-5957. Please be advised that this determination is only valid for one year from the date of this letter.

Very truly yours,

James R. Leigey
Wildlife Impact Review Coordinator
Division of Environmental Planning
And Habitat Protection
Bureau of Wildlife Habitat Management

JRL/pfb

Cc: File

ADMINISTRATIVE BUREAUS:
PERSONNEL: 717-787-7836 ADMINISTRATION: 717-787-5670 AUTOMOTIVE AND PROCURMENT: 717-787-6594
LICENSE DIVISION: 717-787-2084 WILDLIFE MANAGEMENT: 717-787-5529 INFORMATION & EDUCATION: 717787-6286
WILDLIFE PROTECTION: 717-787-5740 WILDLIFE HABITAT MANAGEMENT: 717-787-6818 REAL ESTATE: 717-787-6568
AUTOMATEDTECHNOLOGY SYSTEMS: 717-787-4076

WWW.PGC.STATE.PA.US

PNDI # n/a USFWS Project # 2009-0329

U.S. FISH AND WILDLIFE SERVICE
315 South Allen Street, Suite 322, State College, PA 16801

This responds to your inquiry about a PNDI Internet Database search that resulted in a potential conflict with a federally listed, proposed or candidate species.

PROJECT LOCATION INFORMATION

County: Butler

Township: Butler

MISC INFORMATION

Date received by FWS: 11/20/2008

USFWS COMMENTS ☒ FAXED ☐ MAILED Fax #: 412-809-6611

To: Michael McKee Affiliation: Chester Engineers

SPECIFIC PROJECT: ACT 537 Sewage Facilities

FISH AND WILDLIFE SERVICE COMMENT(s):

✓ ***NO EFFECT***

Except for occasional transient species, no federally listed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, based on currently available information, no biological assessment or further consultation under the Endangered Species Act is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed species becomes available, this determination may be reconsidered.

Please be aware that a field survey may reveal previously undocumented populations of one or more species of concern within a project area. If surveys or further information reveals that a federally listed species exists in your project area, contact the Service immediately to discuss measures to avoid or minimize potential impacts to the species prior to initiating your project.

This determination is valid for one year from the date of this letter.

This review was conducted by the biologist listed below. He/she can be contacted at 814-234-4090.

✓ Pamela Shellenberger (x 241) ___ Bonnie Dershem (x 234) ___ Robert Anderson (x 228)
___ Kathy Gipe (x 242)

SIGNATURE: _____ DATE: 12-16-08

Supervisor, Pennsylvania Field Office

APPENDIX K
HISTORIC PRESERVATION LETTERS

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

April 2, 2008

Chrysa A. Stanislaw
Chester Engineers
260 Airside Drive
Moon, PA 15108-2793

Re: File No. ER 08-1168-019-A
PV Planning Approval Under
Sewage Facilities Act: Act 537
Sewage Facilities Plan Update
Construction of Flow Diversion &
Storage Facilities, City of Butler,
Butler Twp., Butler Co.

Dear Ms. Stanislaw:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

Based on an evaluation by our staff, there is a high probability that significant archaeological sites are located in this project area and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and instructions for conducting Phase I surveys are available on our web site at http://www.phmc.state.pa.us/bhp/Inventories/ArchaeologyGuidelines.pdf or from our office upon request.

There may be historic buildings/structures/districts/objects eligible for the National Register of Historic Places located in the project area. However, due to the nature of the activity, it is our opinion that there will be no effect on these properties. Should the scope and/or nature of the project activities change, the Bureau for Historic Preservation should be contacted immediately.

If you need further information in this matter please consult Kira Presler at (717) 705-0700.

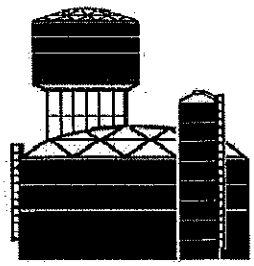
Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

Cc: DEP, Northwest Regional Office

DCM/tmw

APPENDIX L
EQUALIZATION TANK BUDGET PRICES



MID Atlantic Storage Systems, Inc.

QUALITY ERECTORS OF, AQUASTORE® TecStore & WELDSTORE™ TANKS

November 24, 2008

Michael McKee, P.E.
Senior Technical Consultant
Chester Engineers
Airside Business Park
260 Airside Drive
Moon Township, PA 15108

RE: BASA Preliminary Flow EQ Tank Sizing Price Update for 2010 Construction

Per your request for budget pricing we offer the following:

Deshon Pump Station
AQUASTORE® Glass Fused to Steel Water Tank Model – 15424SSWT
153.86' diameter x 23.84' sidewall height
3,310,000 gallons maximum capacity
Installed Price Estimate: $1,721,000.00
**$ 1,257,000 open top with option for future dome roof

Monroe Pump Station
AQUASTORE® Glass Fused to Steel Water Tank Model – 10124SSWT
100.71' diameter x 23.84' sidewall height
1,400,000 gallons maximum capacity
Installed Price Estimate: $770,000.00
$ 585,000 open top with option for future dome roof

Central Storage Facility
AQUASTORE® Glass Fused to Steel Water Tank Model – 17127SSWT
170.65' diameter x 26.66' sidewall height
4,500,000 gallons maximum capacity
Installed Price Estimate: $2,250,000.00
$ 1,600,000 open top with option for future dome roof

Included:

- Excavation of standard design ringwall foundation (Assuming min 4,000 PSF soil bearing strength)
- Reinforced concrete ringwall foundation and floor
- Concrete encased DIP inlet-outlet lines stubbed out 5' from tank
- Sch.80 PVC overflow with stainless steel screened base end
- Glass-coated, bolted steel sidewall with 24" manway, ladder/cage/platform
- Aluminum Geodesic free span style roof with vent and manway
- Non-prevailing wage, open-shop installation labor
- Passive Cathodic Protection System

Not included:

1551 ROBINSON ROAD • WASHINGTON C.H., OH 43160-9201 • 740-335-2019 • FAX 740-335-0584

www.midatlanticstorage.com

- Access road and site preparation
- Yard piping and vault
- Bonds/permits
- Level sensing-measuring equipment
- Rock excavation of foundation *(if encountered)*
- Sales tax

Please advise of any questions or further needs on this project. Thank you!

Greg Mullins
Regional Sales Manager
(740) 335-2019 greg@midatlanticstorage.com

NATGUN

Wire-wound Concrete Tanks
Established 1929

Sent Via Email
mmckee@chesterengineers.com

Natgun Corporation
10 Hearthstone Court, Suite 2
Reading, Pennsylvania 19606
Telephone: 610-370-2790
Facsimile: 610-370-2792

December, 1, 2008

Mr. Michael McKee, P.E.
Senior Technical Consultant
Chester Engineers
Airside Business Park
260 Airside Drive
Moon Township, Pennsylvania 15108

Reference: **Proposed Flow Equalization Tanks** - Butler Area Sewer Authority

Dear Mr. McKee:

Thank you for your interest in prestressed concrete tanks. Based on 2010 construction costs, suitable budget-estimating options for a wire-wound precast prestressed concrete tanks are as follows:

DOME TANK OPTIONS:

SSO Location	Size	Dimensions	Price	Construction Time
Monroe Pump Station	1.30 MG	96.02' Dia X 24' SWD	$ 874,000.00	10-12 weeks
Deshon Pump Station	3.20 MG	150.65' Dia X 24' SWD	$ 1,553,650.00	14-16 weeks
Central Storage Facility	(3)3.60 MG	159.79' Dia X 24' SWD	$ 4,830,000.00	18-20 weeks

OPEN TOP OPTIONS:

SSO Location	Size	Dimensions	Price	Construction Time
Monroe Pump Station	1.30 MG	96.02' Dia X 24' SWD	$ 649,750.00	8-10 weeks
Deshon Pump Station	3.20 MG	150.65' Dia X 24' SWD	$ 1,104,000.00	12-14 weeks
Central Storage Facility	(3) 3.60 MG	159.79' Dia X 24' SWD	$ 3,553,500.00	16-18 weeks

For each option above, please allow an additional $50,000 per tank for optional accessories, and 5% for bonds and contingencies.

The budget estimating figures include the tanks complete including the foundation and overflow for open top tanks. The figures include hatch and vent for the dome tank option. **The figures do**

not include site work or additional tank accessories. Pricing provided for the Central Storage Facility includes a five percent discount for three tanks constructed on the same site, at the same time. Local, state, and federal taxes, if applicable, are not included in the above prices.

The above tanks are designed and constructed in accordance with AWWA standard D110, Type III, precast concrete walls with steel diaphragm, wire prestressing, and concrete dome or open top (as indicated above).

To assist in developing the contract documents Natgun can provide you with the following information:

1. Preliminary design drawings and calculations in electronic format
2. Complete performance specification in electronic format
3. Geotechnical requirements for wire-wound concrete tanks and geotechnical report review
4. Value engineering from our Engineering and Estimating departments
5. Site layout and estimated site work cost from our Estimating Department
6. Review of preliminary drawings and specifications to provide updated tank and site work budget estimates

The above services will assist in providing a quality project with complete budgeting information and minimal questions at bid time.

Thank you for this opportunity to be of service. Please feel free to contact me if you have any questions or if I can be of any further assistance.

Respectfully,
NATGUN CORPORATION

Jason North

Jason North,
Regional Manager

JN/smr

APPENDIX M
OPINIONS OF PROBABLE COST FOR DIVERSION PUMP STATIONS

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 1 - Existing Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		34500
TOTAL, DIVISION 2, SITE WORK		114400
TOTAL, DIVISION 3, CONCRETE		239900
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		174200
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		61000
TOTAL, DIVISION 16, ELECTRICAL		215000
TOTAL, DIVISIONS 1 THRU 16		$ 959,000
CONTINGENCY @	25 %	239,750
GRAND TOTAL		$ 1,198,750
	SAY	$ 1,198,800

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						34500

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		12' X 20' X 26' deep						
		Structural excavation	2800	cy	15	1	-	42000
		Backfill	2530	cy	20	1	-	50600
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	270	cy	25	1	-	6800
		TOTAL DIVISION 2, SITE WORK						114400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		12' X 20' X 26' deep						
		Base Slab	49	cy	450	2		44100
		Walls	114	cy	750	2		171000
		Top Slab	14	cy	450	2		12600
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						239900

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 2300 GPM Submersible Sewage Pumps	1	ls	99550	1.75	99550	174200
		TOTAL DIVISION 11						174200

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	60970	1		61000
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						61000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				71000
		TOTAL DIVISION 16, ELECTRICAL	1	ls				215000
		TOTAL, DIVISIONS 1 THRU 16						$ 959,000
		CONTINGENCY @	25	%				239,750
		GRAND TOTAL						$ 1,198,750
				SAY				$ 1,198,800

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 2 - Future Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		34600
TOTAL, DIVISION 2, SITE WORK		114400
TOTAL, DIVISION 3, CONCRETE		239900
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		198100
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		69300
TOTAL, DIVISION 16, ELECTRICAL		218200
TOTAL, DIVISIONS 1 THRU 16		$ 994,500
CONTINGENCY @	25 %	248,625
GRAND TOTAL		$ 1,243,125
	SAY	$ 1,243,100

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 2 - Future Conditions

PROJECT 0555-99

DIV NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1	GENERAL REQUIREMENTS	1	ls				
	TOTAL DIVISION 1, GENERAL REQUIREMENTS						34600

DIV NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2	SITE WORK						
	Pump Station Wetwell						
	12' X 20' X 26' deep						
	Structural excavation	2800	cy	15	1	-	42000
	Backfill	2530	cy	20	1	-	50600
	Dewatering	1	lot	15000	1		15000
	Haul & dispose, off site	270	cy	25	1	-	6800
	TOTAL DIVISION 2, SITE WORK						114400

DIV NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3	CONCRETE						
	Pump Station Wetwell						
	12' X 20' X 26' deep						
	Base Slab	49	cy	450	2		44100
	Walls	114	cy	750	2		171000
	Top Slab	14	cy	450	2		12600
	Building						
	24' X 29'4" .						
	Base Slab	27	cy	450	1		12200
	TOTAL DIVISION 3, CONCRETE						239900

DIV NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10	BUILDINGS						
	Generator Building						
	20' X 30' Nominal	600	sf	200	1		120000
	TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Deshon Pump Station Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 2700 GPM Submersible Sewage Pumps	1	ls	113200	1.75	113200	198100
		TOTAL DIVISION 11						198100

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	69335	1		69300
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						69300

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				74200
		TOTAL DIVISION 16, ELECTRICAL	1	ls				218200
		TOTAL, DIVISIONS 1 THRU 16						$ 994,500
		CONTINGENCY @	25	%				248,625
		GRAND TOTAL						$ 1,243,125
				SAY				$ 1,243,100

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 1 - Existing Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		28000
TOTAL, DIVISION 2, SITE WORK		103100
TOTAL, DIVISION 3, CONCRETE		143300
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		91000
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		31900
TOTAL, DIVISION 16, ELECTRICAL		192900
TOTAL, DIVISIONS 1 THRU 16		$ 710,200
CONTINGENCY @	25 %	177,550
GRAND TOTAL		$ 887,750
	SAY	$ 887,800

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						28000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		10' X 12' X 26' deep						
		Structural excavation	2500	cy	15	1	-	37500
		Backfill	2380	cy	20	1	-	47600
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	120	cy	25	1	-	3000
		TOTAL DIVISION 2, SITE WORK						103100

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		10' X 12' X 26' deep						
		Base Slab	19	cy	450	2		17100
		Walls	73	cy	750	2		109500
		Top Slab	5	cy	450	2		4500
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						143300

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 1350 GPM Submersible Sewage Pumps	1	ls	52000	1.75	52000	91000
		TOTAL DIVISION 11						91000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	31850	1		31900
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						31900

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				48900
		TOTAL DIVISION 16, ELECTRICAL	1	ls				192900
		TOTAL, DIVISIONS 1 THRU 16						$ 710,200
		CONTINGENCY @	25	%				177,550
		GRAND TOTAL						$ 887,750
				SAY				**$ 887,800**

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 2 - Future Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		30800
TOTAL, DIVISION 2, SITE WORK		109400
TOTAL, DIVISION 3, CONCRETE		177800
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		174300
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		81000
TOTAL, DIVISION 16, ELECTRICAL		208300
TOTAL, DIVISIONS 1 THRU 16		$ 881,600
CONTINGENCY @	25 %	220,400
GRAND TOTAL		$ 1,102,000
	SAY	$ 1,102,000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						30800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		12' X 15' X 26' deep						
		Structural excavation	2670	cy	15	1	-	40100
		Backfill	2496	cy	20	1	-	49900
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	174	cy	25	1	-	4400
		TOTAL DIVISION 2, SITE WORK						109400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		12' X 15' X 26' deep						
		Base Slab	32	cy	450	2		28800
		Walls	87	cy	750	2		130500
		Top Slab	7	cy	450	2		6300
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						177800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Monroe Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 2150 GPM Submersible Sewage Pumps	1	ls	99600	1.75	99600	174300
		TOTAL DIVISION 11						174300

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	61005	1		61000
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						61000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				64300
		TOTAL DIVISION 16, ELECTRICAL	1	ls				208300
		TOTAL, DIVISIONS 1 THRU 16						**$ 881,600**
		CONTINGENCY @	25	%				220,400
		GRAND TOTAL						$ 1,102,000
				SAY				**$ 1,102,000**

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 1 - Existing Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		39600
TOTAL, DIVISION 2, SITE WORK		144800
TOTAL, DIVISION 3, CONCRETE		290000
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		284800
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		99700
TOTAL, DIVISION 16, ELECTRICAL		237900
TOTAL, DIVISIONS 1 THRU 16		$ 1,216,800
CONTINGENCY @	25 %	304,200
GRAND TOTAL		$ 1,521,000
	SAY	$ 1,521,000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						39600

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		15' X 25' X 28' Deep						
		Structural excavation	3650	cy	15	1	-	54800
		Backfill	3260	cy	20	1	-	65200
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	390	cy	25	1	-	9800
		TOTAL DIVISION 2, SITE WORK						144800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		15' X 25' X 28' deep						
		Base Slab	73	cy	450	2		65700
		Walls	133	cy	750	2		199500
		Top Slab	14	cy	450	2		12800
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						290000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 4300 GPM Submersible Sewage Pumps	1	ls	162750	1.75	162750	284800
		TOTAL DIVISION 11						284800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	99680	1		99700
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						99700

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				93900
		TOTAL DIVISION 16, ELECTRICAL	1	ls				237900
		TOTAL, DIVISIONS 1 THRU 16						$ 1,216,800
		CONTINGENCY @	25	%				304,200
		GRAND TOTAL						$ 1,521,000
				SAY				$ 1,521,000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 2 - Future Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		39900
TOTAL, DIVISION 2, SITE WORK		144800
TOTAL, DIVISION 3, CONCRETE		290000
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		315400
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		110400
TOTAL, DIVISION 16, ELECTRICAL		242100
TOTAL, DIVISIONS 1 THRU 16		$ 1,262,600
CONTINGENCY @	25 %	315,650
GRAND TOTAL		$ 1,578,250
	SAY	$ 1,578,300

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						39900

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		15' X 25' X 28' Deep						
		Structural excavation	3650	cy	15	1	-	54800
		Backfill	3260	cy	20	1	-	65200
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	390	cy	25	1	-	9800
		TOTAL DIVISION 2, SITE WORK						144800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		15' X 25' X 28' deep						
		Base Slab	73	cy	450	2		65700
		Walls	133	cy	750	2		199500
		Top Slab	14	cy	450	2		12600
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						290000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Ballpark/General Tire Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 5100 GPM Submersible Sewage Pumps	1	ls	180200	1.75	180200	315400
		TOTAL DIVISION 11						315400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	110390	1		110400
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						110400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				98100
		TOTAL DIVISION 16, ELECTRICAL	1	ls				242100
		TOTAL, DIVISIONS 1 THRU 16						**$ 1,262,600**
		CONTINGENCY @	25	%				315,650
		GRAND TOTAL						$ 1,578,250
				SAY				**$ 1,578,300**

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 1 - Existing Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		37200
TOTAL, DIVISION 2, SITE WORK		137400
TOTAL, DIVISION 3, CONCRETE		254300
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		273400
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		95700
TOTAL, DIVISION 16, ELECTRICAL		232100
TOTAL, DIVISIONS 1 THRU 16		$ 1,150,100
CONTINGENCY @	25 %	287,525
GRAND TOTAL		$ 1,437,625
	SAY	$ 1,437,600

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						37200

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		15' X 20' X 28' Deep						
		Structural excavation	3450	cy	15	1	-	51800
		Backfill	3139	cy	20	1	-	62800
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	311	cy	25	1	-	7800
		TOTAL DIVISION 2, SITE WORK						137400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		15' X 20' X 28' deep						
		Base Slab	50	cy	450	2		45000
		Walls	123	cy	750	2		184500
		Top Slab	14	cy	450	2		12600
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						254300

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 1 - Existing Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		**PROCESS EQUIPMENT**						
		Pumps						
		Three, 4500 GPM Submersible Sewage Pumps	1	ls	156200	1.75	156200	273400
		TOTAL DIVISION 11						273400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		**MECHANICAL EQUIPMENT**						
		Piping and valves						
		Connecting piping and valves	1	ls	95690	1		95700
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						95700

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		**ELECTRICAL**						
		Generator	1	ls	90000	1.6	90000	144000
		Electrical Work	1	ls				88100
		TOTAL DIVISION 16, ELECTRICAL	1	ls				232100
		TOTAL, DIVISIONS 1 THRU 16						**$ 1,150,100**
		CONTINGENCY @	25	%				287,525
		GRAND TOTAL						$ 1,437,625
				SAY				**$ 1,437,600**

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 2 - Future Conditions

PROJECT 0555-99

OPINION OF PROBABLE COST

		INSTALLED COST
TOTAL, DIVISION 1, GENERAL REQUIREMENTS		41500
TOTAL, DIVISION 2, SITE WORK		144800
TOTAL, DIVISION 3, CONCRETE		280000
TOTAL, DIVISION 4 thru 10, BUILDING		120000
TOTAL, DIVISION 11, PROCESS EQUIPMENT		315400
TOTAL, DIVISION 15, MECHANICAL EQUIPMENT		110400
TOTAL, DIVISION 16, ELECTRICAL		274100
TOTAL, DIVISIONS 1 THRU 16		$ 1,296,200
CONTINGENCY @	25 %	324,050
GRAND TOTAL		$ 1,620,250
	SAY	$ 1,620,300

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
1		GENERAL REQUIREMENTS	1	ls				
		TOTAL DIVISION 1, GENERAL REQUIREMENTS						41500

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
2		SITE WORK						
		Pump Station Wetwell						
		15' X 25' X 28' Deep						
		Structural excavation	3650	cy	15	1	-	54800
		Backfill	3260	cy	20	1	-	65200
		Dewatering	1	lot	15000	1		15000
		Haul & dispose, off site	390	cy	25	1	-	9800
		TOTAL DIVISION 2, SITE WORK						144800

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
3		CONCRETE						
		Pump Station Wetwell						
		15' X 25' X 28' deep						
		Base Slab	73	cy	450	2		65700
		Walls	133	cy	750	2		199500
		Top Slab	14	cy	450	2		12600
		Building						
		24' X 29'4" .						
		Base Slab	27	cy	450	1		12200
		TOTAL DIVISION 3, CONCRETE						290000

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
4 thru 10		BUILDINGS						
		Generator Building						
		20' X 30' Nominal	600	sf	200	1		120000
		TOTAL DIVISION 4 thru 10, BUILDINGS						120000

BUTLER AREA SEWER AUTHORITY
Butler, Pennsylvania

Connoquenessing Option 2 - Future Conditions

PROJECT 0555-99

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
11		PROCESS EQUIPMENT						
		Pumps						
		Three, 6600 GPM Submersible Sewage Pumps	1	ls	180200	1.75	180200	315400
		TOTAL DIVISION 11						315400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
15		MECHANICAL EQUIPMENT						
		Piping and valves						
		Connecting piping and valves	1	ls	110390	1		110400
		TOTAL DIVISION 15, MECHANICAL EQUIPMENT						110400

DIV	NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	MTPL	MATERIAL COST	INSTALLED COST
16		ELECTRICAL						
		Generator	1	ls	110000	1.6	110000	176000
		Electrical Work	1	ls				98100
		TOTAL DIVISION 16, ELECTRICAL	1	ls				274100
		TOTAL, DIVISIONS 1 THRU 16						**$ 1,296,200**
		CONTINGENCY @	25	%				324,050
		GRAND TOTAL						$ 1,620,250
				SAY				**$ 1,620,300**

RAM INDUSTRIAL SERVICES, INC.
Box 478 • 1799 Plank Rd. • Carrolltown, PA 15722-0478
Telephone 814/344-6591 • Fax 814/344-8020

April 18, 2008

ATS Chester Engineers
260 Airside Drive
Moon Twp., PA 15108
Phone# 412-809-6588
Fax# 412-809-6611
Attn: Mr. Chuck Brence

Page 1

Proposal No.: MP0408-2006JF

Per your recent inquiry, we are pleased to offer a budgetary quote the following equipment for the Butler CSO Study Project:

Item 1: ***Pump Station #1 (Duty Point: 2300 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3202, 640 Impeller Code. Complete with 50' of Cable and FLS. The pumps will be powered by a 3-60-460 Volt, 60 HP Motor. Complete slide rail system with 8" x 8" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 1): $99,550.00

Item 2: ***Pump Station #2 (Duty Point: 2700 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3301, 636 Impeller Code. Complete with 50' of Cable and FLS. The pumps will be powered by a 3-60-460 Volt, 70 HP Motor. Complete slide rail system with 10" x 10" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 2): $113,166.00

Item 3: ***Pump Station #3 (Duty Point: 4300 GPM @ 70' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3300/625 impeller with a 410 mm impeller. Complete with 50' of Cable, MAS units, FLS in junction chamber, and FLS in stator housing. The pumps will be powered by a 3-60-460 Volt, 110 HP Motor. Complete slide rail system with 12" x 14" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 3): $162,744.00

Item 4: ***Pump Station #4 (Duty Point: 5100 GPM @ 70' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3306/670 impeller with a 410 mm impeller. Complete with 50' of Cable, MAS units, FLS in junction chamber, and FLS in stator housing. The pumps will be powered by a 3-60-460 Volt, 140 HP Motor. Complete slide rail system with 12" x 12" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 4): $180,102.00

Item 5: ***Pump Station #5 (Duty Point: 4500 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3300/625 impeller with a 395 mm impeller. Complete with 50' of Cable, MAS units, FLS in junction chamber, and FLS in stator housing. The pumps will be powered by a 3-60-460 Volt, 90 HP Motor. Complete slide rail system with 12" x 14" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 5): $156,174.00

RAM INDUSTRIAL SERVICES, INC.
Box 478 • 1799 Plank Rd. • Carrolltown, PA 15722-0478
Telephone 814/344-6591 • Fax 814/344-8020

Item 6: ***Pump Station #6 (Duty Point: 6600 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3306/670 impeller with a 420 mm impeller. Complete with 50' of Cable, MAS units, FLS in junction chamber, and FLS in stator housing. The pumps will be powered by a 3-60-460 Volt, 140 HP Motor. Complete slide rail system with 12" x 12" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 6): $180,102.00

Item 7: ***Pump Station #7 (Duty Point: 1350 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP171, 434 Impeller Code. Complete with 50' of Cable and FLS. The pumps will be powered by a 3-60-460 Volt, 34 HP Motor. Complete slide rail system with 6" x 6" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 2" schedule 40 pipe (not included).

Total Package Price (Item 7): $51,954.00

Item 8: ***Pump Station #8 (Duty Point: 2150 GPM @ 60' TDH)***
Three (3) Flygt Submersible Wastewater Pump, Model NP3202, 640 Impeller Code. Complete with 50' of Cable and FLS. The pumps will be powered by a 3-60-460 Volt, 60 HP Motor. Complete slide rail system with 8" x 8" pit mounted elbow, safety hook assy., 20' lifting chain, and upper guide bar brackets. This system requires qty. (2) of 3" schedule 40 pipe (not included).

Total Package Price (Item 8): $99,550.00

Terms: To be determined
F.O.B. Shipping Point
Freight: Prepaid and Allowed
Delivery: 10-12 Weeks after approved submittals
Pricing: Firm for acceptance within thirty days from date of quotation.

Should you require any additional information, or if we may be of further assistance please do not hesitate to contact us.

Sincerely,

Joe Felix, Inside Sales
Mike Presutti, Sales Manager - Cell # 412-841-9324
Ram Industrial Services, Inc.

APPENDIX N
ENVIRONMENTAL REPORT

ENVIRONMENTAL REPORT
BUTLER AREA SEWER AUTHORITY
BUTLER COUNTY, PENNSYLVANIA

1.0 PROJECT DESCRIPTION AND NEED

1.1 Purpose and Need for Project

The purpose of the proposed project is to eliminate sanitary sewer overflows (SSOs) in the Butler Area Sewer Authority (BASA) service area. On October 13, 2006, the Authority and all seven of its service area municipalities entered into a Consent Order and Agreement (COA) with the Pennsylvania Department of Environmental Protection to address wet weather SSO problems. The COA requires the Authority to eliminate unpermitted discharges from the Ballpark, General Tire, and Deshon SSO structures by July 31, 2012.

1.2 Project Description

The Butler Area Sewer Authority serves seven communities in central Butler County. The service area includes the entire City of Butler plus portions of the surrounding municipalities of Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township. The Authority currently owns, operates, and maintains a 10.00 million gallon per day (mgd) capacity wastewater treatment plant, over 300 miles of collector and interceptor sewers ranging in size from 6-inches to 48-inches in diameter, and 22 sewage pumping stations. Treated effluent from the plant is discharged to Connoquenessing Creek, a tributary of the Beaver River.

The Butler wastewater treatment plant is not hydraulically or organically overloaded as defined by Chapter 94 regulations. However, the conveyance system is hydraulically overloaded during wet-weather periods, whereby peak flows exceed the carrying capacity of some portions of the system and cause sanitary sewer overflows (SSOs). The Authority proposes to construct flow equalization facilities and related conveyance system upgrades to reduce the number and severity of SSO events. The recommended storage facilities have sufficient volume to capture all historic overflow events that have ever been recorded in the BASA system, except for a single overflow event that was measured at the Deshon pump station in January 2005. Estimated costs for the recommended system improvements are summarized below.

Description	Estimated Cost
Deshon Diversion, Pumping, and Storage Facilities	$ 6,727,000
Monroe Diversion, Pumping, and Storage Facilities	3,521,000
Ballpark/General Tire Diversion and Pumping Facilities	3,591,000
Connoquenessing Diversion and Pumping Facilities	3,671,000
Central Storage Facilities	10,104,000
Conveyance System Upgrades	2,779,000
Total	$30,393,000

The anticipated primary funding source for the project is PENNVEST. The secondary funding source is sewer revenue bonds issued by the Authority.

Exhibit A to this report contains project information from the Act 537 Sewage Facilities Planning Study Update. Figure VI-7 shows general locations for proposed new facilities associated with the project. The area shown in Figure VI-7 includes portions of United States Geological Survey topographic maps for the Mount Chestnut, East Butler, Butler, and Saxonburg 7.5 minute quadrangles.

Exhibit A also includes site maps for each of the locations shown in Figure VI-7. Figure VI-2 shows the proposed location for diversion, pumping, and storage facilities at the Deshon pump station. Figure VI-3 illustrates alternative locations for proposed diversion, pumping, and storage facilities at the Monroe pump station. Figure VI-4 shows the proposed location for the Ballpark/General Tire diversion and pumping facilities. Figure VI-5 indicates the proposed location for the Connoquenessing diversion and pumping facilities. Figure VI-6 shows the proposed location for the Central Storage Facilities.

2.0 SUMMARY OF REASONABLE ALTERNATIVES CONSIDERED

2.1 Alternatives Considered

A no-action alternative would not address current conveyance system deficiencies that cause SSOs. This lack of action would have negative short and long-term impacts on water quality because sanitary sewer overflows would continue to occur during wet weather conditions and pollute surface waters. The pollutants emitted by untreated discharges reduce recreational opportunities and potentially impact downstream drinking water sources. No action in addressing the identified problems would also adversely affect growth potential and economic conditions in local communities because a ban on new taps to the public sewer system would continue in the BASA service area until the overload condition is addressed. Finally, no action in addressing the current SSO problem would be in direct violation of the October 13, 2006 COA and would lead to additional fines and legal actions.

Reasonable alternatives that were considered for the project included the following:

- Construction of flow diversion, pumping, and flow equalization facilities to capture SSOs

2.2 Comparison of Alternatives

Construction of flow diversion, pumping, and equalization facilities to address the SSO problem was the only alternative considered in the Act 537 Sewage Facilities Planning Study Update. The 537 Plan evaluated the pumping rates required to fill the flow equalization tanks, as well as the SSO capture rates that could be achieved by providing different storage volumes.

Under a previous COA dated February 20, 2001, the Authority developed order of magnitude cost estimates for alternatives that included the following:

- Complete public sewer rehabilitation/replacement to eliminate extraneous flow.
- Increased plant capacity to treat peak wastewater flow rates.
- Installation of wet weather equalization storage facilities at overflow sites.

Costs were highest for the sewer rehabilitation alternative and lowest for the flow equalization option. All three alternatives are technically feasible. However, provision of wet weather storage facilities was determined to be the best choice from a practical standpoint and the most direct method to eliminate sewer system overflows. No observable reductions in peak flow rates have resulted from past sewer rehabilitation work, including $11 million worth of projects completed by the Authority under the February 2001 COA. Therefore, there is no guarantee that a system-wide sewer rehabilitation program would eliminate SSOs. Finally, site constraints in and around the treatment plant property would make expansion of the existing facilities difficult. Plus, an expanded treatment facility would face significant operational challenges in adequately treating wastewater flow rates that range from less than 5 mgd to almost 70 mgd.

The proposed alternative of installing flow diversion, pumping, and equalization facilities is not expected to significantly impact environmental resources in affected areas, except for the temporary impacts associated with construction projects.

3.0 ENVIRONMENTAL CONSEQUENCES OF THE PROJECT

The selected alternative includes construction of flow diversion, pumping, and flow equalization facilities to capture SSOs for treatment. This alternative was selected because it was previously identified as the lowest cost option to address SSO discharges during wet weather periods. The environmental effects of the proposed project are described below.

3.1 Land Use/Important Farmland/Formally Classified Lands

The proposed location for the Deshon flow equalization facilities is adjacent to the Deshon pump station in Butler Township. This section of the Township is zoned R-1, single family residential. The remaining flow equalization facilities will be constructed in the City of Butler. The proposed location for the Ballpark/General Tire pumping facility is zoned R-2, medium density residential. Proposed locations for the other facilities are all zoned M-2, heavy industrial.

The project will not impact areas with prime farmland. The Deshon equalization tank will be located on Hazelton, Gilpin, and Andover soils. None of these soils are classified as prime farmland. Prime farmland in the City is limited to a few map units along the northern border. None of the proposed facilities within the City will impact areas with prime farmland. The proposed project will also not impact any national parks, state parks, forests, trails, national monuments, or national landmarks.

Exhibit B presents information for the project area, including a zoning map for the City of Butler and part of the zoning map for Butler Township. Table VI-1 lists the soil map units in Butler County that qualify as prime farmland. The two soils maps show the locations of prime farmland in Butler Township and the City of Butler.

3.2 Floodplains

Floodplain information from the Federal Emergency Management Agency (FEMA) website is presented in Exhibit C. The Flood Insurance Rate Maps show areas of interest in Butler Township and the City of Butler. Approximate locations for proposed facilities are illustrated on the maps.

The proposed location for diversion, pumping, and storage facilities at the Deshon pump station is in Zone C, an area of minimal flooding. The proposed location for the Connoquenessing diversion and pumping facilities is also situated in Zone C. The location for proposed diversion and pumping facilities at the Monroe pump station is in Zone C but the equalization tank site is located in Zones A6 and B. Zones A1 to A30 are classified as areas of 100-year flooding. Zone B is defined as areas subject to 100-year flooding with an average depth of less than 1-foot

The proposed location for the Central Storage Facilities is in Zone C, an area of minimal flooding. The proposed location of the Ballpark/General Tire diversion pumping facility is situated in Zone A5, which is part of the 100-year flood plain. Part of the force main that will transport wastewater to the Central Storage Facilities will also pass through the 100-year flood plain. The force main to the Central Storage Facility will not be subject to infiltration since the pipe will be under pressure.

The City of Butler and the Pennsylvania Department of Environmental Protection are planning a Sullivan Run improvement project that will eliminate a culvert on Sullivan Run that is located near Negley Avenue. This culvert is said to be a significant impediment to stream flow, causing the limits of the flood plain upstream of the culvert to widen significantly. The limits of the flood plain will be greatly reduced after the culvert is removed, at which time the Ballpark/General Tire diversion pumping facility may no longer be situated in Zone A5.

New lines will be bored under streams because boring the lines will have little or no impact as compared to alternative construction techniques. Plans and specifications for the project will require the use of best management practices for erosion and sedimentation control for all boring operations to minimize potential impacts on streams.

3.3 Wetlands

Exhibit D contains wetlands maps for the City of Butler and Butler Township. Exhibit D also includes a list of hydric soils for Butler County and maps that show the locations of hydric soils.

One mapped wetland in the City of Butler, identified as PEMY or a semi-permanent palustrine emergent wetland, is situated in the vicinity of the proposed Monroe diversion and storage facility. However, this wetland area is located approximately 300 feet from both alternative sites for the proposed facility and will not be impacted by construction. There are no wetland areas located near the proposed diversion, pumping, and storage facilities at the Deshon pump station.

There are no hydric soils located near proposed facilities in the City of Butler. The soils list and the map for Butler Township indicate that there are hydric soils in the vicinity of the Deshon pump station. Soils in and around the Deshon pump station, where the proposed diversion pump station will be constructed, are Atkins silt loam. The proposed equalization tanks will be located primarily on Hazelton and Gilpin soils, but part of the tank may be located on Andover loam. Andover loam, Atkins silt loam, and Hazelton channery loam are classified as hydric soils. Therefore, the construction area around the Deshon pump station will have to be delineated for wetlands in accordance with current DEP and USACE guidelines. Wetlands delineations may also be needed for some of the other sites based on their locations.

3.4 Historic Resources

A Cultural Resource Notice was completed and sent to the Pennsylvania Historical and Museum Commission (PHMC). A copy of the PHMC review letter is included as Exhibit E. A Phase I archaeological survey of the project area was prepared and a Historical Industrial Resource and Site Survey Form was also completed for a building on one of the properties. Copies of the PHMC review letters for these items can be found in Exhibit H as well. PHMC is of the opinion that no further archaeological work is necessary and the proposed project will have no effect on historic properties.

3.5 Sensitive Biological Resources

A request for review of Pennsylvania Natural Diversity Inventory (PNDI) data was made to the Department of Conservation and Natural Resources Bureau of Forestry. The same request was also made to the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, and the U.S. Fish and Wildlife Service. Response letters are included as Exhibit F. Based on the responses, no adverse impacts are expected from the proposed project.

3.6 Water Quality Issues

Construction of diversion, pumping, and flow equalization facilities will improve surface water quality in the area by reducing the number and severity of SSO discharges during wet weather. The facilities will also allow BASA to comply with an October 13, 2006 COA that requires the Authority to eliminate unpermitted discharges from the Ballpark, General Tire, and Deshon SSO structures by July 31, 2012.

3.7 Coastal Resources

No coastal zones or coastal barriers resources exist within or near the proposed study area.

3.8 Socio-Economic Issues

The proposed project will not impose any disproportionate adverse effects on minority and disadvantaged populations. US Census 2000 information shows that minorities represent less than five percent of the population in the BASA member municipalities. For comparison purposes, minorities account for about 25 percent of the population in the United States as a whole.

US Census information also indicates that the incomes of 9.2 percent of families in the United States fall below the poverty level. Most of the municipalities in the BASA system have poverty levels well less than the national average. However, 14.7 percent of the families in the City of Butler and 10.5 percent of the families in Summit Township have incomes below the poverty level. The primary economic impact of the proposed project will be related to higher monthly sewer service charges that are needed to finance the recommended improvements.

3.9 Air Quality

Air emissions associated with the project will be temporary and limited to those that normally result from construction projects. Fugitive dust emissions and exhaust emissions from construction vehicles will be short term and will be controlled using normal construction practices. The proposed projects will not produce any long-term air emissions.

3.10 Transportation

Sewer construction activities will be limited to existing streets and may temporarily affect the road system and traffic patterns. Traffic at the end of the workday will be restored on all streets. Emergency vehicles will be able to access all portions of the study area. No new traffic patterns are expected.

3.11 Noise Abatement and Control

During construction activities, machinery and equipment noises will be generated during the workday. However, the noise associated with construction will be temporary and will only impact residents during construction work hours. No new noise impacts are expected after construction is completed.

3.12 Wild and Scenic Rivers

The proposed project will not have any effects on any river in the National Wild and Scenic Rivers system, the "Nationwide Rivers Inventory", or on American Heritage rivers.

3.13 Miscellaneous Environmental Considerations

The primary environmental impact of the proposed project will be an improvement in water quality through capture, storage, and treatment of SSOs during wet weather conditions.

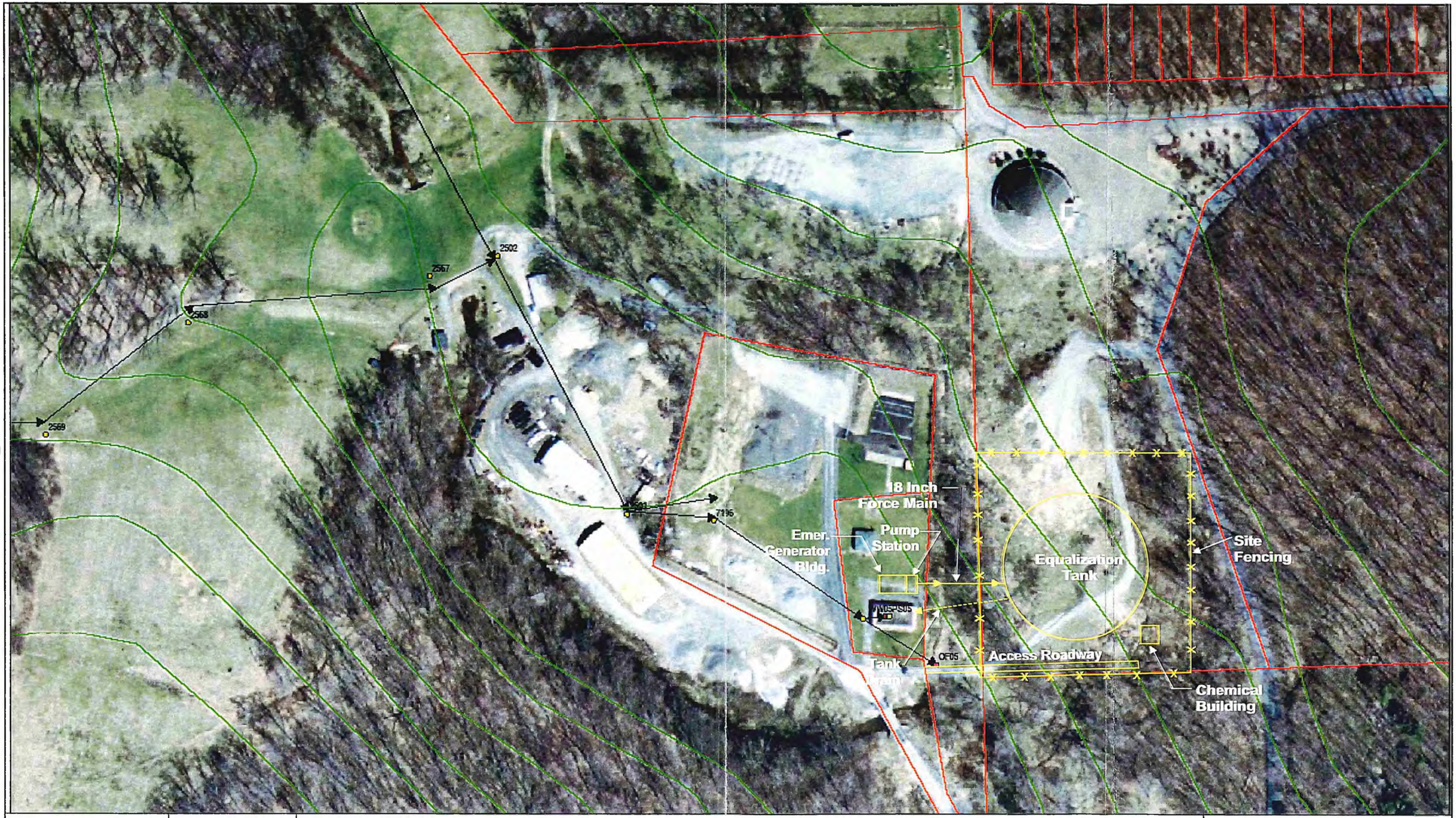
4.0 SUMMARY OF MITIGATION

The Contract Documents will require contractors to comply with the Soil and Erosion and Sediment Control Plan approved by the Butler County Conservation District.

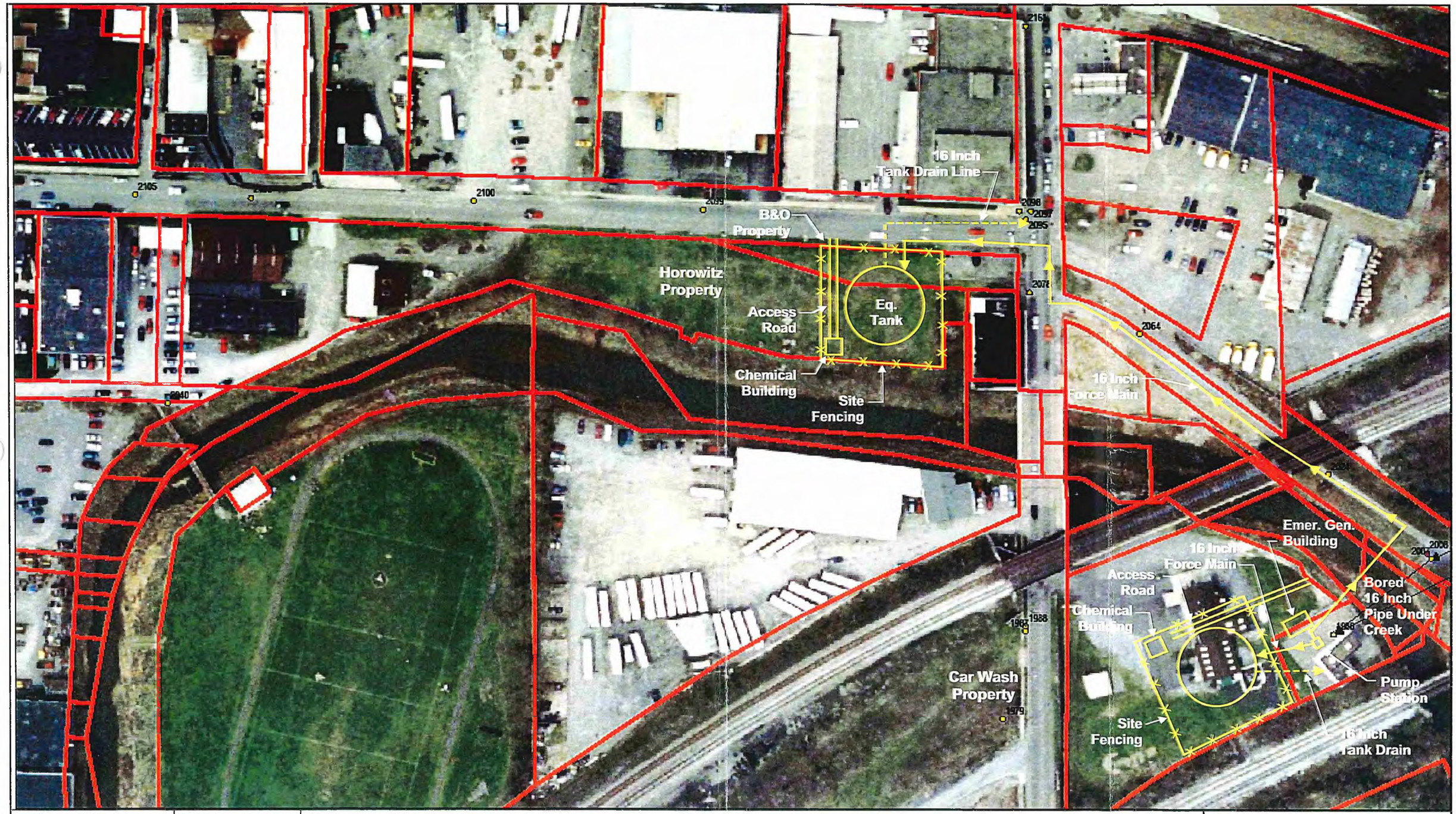
5.0 PUBLIC PARTICIPATION

The Butler Area Sewer Authority will hold a public meeting to discuss planning and implementation of the proposed project. The date and time of the meeting will be advertised in a local general circulation newspaper prior to the meeting date. Information to be provided to the public will include a general project description, estimated project costs, proposed project financing plan, estimated user rates, anticipated project benefits, and potential project impacts.

EXHIBIT A



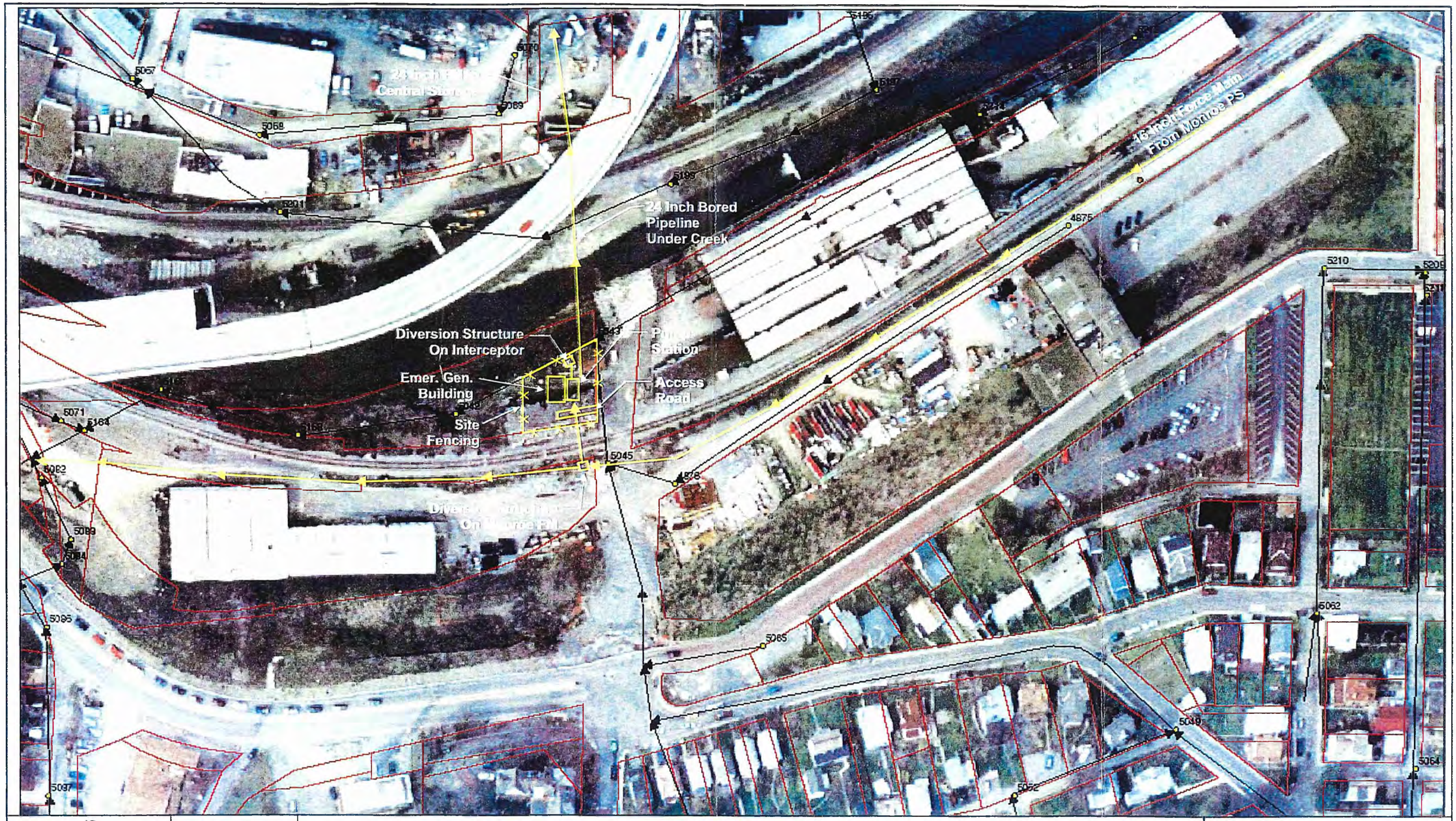
DRW. JS	Date. 5/2/08	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Deshon Pump Station Proposed Diversion, Pumping, and Storage Facilities	CHESTER ENGINEERS
APP. MM	**Figure** VI-2		
Scale 1" = 100'			
File BASA_des1			



DRW. JS	Date. 5/6/08	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Monroe Pump Station Proposed Diversion, Pumping, and Storage Facilities	CHESTER ENGINEERS
APP. MM	**Figure** VI-3		
Scale 1" = 100'			
File BASA_Monr			



DRW. JS	Date. 5/6/08	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM	**Figure** VI-4	Ball Park / General Tire Proposed Diversion and Pumping Facilities	
Scale 1" = 100'			
File BASA_Gen			

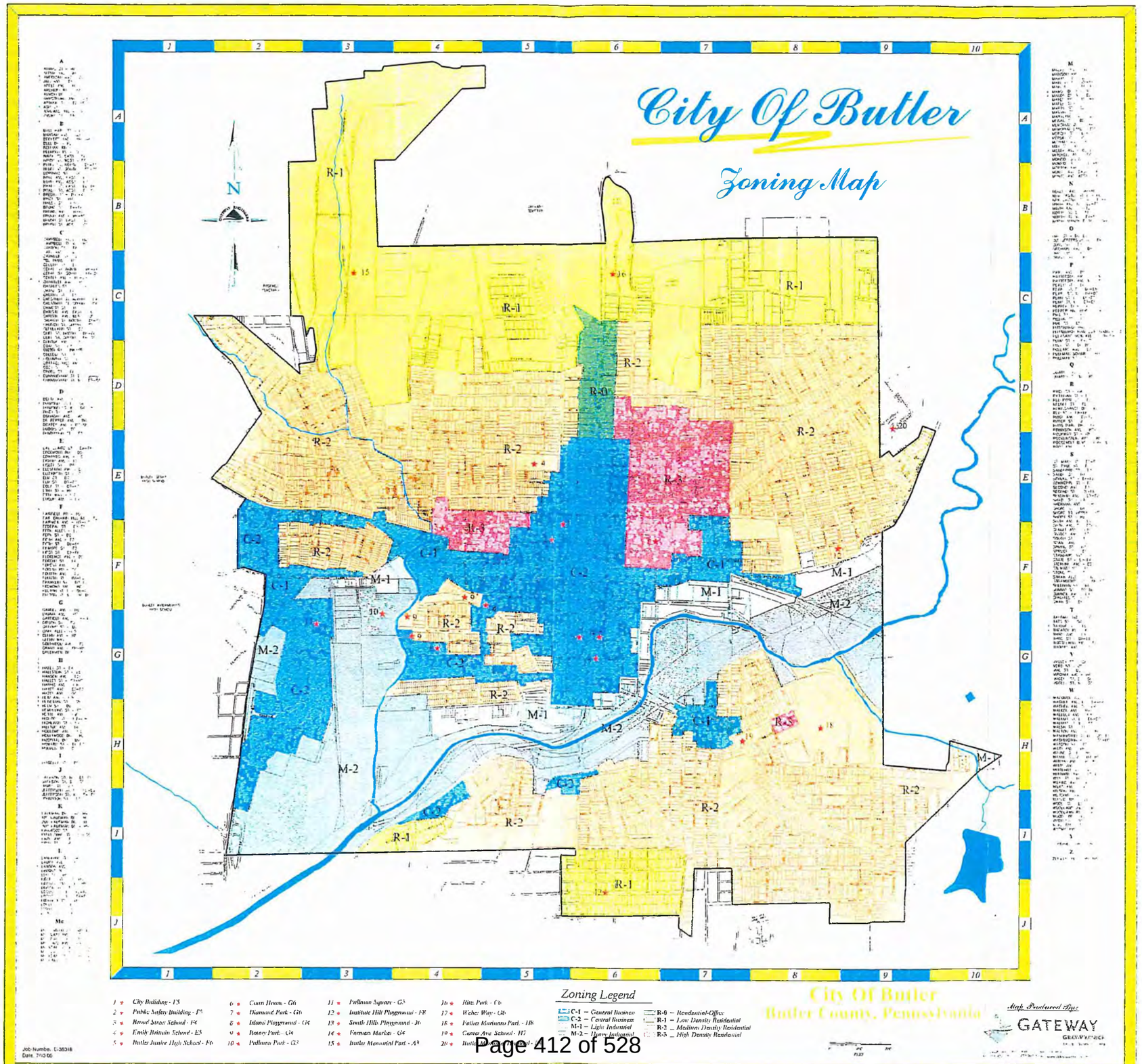


DRW. JS	Date. 5/8/08	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Connoquenessing Creek Proposed Diversion and Pumping Facilities	CHESTER ENGINEERS
APP. MM	**Figure** VI-5		
Scale 1" = 100'			
File BASA_Conn			

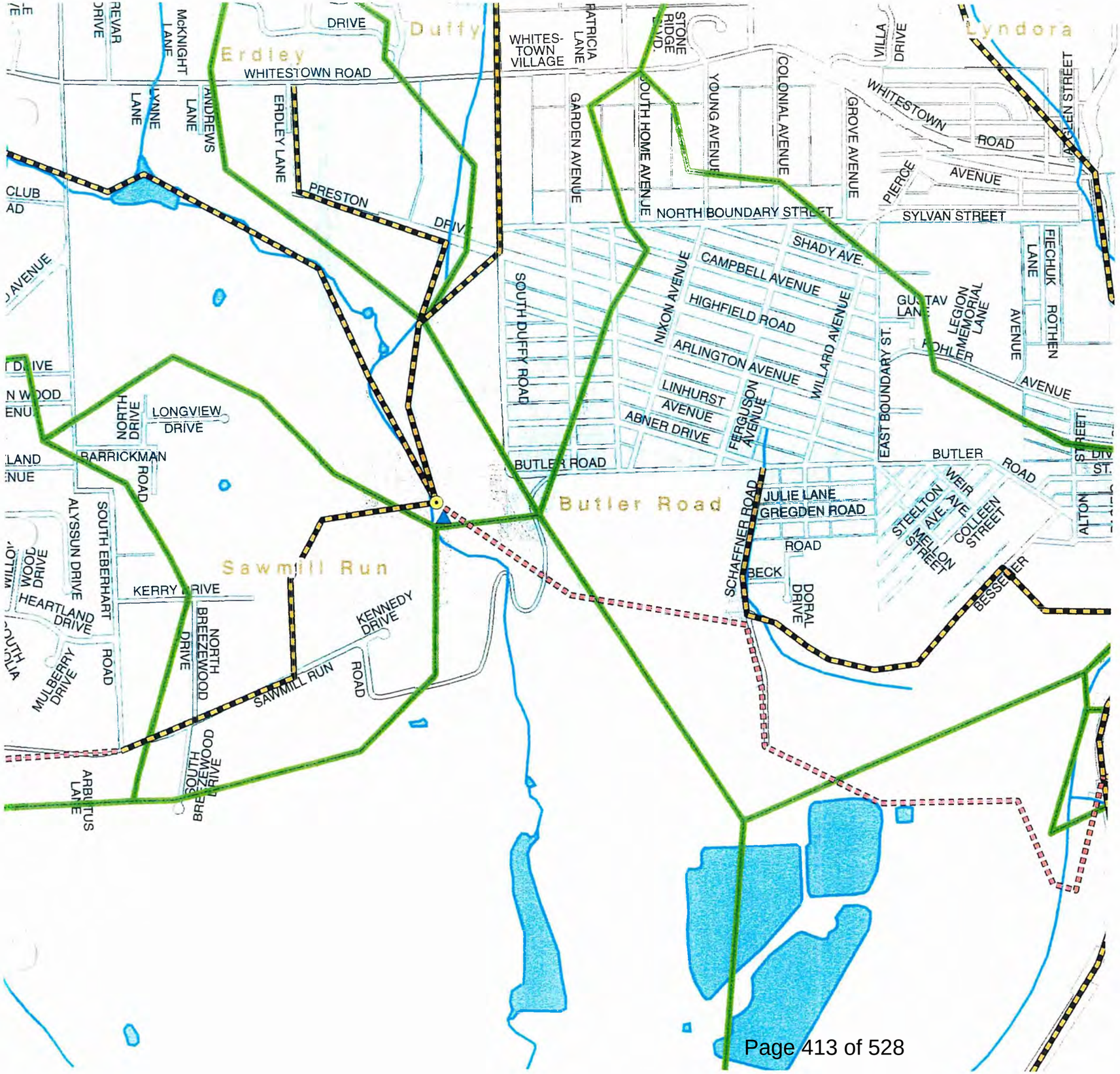


DRW. JS	Date. 5/8/08	**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Proposed Central Storage Facilities	CHESTER ENGINEERS
APP. MM	**Figure** VI-6		
Scale 1" = 100'			
File BASA_Cent			

EXHIBIT B


City Of Butler
Zoning Map
N
R-1
R-2
R-3
R-0
C-1
C-2
M-1
M-2
Zoning Legend
C-1 – General Business
C-2 – Central Business
M-1 – Light Industrial
M-2 – Heavy Industrial
R-0 – Residential-Office
R-1 – Low Density Residential
R-2 – Medium Density Residential
R-3 – High Density Residential
1 City Building - I5
2 Public Safety Building - F5
3 Broad Street School - F4
4 Emily Brittain School - E5
5 Butler Junior High School - H6
6 Court House - G6
7 Diamond Park - G6
8 Island Playground - G4
9 Rotary Park - G4
10 Pullman Park - G2
11 Pullman Square - G3
12 Institute Hill Playground - F8
13 South Hills Playground - J6
14 Farmers Market - G4
15 Butler Memorial Park - A3
16 Rite Park - C6
17 Wehe Way - G6
18 Father Marinaro Park - H8
19 Center Ave School - H7
20 Butler Memorial Park - A3
City Of Butler
Butler County, Pennsylvania
Map Produced By:
GATEWAY

Butler Township Zoning Map (part)



Legend

- Butler Township Line
- Sewersheds

Sewer Structures

- Pump Station
- Sanitary Sewer Overflow
- Treatment Plant

Sewer Lines

- Interceptor
- Force Main

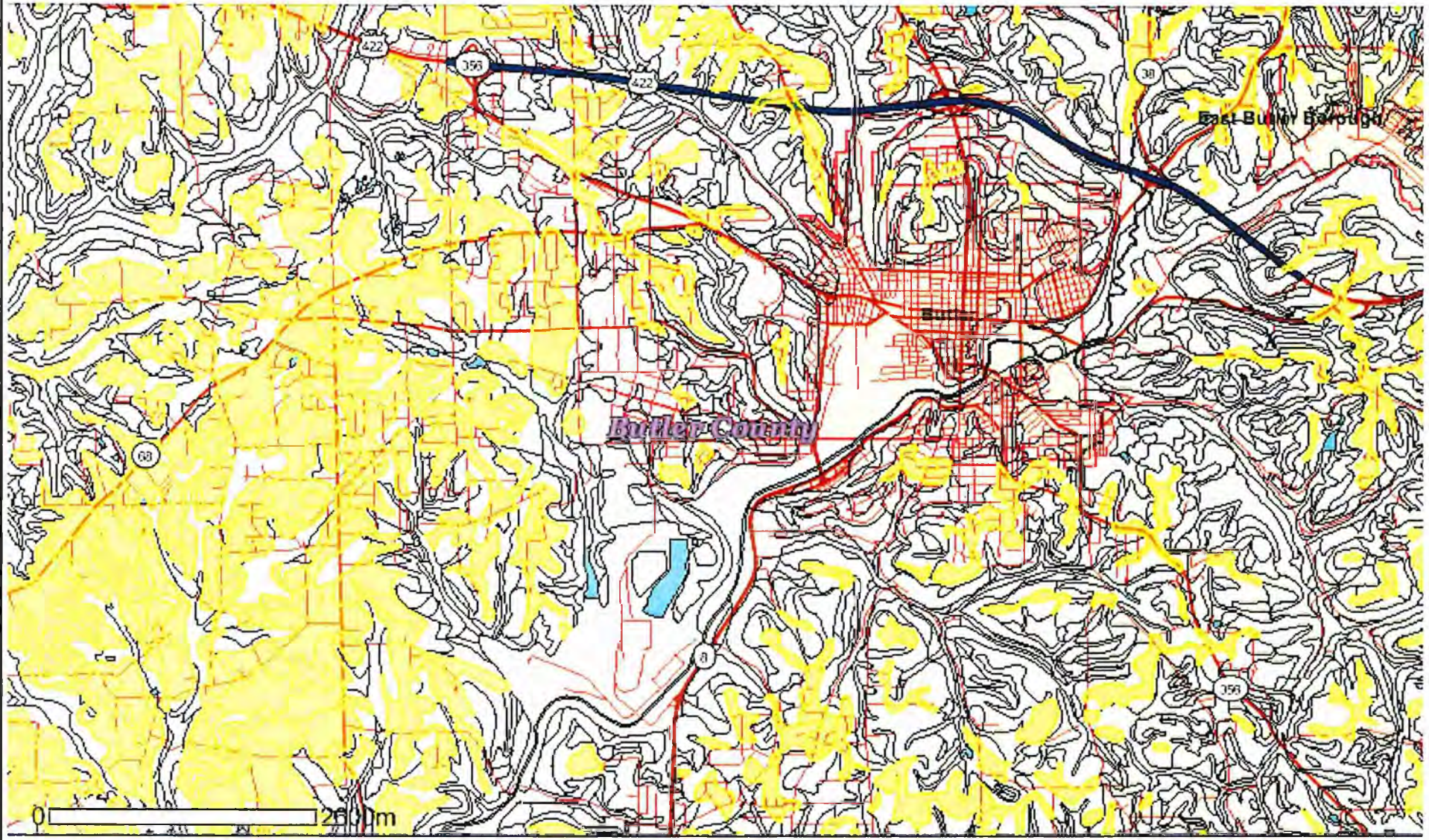
Zoning Districts

- A-1
- C-1
- C-2
- M
- R-1
- R-2

Table VI-1

Butler County Prime Farmland

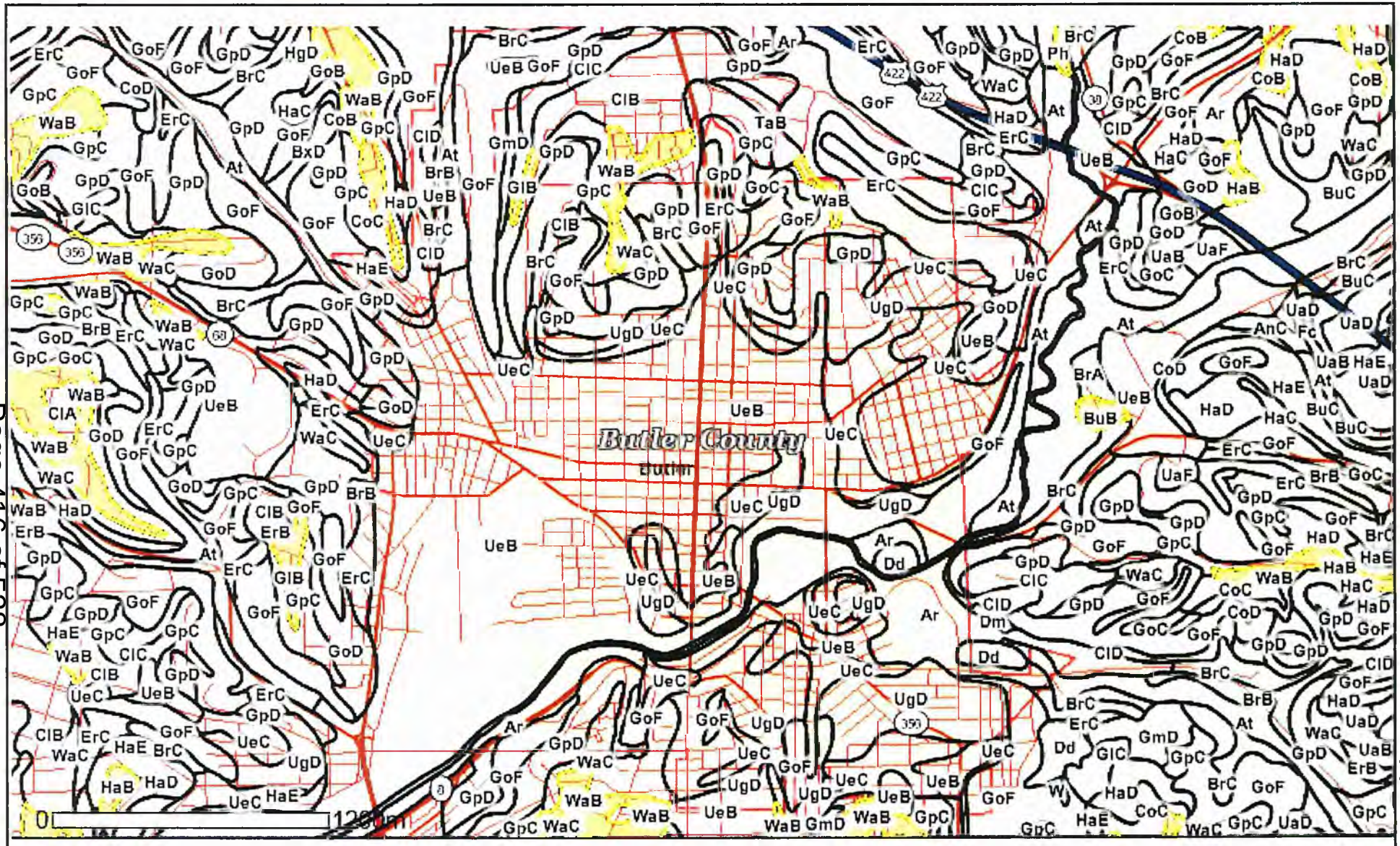
Map Symbol	Soil Map Unit
BeA	Braceville loam, 0 to 3 percent slopes
BeB	Braceville loam, 3 to 8 percent slopes
BuB	Buchanan loam, 3 to 8 percent slopes
CfB	Canfield silt loam, 3 to 8 percent slopes
CmB	Clymer loam, 3 to 8 percent slopes
CoA	Cookport loam, 0 to 3 percent slopes
CoB	Cookport loam, 3 to 8 percent slopes
GlB	Gilpin silt loam, 3 to 8 percent slopes
HaB	Hazleton channery loam, 3 to 8 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
Ph	Philo loam
Po	Pope loam
RaA	Ravenna silt loam, 0 to 3 percent slopes
RaB	Ravenna silt loam, 3 to 8 percent slopes
RdB	Riverhead sandy loam, 3 to 8 percent slopes
TaA	Tilsit silt loam, 0 to 3 percent slopes
TeB	Titusville silt loam, 3 to 8 percent slopes
WaA	Wharton silt loam, 0 to 3 percent slopes
WaB	Wharton silt loam, 3 to 8 percent slopes
WhA	Wheeling silt loam, 0 to 3 percent slopes
WhB	Wheeling silt loam, 3 to 8 percent slopes
WoB	Wooster gravity silt loam, 3 to 8 percent slopes



KEY

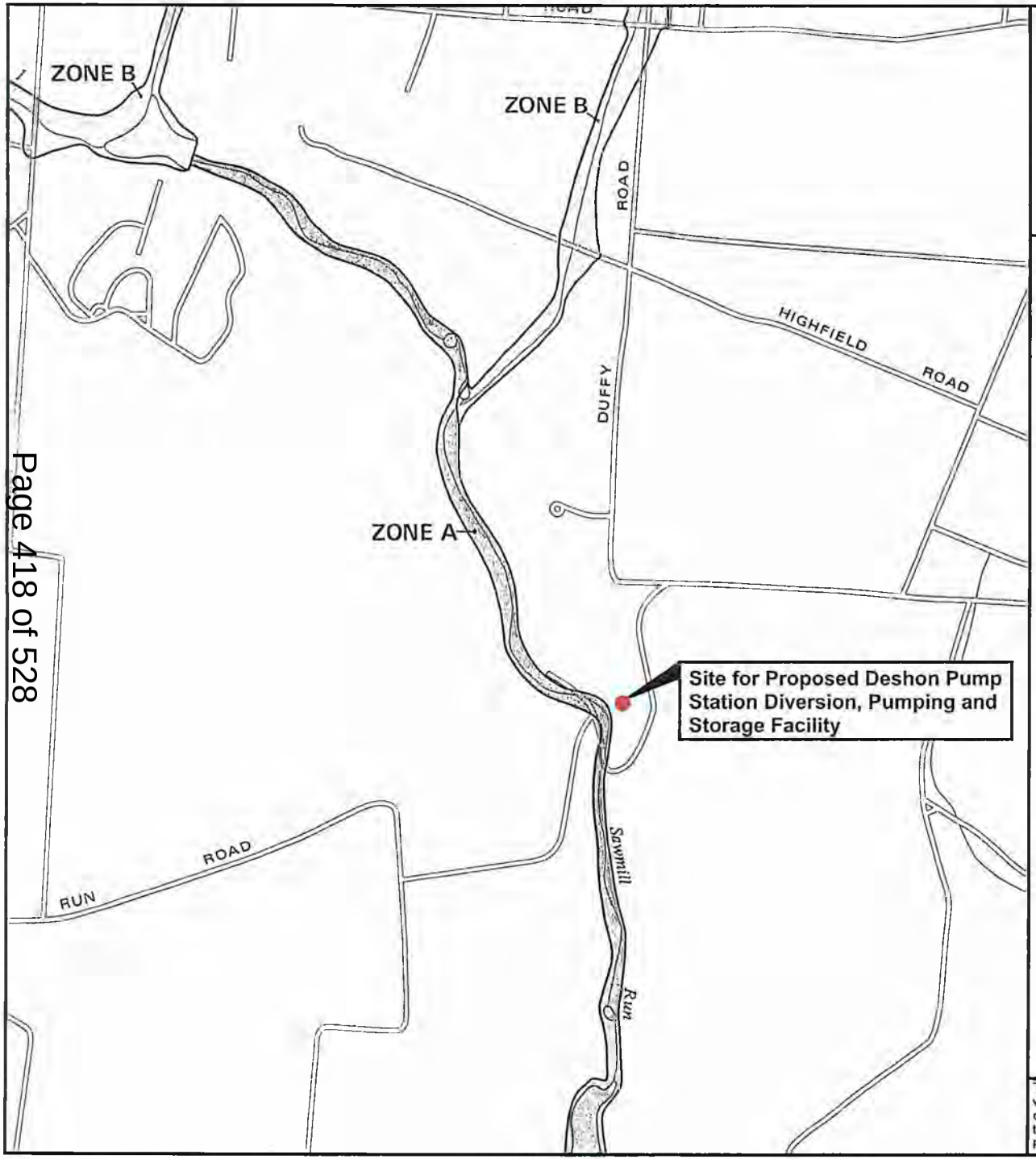
Prime Farmland

DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update** Prime Farmland In Butler Township	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File BASA III 4/25/08			



DRW. JS		**Butler Area Sewer Authority** **Act 537 Sewage Facilities Plan Update**	CHESTER ENGINEERS
APP. MM			
Scale As Shown		Prime Farmlands In City of Butler	
File BASA VII 4/25/08			

EXHIBIT C



APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

TOWNSHIP OF
BUTLER,
PENNSYLVANIA
BUTLER COUNTY

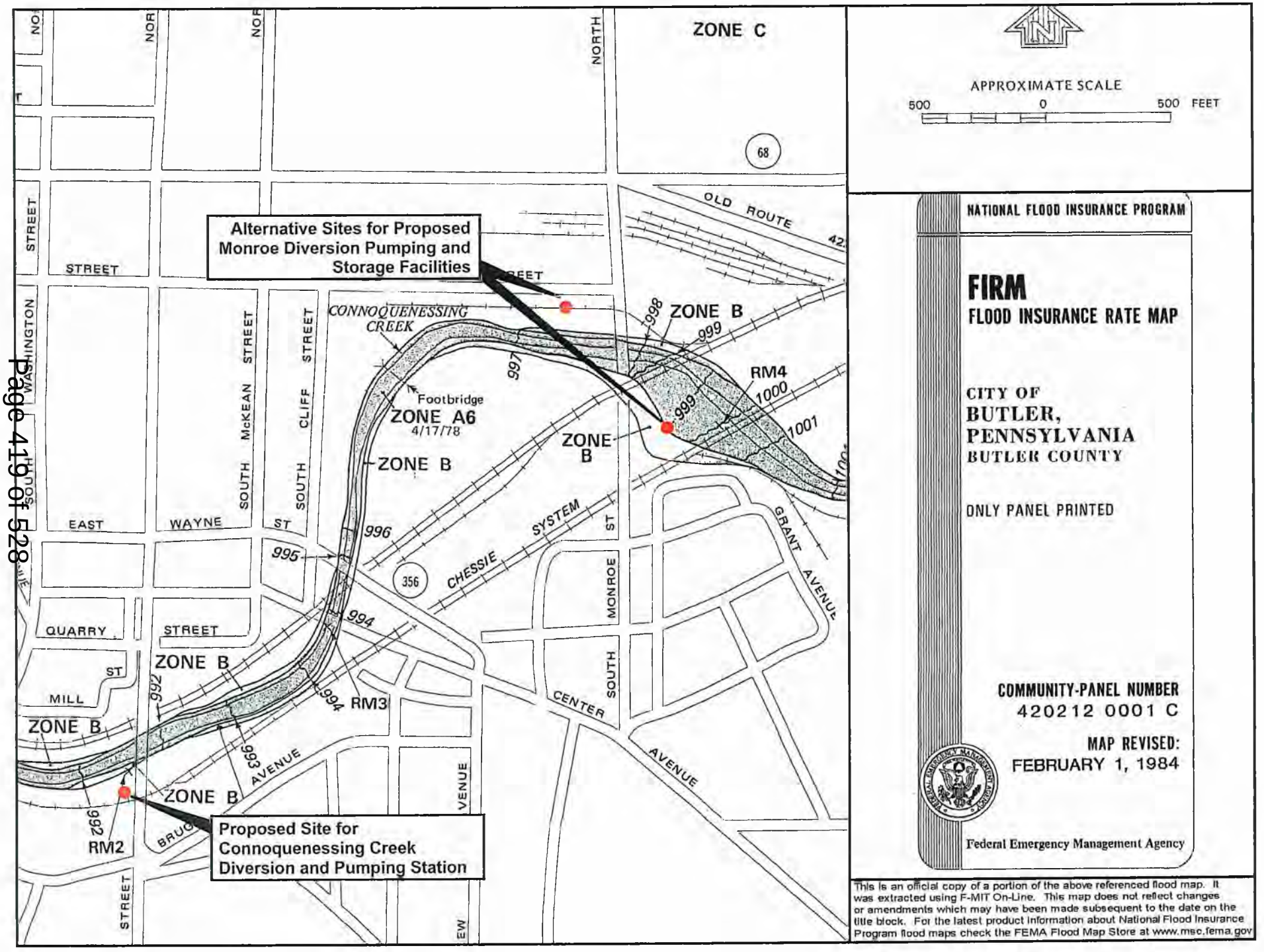
COMMUNITY-PANEL NUMBER
421138 0010 B

PAGE 10 OF 15
(SEE MAP INDEX FOR PAGES NOT PRINTED)

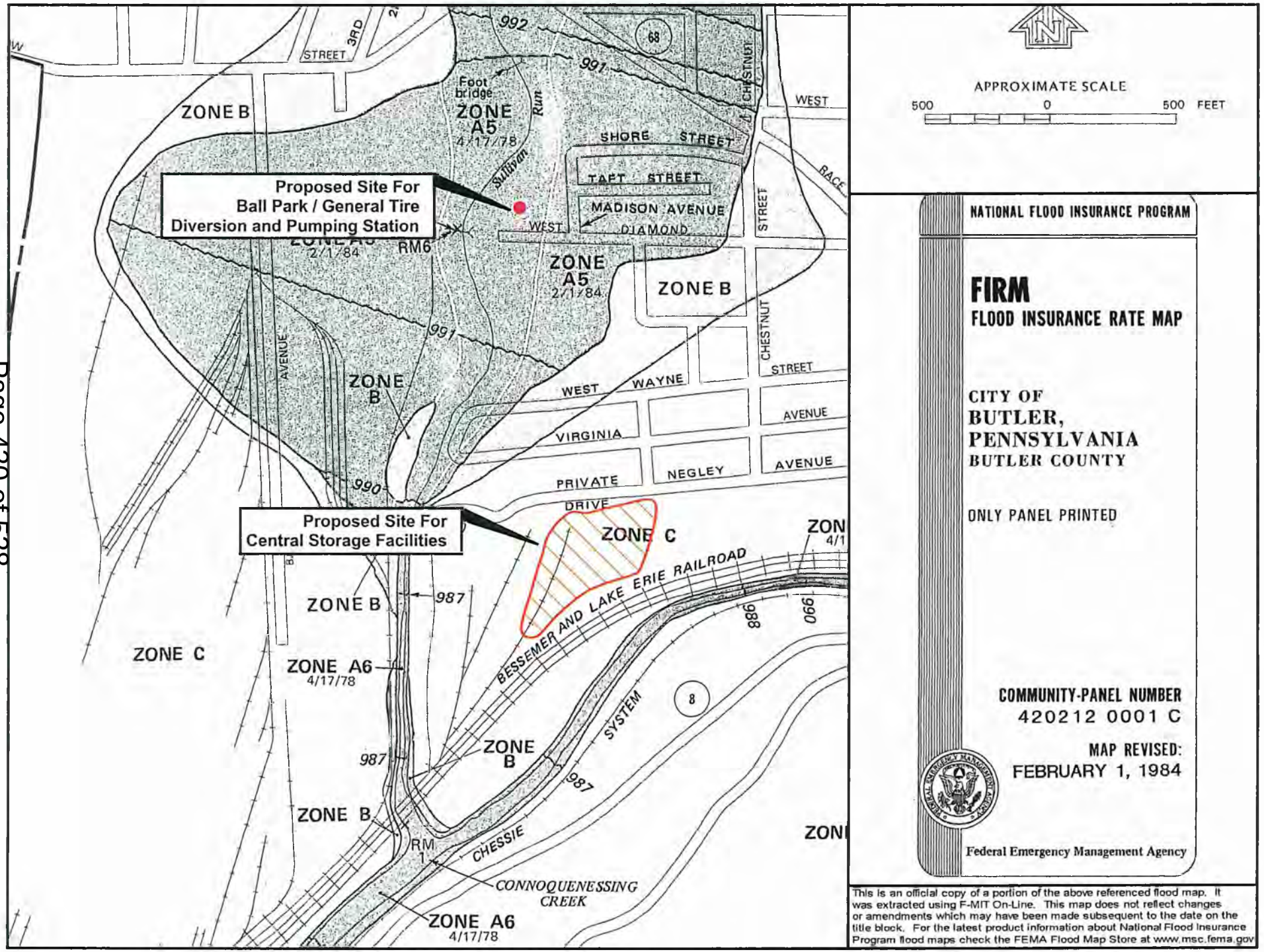
EFFECTIVE
JULY 3. 1978

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



Butler_firm 1 5/30/08



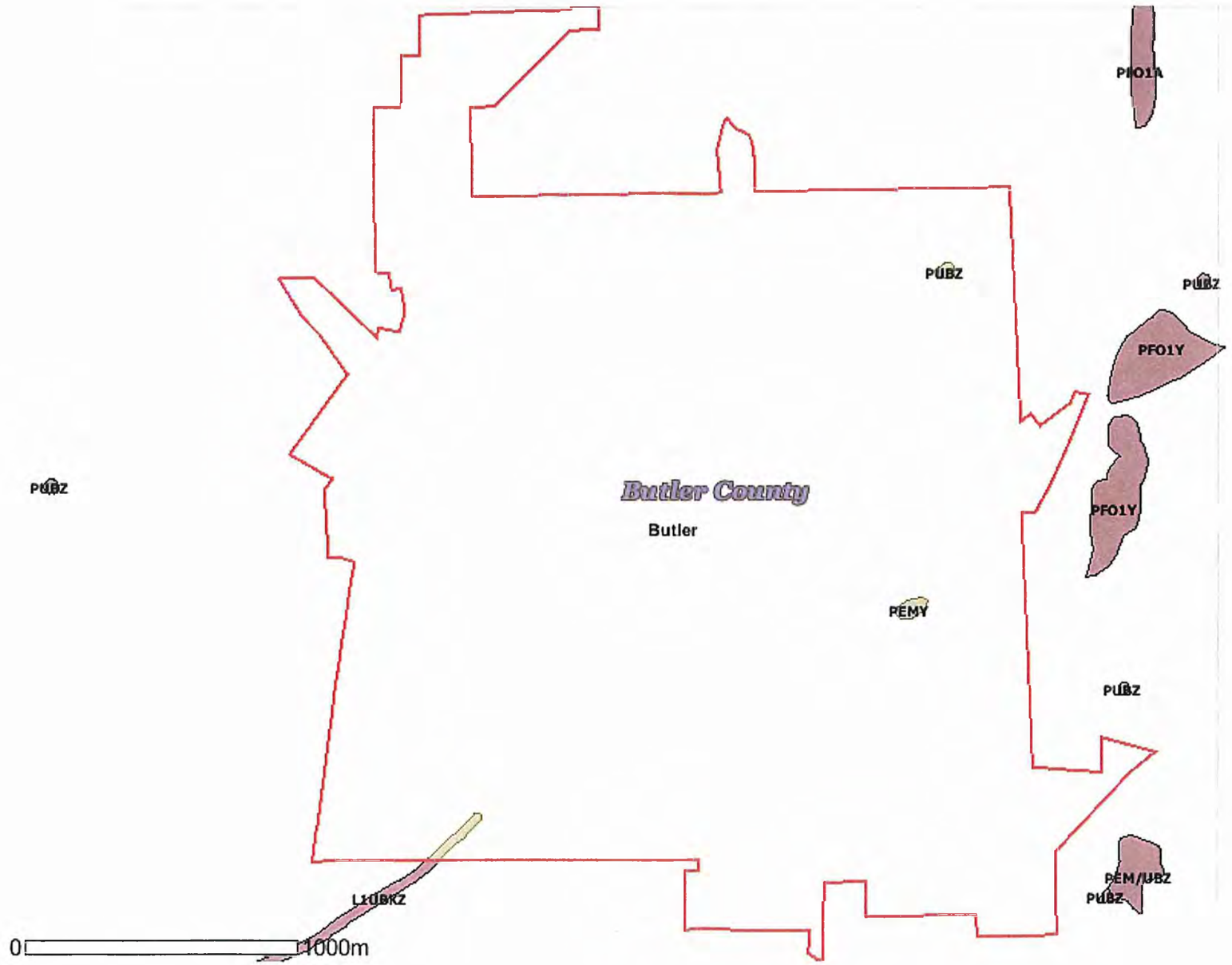
Butler_firm 5/30/08

EXHIBIT D

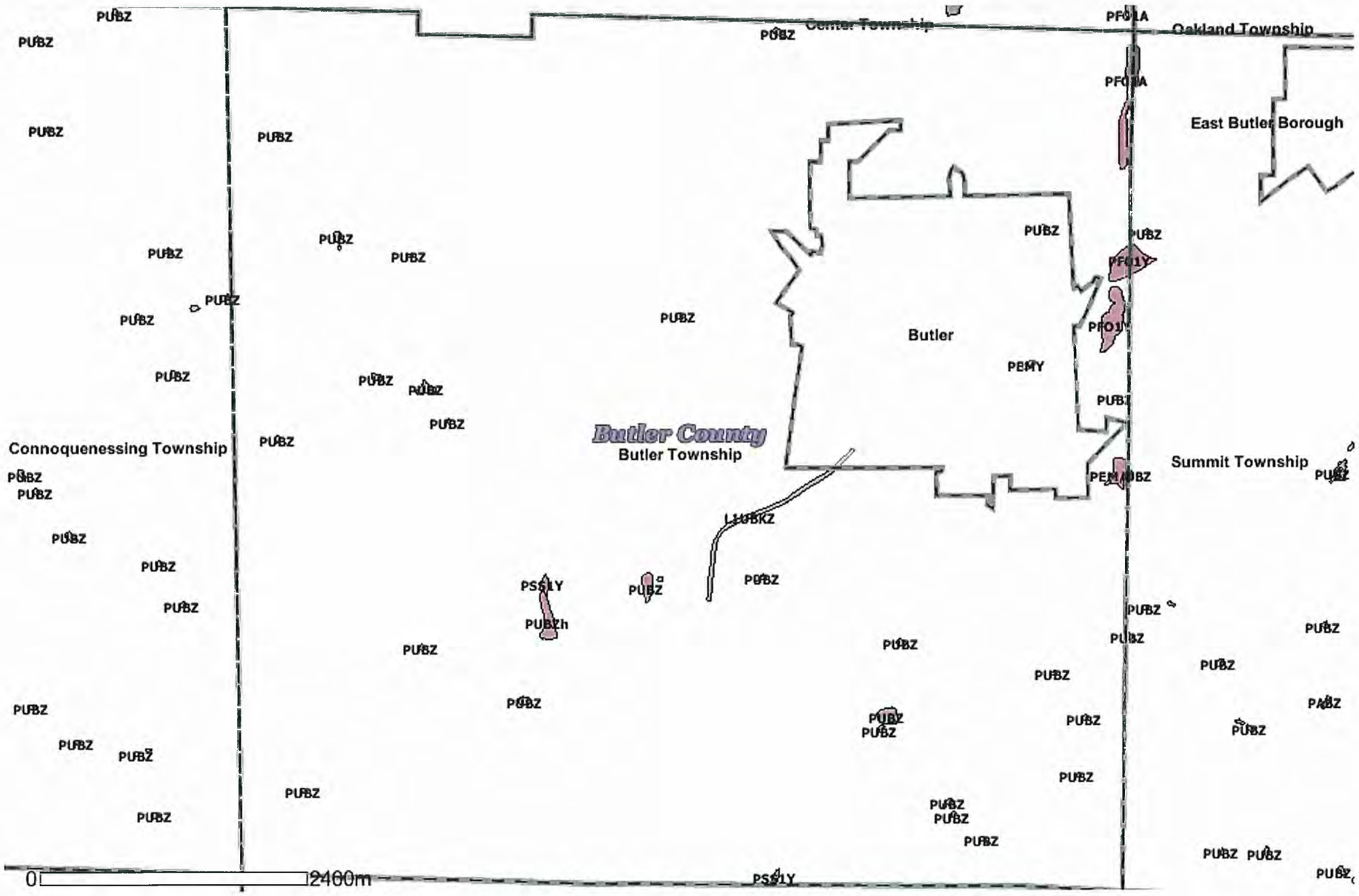
Pennsylvania Portion of the National Hydric Soil List -- August 11, 2005

map unit symbol	map unit name	hydric criteria
AnA	Andover loam, 0 to 3 percent slopes	2B3
AnA	Andover loam, 0 to 3 percent slopes	2B3
AnB	Andover loam, 3 to 8 percent slopes	2B3
AnB	Andover loam, 3 to 8 percent slopes	2B3
AnC	Andover loam, 8 to 15 percent slopes	2B3
AnC	Andover loam, 8 to 15 percent slopes	2B3
AoB	Andover loam, 0 to 8 percent slopes, very stony	2B3
AoB	Andover loam, 0 to 8 percent slopes, very stony	2B3
AoC	Andover loam, 8 to 15 percent slopes, very stony	2B3
AoC	Andover loam, 8 to 15 percent slopes, very stony	2B3
Ar	Arents-Urban land complex	2B3
Ar	Arents-Urban land complex	2B3
At	Atkins silt loam	2B3
At	Atkins silt loam	2B3
At	Atkins silt loam	2B3
BeA	Braceville loam, 0 to 3 percent slopes	2B3
BeB	Braceville loam, 3 to 8 percent slopes	2B3
BeC	Braceville loam, 8 to 15 percent slopes	2B3
BrA	Brinkerton silt loam, 0 to 3 percent slopes	2B3
BrB	Brinkerton silt loam, 3 to 8 percent slopes	2B3
BrC	Brinkerton silt loam, 8 to 15 percent slopes	2B3
BrC	Brinkerton silt loam, 8 to 15 percent slopes	2B3
BuB	Buchanan loam, 3 to 8 percent slopes	2B3
BuB	Buchanan loam, 3 to 8 percent slopes	2B3
BuC	Buchanan loam, 8 to 15 percent slopes	2B3
BxB	Buchanan loam, 0 to 8 percent slopes, very stony	2B3
BxB	Buchanan loam, 0 to 8 percent slopes, very stony	2B3
BxD	Buchanan loam, 8 to 25 percent slopes, very stony	2B3
Cd	Canadice silty clay loam	2B3
Cd	Canadice silty clay loam	2B3
CeA	Caneadea silt loam, 0 to 3 percent slopes	
CeA	Caneadea silt loam, 0 to 3 percent slopes	2B3
CeB	Caneadea silt loam, 3 to 8 percent slopes	
CeB	Caneadea silt loam, 3 to 8 percent slopes	2B3
CeC	Caneadea silt loam, 8 to 15 percent slopes	2B3
CeD	Caneadea silt loam, 15 to 25 percent slopes	2B3
ClA	Cavode silt loam, 0 to 3 percent slopes	2B3
ClB	Cavode silt loam, 3 to 8 percent slopes	2B3
ClC	Cavode silt loam, 8 to 15 percent slopes	2B3
CoA	Cookport loam, 0 to 3 percent slopes	2B3
CoA	Cookport loam, 0 to 3 percent slopes	2B3
CoB	Cookport loam, 3 to 8 percent slopes	2B3
CoB	Cookport loam, 3 to 8 percent slopes	2B3
CoC	Cookport loam, 8 to 15 percent slopes	2B3
CoD	Cookport loam, 15 to 25 percent slopes	2B3
Dd	Dumps, industrial waste	2B3
Dd	Dumps, industrial waste	2B3

Dm	Dumps, mine	2B3
Dm	Dumps, mine	2B3, 3
ErB	Ernest silt loam, 3 to 8 percent slopes	2B3
ErC	Ernest silt loam, 8 to 15 percent slopes	2B3
ErD	Ernest silt loam, 15 to 25 percent slopes	2B3
Fc	Fluvaquents, coal overwash	2B3
Fc	Fluvaquents, coal overwash	2B3
FeA	Fredon loam, 0 to 3 percent slopes	2B3
FeA	Fredon loam, 0 to 3 percent slopes	2B3
FeB	Fredon loam, 3 to 8 percent slopes	2B3
FeB	Fredon loam, 3 to 8 percent slopes	2B3
FrA	Frenchtown silt loam, 0 to 3 percent slopes	2B3, 3
FrA	Frenchtown silt loam, 0 to 3 percent slopes	2B3
FrA	Frenchtown silt loam, 0 to 3 percent slopes	2B3
FrB	Frenchtown silt loam, 3 to 8 percent slopes	2B3, 3
FrB	Frenchtown silt loam, 3 to 8 percent slopes	2B3
FrB	Frenchtown silt loam, 3 to 8 percent slopes	2B3
GoD	Gilpin-Weikert channery silt loams, 15 to 25 percent slopes	2B3
GrA	Gresham silt loam, 0 to 3 percent slopes	2B3
GrB	Gresham silt loam, 3 to 8 percent slopes	2B3
GrC	Gresham silt loam, 8 to 15 percent slopes	2B3
HaB	Hazleton channery loam, 3 to 8 percent slopes	2B3
HaC	Hazleton channery loam, 8 to 15 percent slopes	2B3
HaD	Hazleton channery loam, 15 to 25 percent slopes	2B3
HbB	Hazleton loam, 0 to 8 percent slopes, very stony	2B3
MoB	Monongahela silt loam, 3 to 8 percent slopes	2B3
Ph	Philo loam	2B3, 4
Po	Pope loam	2B3
TaA	Tilsit silt loam, 0 to 3 percent slopes	2B3
TaB	Tilsit silt loam, 3 to 8 percent slopes	2B3
TeB	Titusville silt loam, 3 to 8 percent slopes	2B3
TeC	Titusville silt loam, 8 to 15 percent slopes	2B3
UaD	Udorthents, acid material, moderately steep	2B3
UB	Urban land	2B3, 4
UeB	Urban land-Ernest complex, 0 to 8 percent slopes	2B3
UeB	Urban land-Ernest complex, 0 to 8 percent slopes	2B3
UeC	Urban land-Ernest complex, 8 to 15 percent slopes	2B3
UeC	Urban land-Ernest complex, 8 to 15 percent slopes	2B3
VcB	Vandergrift-Cavode silt loams, 3 to 8 percent slopes	2B3
VcC	Vandergrift-Cavode silt loams, 8 to 15 percent slopes	2B3
VcD	Vandergrift-Cavode silt loams, 15 to 25 percent slopes	2B3
WaA	Wharton silt loam, 0 to 3 percent slopes	2B3
WaB	Wharton silt loam, 3 to 8 percent slopes	2B3
WaC	Wharton silt loam, 8 to 15 percent slopes	2B3



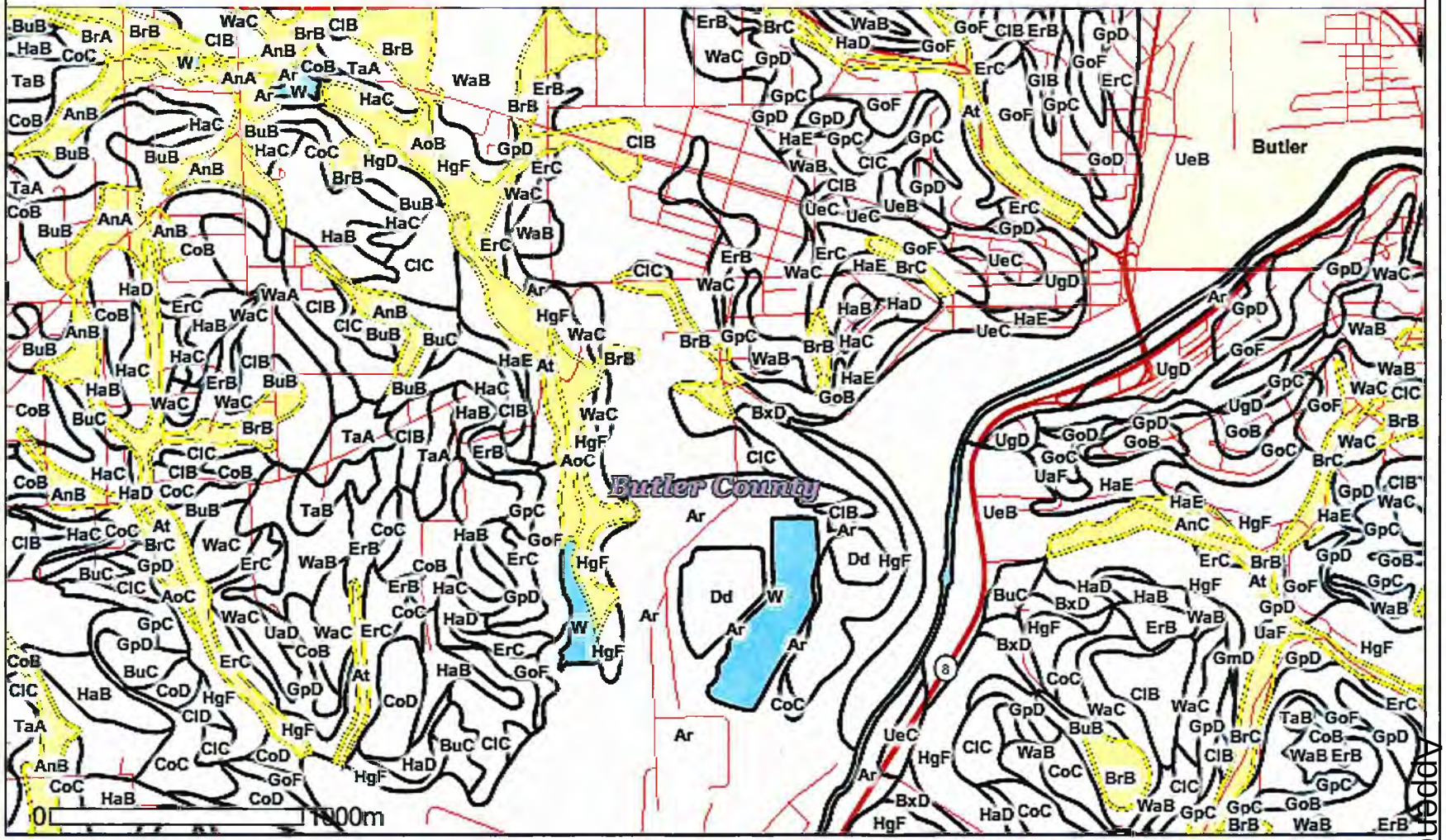
DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** City of Butler Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 1,8			



DRW. JS	Date. 4/15/08	**Butler Area Sewer Authority** **Act 537 Sewage Facalities Plan Update** Butler Township Wetlands Map	CHESTER ENGINEERS
APP. MM			
Scale As Shown			
File Butler_wet 2,8			

SoilMap

- Soils
- Roads
- Interstate
- US Route
- State Route
- Local Roads
- Access Ramps
- Other
- Water
- Counties
- Boroughs



Map Scale 1:23595, 1 inch = 1966 feet
Created by SoilMap, 5/30/2008 12:39:55 PM

The information on SoilMap is provided 'as is' and the User assumes the entire risk as to its quality and performance. Soil maps are subject to change and may be copied without permission. Enlarging the maps may cause misunderstanding of the detail of mapping. Help in using soil surveys is available from the local office of the NRCS.

Cooperative Extension
Geospatial Technology Program

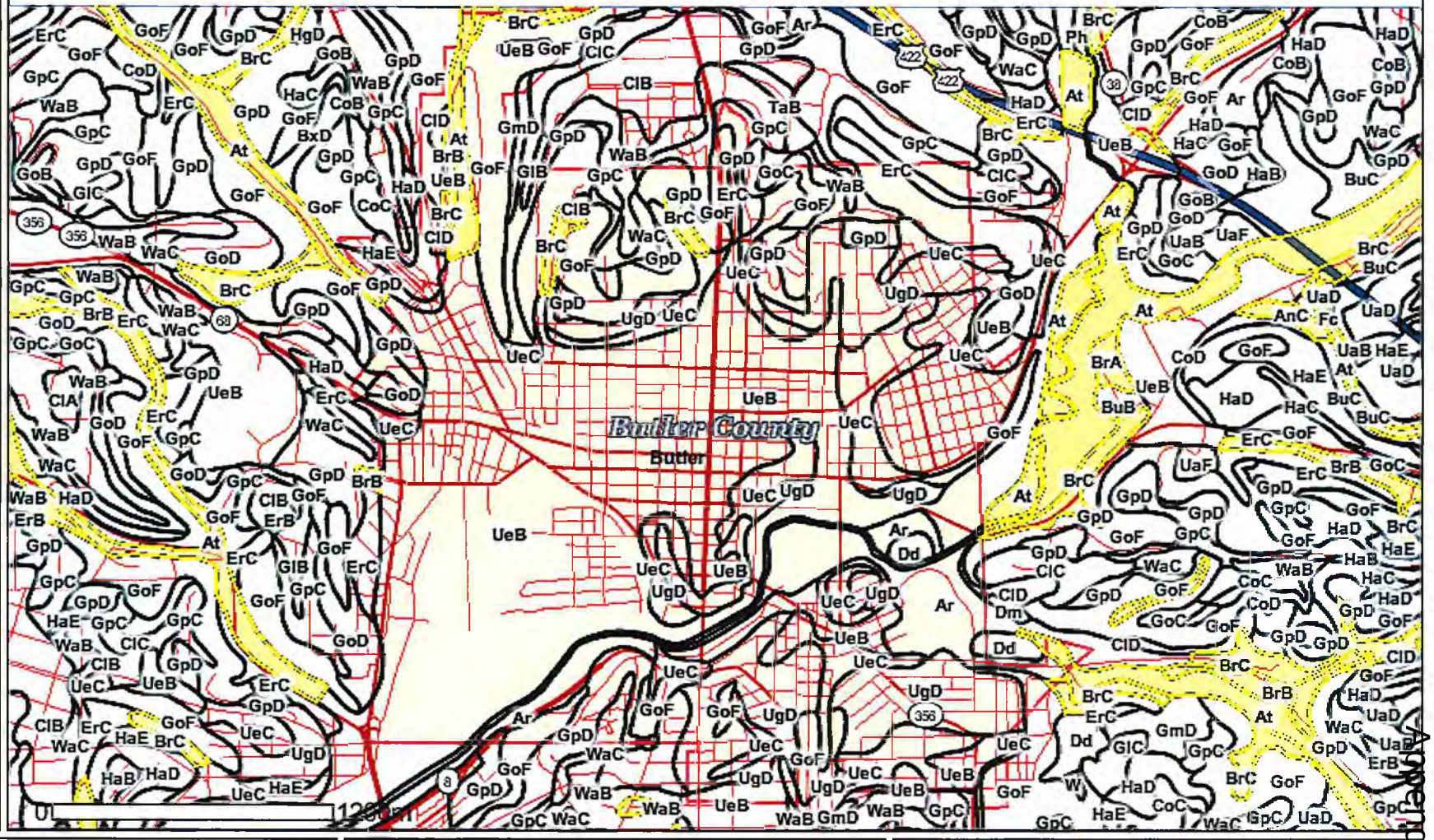
N W E S

Butler Township Hydric Soils



SoilMap

- Soils
- Roads
- Interstate
- US Route
- State Route
- Local Roads
- Access Ramps
- Other
- Water
- Counties
- Boroughs



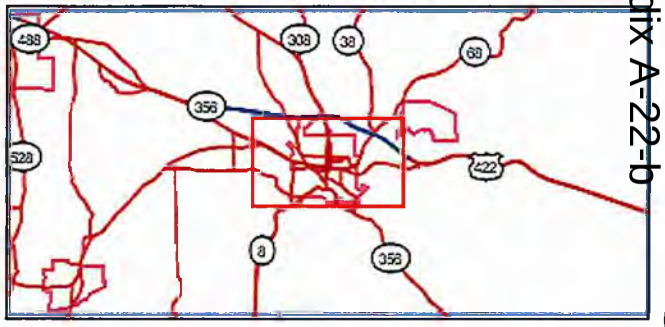
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Created by SoilMap, 5/30/2008 12:36:25 PM

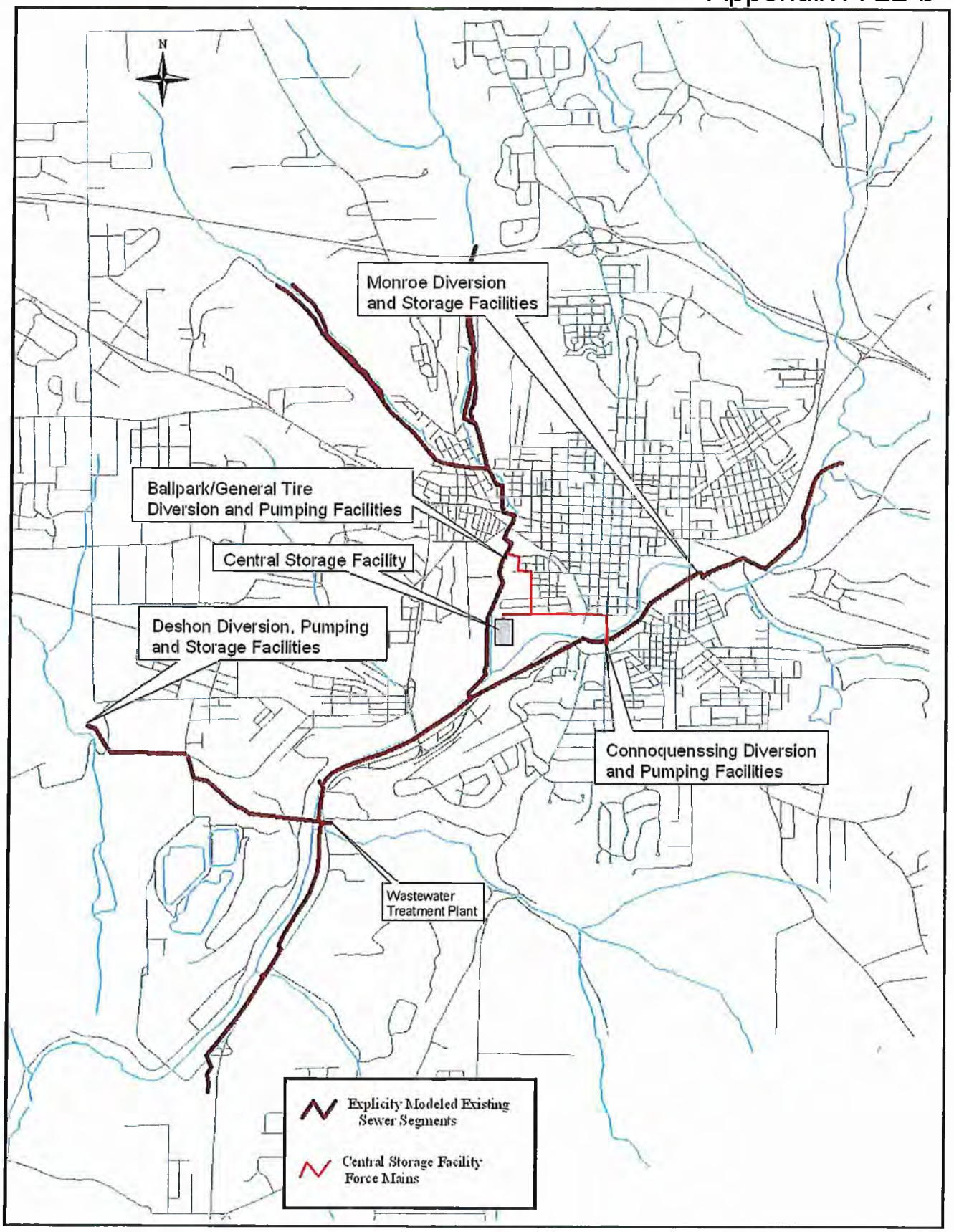
The information on SoilMap is provided 'as is' and the User assumes the entire risk as to its quality and performance. Soil maps are subject to change and may be copied without permission. Enlarging the maps may cause misunderstanding of the detail of mapping. Help in using soil surveys is available from the local office of the NRCS.

Cooperative Extension
Geospatial Technology Program

N
W E
S

Hydric Soils in the City of Butler





DRW BY:	CHK BY:	Scale	Date	File
JS	MM		5/12/08	BUT_flow

CHESTER ENGINEERS

Figure VI-7

General Locations of Wet Weather Flow Control Facilities

EXHIBIT E

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

April 2, 2008

Chrysa A. Stanislaw
Chester Engineers
260 Airside Drive
Moon, PA 15108-2793

Re: File No. ER 08-1168-019-A
PV Planning Approval Under
Sewage Facilities Act: Act 537
Sewage Facilities Plan Update
Construction of Flow Diversion &
Storage Facilities, City of Butler,
Butler Twp., Butler Co.

Dear Ms. Stanislaw:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

Based on an evaluation by our staff, there is a high probability that significant archaeological sites are located in this project area and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and instructions for conducting Phase I surveys are available on our web site at http://www.phmc.state.pa.us/bhp/Inventories/ArchaeologyGuidelines.pdf or from our office upon request.

There may be historic buildings/structures/districts/objects eligible for the National Register of Historic Places located in the project area. However, due to the nature of the activity, it is our opinion that there will be no effect on these properties. Should the scope and/or nature of the project activities change, the Bureau for Historic Preservation should be contacted immediately.

If you need further information in this matter please consult Kira Presler at (717) 705-0700.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

Cc: DEP, Northwest Regional Office

DCM/tmw

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

OCT 21 2008
BASA

16 October 2008

Christine Davis
Christine Davis Consultants
560 Penn Street
Verona, PA 15147

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER# 2008-1168-019-B
PV: Phase IA Archaeological and Geomorphological Survey, Butler Flow Diversion and Storage Facilities, City of Butler and Butler Township, Butler County

Dear Ms. Davis:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

This report meets our standards and specifications as outlined in *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations* (BHP 1991) and the Secretary of the Interior's Guidelines for Archaeological Documentation. We agree with the recommendations of this report and in our opinion no further archaeological work is necessary for this project.

Please send four copies of the final report (one unbound and all with original photographs) for our files and distribution to the various repositories. If you need further information in this matter please consult Kira Presler at (717) 705-0700.

Sincerely,

(for)

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/kmp

Colosimo
Steigerwald
Hi Steel
Hubbell 1850
Township

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

18 December 2008

Christine Davis
Christine Davis Consultants
560 Penn Street
Verona, PA 15147

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

RE: ER 08-1168-019-C
PV: Butler Flow Diversion and Storage Facilities, City of Butler and Butler Twp., Butler Co.

Dear Ms. Davis:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

Thank you for providing the Historic Industrial Resource and Site Survey Form. It is the opinion of the State Historic Preservation Officer that the Poole Brass Foundry Company, located on Etna Street, is not eligible for listing in the National Register of Historic Places due to loss of integrity of association, setting and feeling. Therefore, the above referenced project will have no effect to historic properties. Thank you for your cooperation.

If you need further information in this matter please consult Ann Safley at (717) 787-9121.

Sincerely,

Andrea L. MacDonald, Chief
Division of Preservation Services

ALMacD/ras

EXHIBIT F

Pennsylvania Department of Conservation and Natural Resources

Bureau of Forestry

May 1, 2008

Chrysa A. Stanislaw
Chester Engineers
260 Airside Drive
Moon Township, PA 15108

Pennsylvania Natural Diversity Inventory Review, PNDI Number **019609**
Butler Area Sewer Authority Diversion and Storage Locations
Butler Twp.; Butler County

Dear Ms. Stanislaw,

This responds to your request about a Pennsylvania Natural Diversity Inventory (PNDI) ER Tool "Potential Impact" or a species of special concern impact review. **We screened this project for potential impacts to species and resources of special concern under the Department of Conservation and Natural Resources' responsibility, which includes plants, natural communities, terrestrial invertebrates and geologic features only.**

☒ ***NO PROJECT IMPACT ANTICIPATED***

☒ PNDI records indicate that no known occurrences of species or resources of special concern under DCNR's jurisdiction occur in the vicinity of the project. Therefore, we do not anticipate the project referenced above will impact plants, natural communities, terrestrial invertebrates and geologic features of special concern. No further coordination with DCNR is needed for this project.

☐ PNDI records indicate special concern species or resources are located in the vicinity of the project. However, based on the information submitted to us concerning the nature of the project, the immediate location, and our detailed resource information, we determined that no impact is likely. No further coordination with DCNR is needed for this project.

COMMENTS:

This response represents the most up-to-date summary of the PNDI data files and is good for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. A field survey of any site may reveal previously unreported populations. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

This finding applies to impacts to plants, natural communities, terrestrial invertebrates and geologic features only. To complete your review of state and federally-listed species of special concern, please be sure the U.S. Fish and Wildlife Service, the PA Game Commission and the Fish and Boat Commission has been contacted regarding this project either directly or by performing a search with the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Rebecca H. Bowen

Rebecca H. Bowen, Environmental Review Specialist
DCNR/BOF/PNDI, PO Box 8552, Harrisburg, PA 17105 ~ Ph: 717-772-0258 ~ F: 717-772-0271 ~ c-rbowen@state.pa.us

Pennsylvania Fish & Boat Commission

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5237 Fax: (814) 359-5175

established 1866

December 16, 2008

IN REPLY REFER TO
SIR # 30394

MICHAEL MCKEE
CHESTER COUNTY CONSERVATION DISTRICT
AIRSIDE BUSINESS PARK
260 AIRSIDE DRIVE
MOON TOWNSHIP, PA 15108

RE: Species Impact Review (SIR) - Rare, Candidate, Threatened and Endangered Species
BUTLER
BUTLER County, Pennsylvania

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A Species Impact Review is valid for one year only.

_X_ ***NO ADVERSE IMPACTS EXPECTED FROM THE PROPOSED PROJECT***

___ Except for occasional transient species, rare, candidate, threatened or endangered species under our jurisdiction are not known to exist in the vicinity of the project area. Therefore, no biological assessment or further consultation regarding rare species is needed with the Commission. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

_X_ An element occurrence of a rare, candidate, threatened, or endangered species under our jurisdiction is known from the vicinity of the proposed project. However, given the nature of the proposed project, the immediate location, or the current status of the nearby element occurrence(s), no adverse impacts are expected to the species of special concern.

If you have any questions regarding this review, please contact the biologist indicated below:

___	Jeff Schmid	814-359-5236	___	Tina Walther	814-359-5186
_X_	Nevin Welte	412-586-2334	___	Bob Morgan	814-359-5129

I am enclosing a copy of our "SIR Request Form", which is to be used for all future species impact review requests. Please make copies of the attached form and use with all future project reviews. Thank you in advance for your cooperation and attention to this important matter of species conservation and habitat protection.

SIGNATURE: _____ DATE: December 16, 2008
Christopher A. Urban
Chief, Natural Diversity Section

Our Mission: **www.fish.state.pa.us**

To protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA GAME COMMISSION
2001 ELMERTON AVENUE, HARRISBURG, PA 17110-9797

December 11, 2008

Mr. Michael F. McKee
Chester Engineers
Airside Business Park
260 Airside Drive
Moon Township, PA 15108

In re: PNDI Database Search/Review
Butler Area Sewer Authority
Act 537 Sewage Facilities Planning Study Update
City of Butler, Butler County, PA

Dear Mr. McKee:

This is in response to your letter dated November 17, 2008 regarding the potential impacts of your project on special concern species of birds or mammals and State Game Lands.

Our office review has determined that your project should not cause any adverse impacts to any special concern species of birds or mammals recognized by the Pennsylvania Game Commission or State Game Lands. This determination may be reconsidered if project plans change or extend beyond the present study area, or if additional information becomes available on state-listed species or State Game Lands.

If you have any questions, please contact me at (717) 783-5957. Please be advised that this determination is only valid for one year from the date of this letter.

Very truly yours,

James R. Leigey
Wildlife Impact Review Coordinator
Division of Environmental Planning
And Habitat Protection
Bureau of Wildlife Habitat Management

JRL/pfb

Cc: File

PNDI # n/a USFWS Project # 2009-0329

U.S. FISH AND WILDLIFE SERVICE
315 South Allen Street, Suite 322, State College, PA 16801

This responds to your inquiry about a PNDI Internet Database search that resulted in a potential conflict with a federally listed, proposed or candidate species.

PROJECT LOCATION INFORMATION

County: Butler

Township: Butler

MISC INFORMATION

Date received by FWS: 11/20/2008

USFWS COMMENTS ☒ FAXED ☐ MAILED Fax #: 412-809-6611

To: Michael McKee Affiliation: Chester Engineers

SPECIFIC PROJECT: ACT 537 Sewage Facilities

FISH AND WILDLIFE SERVICE COMMENT(s):

✓ ***NO EFFECT***

Except for occasional transient species, no federally listed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, based on currently available information, no biological assessment or further consultation under the Endangered Species Act is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed species becomes available, this determination may be reconsidered.

Please be aware that a field survey may reveal previously undocumented populations of one or more species of concern within a project area. If surveys or further information reveals that a federally listed species exists in your project area, contact the Service immediately to discuss measures to avoid or minimize potential impacts to the species prior to initiating your project.

This determination is valid for one year from the date of this letter.

This review was conducted by the biologist listed below. He/she can be contacted at 814-234-4090.

✓ Pamela Shellenberger (x 241) ___ Bonnie Dershem (x 234) ___ Robert Anderson (x 228)
___ Kathy Gipe (x 242)

SIGNATURE: _____ DATE: 12-16-08

Supervisor, Pennsylvania Field Office

APPENDIX O
REVIEW COMMENTS
AND BASA RESPONSES

Pennsylvania Department of Environmental Protection
121 North Mill Street
New Castle, PA 16101

September 19, 2008

724-656-3160
Fax: 724-656-3267

New Castle District Office

John Schon
Butler Area Sewer Authority
100 Litman Road
Butler PA 16001

Re: Draft Act 537 Plan
Butler Area Sewer Authority
Butler County

Dear Mr. Schon

The Department of Environmental Protection has completed a review of Butler Area Sewer Authority's (BASA) Draft Act 537 Sewage Facilities Planning Study Update (Draft Plan). The planning area includes the tributary municipalities of the City of Butler, Butler Township, Connoquenessing Township, Center Township, East Butler Borough, Oakland Township, and Summit Township. The following items should be addressed:

1. Page I-2 states no other wastewater planning is anticipated for the study area. It is the Department's understanding that Connoquenessing Township is undertaking an Act 537 Plan Update to specifically address the needs of the Rt. 68 corridor area. It may be beneficial to consult with Connoquenessing Township officials to see what their plan for this area is.

2. Section IV.A.3 should note that Oakland Township contains areas that are designated Special Protection waterways as defined by Chapter 93.

3. Pages IV-18 and IV-20 make references to Hurricanes Katrina and Ivan impacting flow rates and discharge limits for the year 2004. It should be noted that Hurricane Katrina was a year 2005 event.

4. Page IV-31 states that an interceptor sewer model was used to determine flow diversion rates and volumes required to eliminate existing Sanitary Sewer Overflows (SSO's) and to restrict flows to the STP to 28 mgd. The current peak wet weather design flow capacity is 25 mgd. It is understood this is the limit of the trickling filters but is beyond the current design capacity. Discuss any plans for treatment plant upgrades or re-rating to justify the increased capacity and whether this should be part of this Act 537 Update.

5. Appendix E, Equalization Tank Sizing Analysis states it is not cost effective to size the tanks beyond a 2-year, 24-hour design storm based on existing flows. Yet, the alternative recommended is to size the facilities for future conditions. Will the increased capacity tanks be constructed to address the current needs or in a phased approach?

6. It should be noted that a Comprehensive Plan is being developed for the BASA serviced municipalities of Butler Township, Butler City, Summit Township, and East Butler Borough. Discuss whether the proposed wastewater disposal alternative is consistent with this joint Comprehensive Plan.

7. Page VI-56 states that the base sewer service charge is expected to increase to finance the improvements and that BASA intends to apply for PENNVEST funding. Detailed information must be provided for the expected user fees and anticipated funding for this project. What is the expected increase of the service charge to new and existing BASA customers? What is the most cost effective financing scheme available? What is the contingency plan if the preferred financing method is not obtained?

8. The conclusion to the information presented in the Special Studies completed by the Tributary Municipalities is that it is not cost effective to provide sewer service to the identified areas. The BASA service area is very close to many areas in these municipalities. It is likely that all of the identified EDU's in the Special Studies will not be able to be served but a portion of them may be. It should be acknowledged that while it is not cost effective to provide service to all the EDU's at this time it is inevitable that some of these areas over the next five to twenty years may be BASA customers. The individual municipalities through Act 537 planning will evaluate the needs and costs to sewer any potential areas and may request service from BASA. Discuss whether BASA will be capable of servicing the tributary municipalities by implementing the proposed alternative or whether there is the potential to create additional SSO's once the EDU's would be added.

9. Section VIII should include the following:

   a. Justify the chosen alternative as it relates to existing and future wastewater disposal needs. Why does this alternative best meet the needs of all communities involved?

   b. Operation and maintenance considerations of the selected alternative.

   c. Environmental soundness.

   d. What is the anticipated financing package to be obtained from PENNVEST?

10. The Plan discusses the need to reduce the number and severity of the SSO's. The current CO&A requires the elimination of all SSO's as is also mentioned in the Plan. What is the reason for this discrepancy? Once the SSO's are eliminated is it BASA's intention to continue sewer rehabilitation work and programs such as the real estate transfer inspections?

11. The BASA financial and debt status should be discussed in the Institutional Evaluation.

12. It is unclear why the diversion structure to divert flows to the Central Storage Facility on the Monroe forcemain is necessary. It would seem that the sewage flows will already have been controlled by the proposed EQ tank at the Monroe pump station. Please explain.

13. The final plan should include all costs including the costs to obtain the necessary properties to site all structures.

14. It is doubtful that the only option available to correct the SSO's and hydraulic issues of BASA is the construction of diversion and storage facilities. Any alternatives considered must be discussed in the plan. Since it is stated the current capacity of the sewage treatment plant (STP) was established in 1978, what about the upgrading of the STP? Or a combination of upgrading the STP and utilization of the diversion/storage facilities? The UER states that under the 2001 CO&A BASA evaluated other alternatives. The conclusions of that evaluation should at least be discussed in this Plan, such as the order of magnitude cost estimates.

15. Information was sent to Pennsylvania Department of Conservation and Natural Resources to show consistency with protecting rare, endangered, or threatened species of special concern. Please note consistency must be documented with all jurisdictional agencies including, PA Fish and Boat Commission, Pennsylvania Game Commission and US Fish and Wildlife Service.

16. The Pennsylvania Historical and Museum Commission have required a Phase 1 survey be completed to locate potentially significant archaeological resources. If this survey is conducted as part of the planning process the costs will be eligible for reimbursement. If this survey is to be completed after the planning process it will not be eligible for reimbursement and the timeline for survey completion should be included in the implementation schedule.

17 As a reminder, notice of the Plan must be published in a newspaper of general circulation in accordance with Chapter 71.31.c, comments must be received from the Butler County Planning Commission, the tributary municipalities planning commissions, and this Plan must be adopted by all tributary municipalities.

This completes our review of the Draft Plan; however, we reserve the right to request changes or additional information if the final Official Plan does not meet the requirements of Act 537. Also, many items of the Plan are missing at this time, it is understood not all information was available at the time the Draft Plan was completed and the addition of these items may generate additional comments.

Please contact me if you have any questions on this matter.

Sincerely,

Tomisa Schmeider

Tomisa Schmeider
Sewage Planning Specialist 2
Water Management

cc: Chester Engineers
Mayor, City of Butler
Chairman, Butler Township
Chairman, Connoquenessing Township
Chairman, Center Township
Chairman, Summit Township
Chairman, Oakland Township
Mayor, East Butler Borough
Christine Nagy
Jennifer Kosco
Rick Gilson
Mike Zimmerman
Cynthia Selby
NWRO File
File

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JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Ms. Tomisa Schmeider
Sewage Planning Specialist 2, Water Management
Pennsylvania Department of Environmental Protection
121 North Mill Street
New Castle, PA 16101

Dear Ms. Schmeider:

RE: DEPARTMENT'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed the Department of Environmental Protection's review comments on BASA's Draft Official Plan Update Revision ("Draft Plan"), dated June 3, 2008. Responses to the comments contained in the Department's letter dated September 19, 2008 are listed below. For ease of review, each of the Department's numbered comments is listed in bold, followed immediately by BASA's response.

1. **Page I-2 states no other wastewater planning is anticipated for the study area. It is the Department's understanding that Connoquenessing Township is undertaking an Act 537 Plan Update to specifically address the needs of the Rt. 68 corridor area. It may be beneficial to consult with Connoquenessing Township officials to see what their plan for this area is.**

   The text will be changed to acknowledge that Connoquenessing Township is conducting its own Act 537 Plan Update to address the needs of the Rt. 68 corridor area. The October 13, 2006 Consent Order and Agreement (CO&A) required BASA to prepare an Official Plan Update Revision, using information on current and future sewerage needs from the Special Studies that were prepared and submitted by each Tributary Municipality. The Draft Plan incorporated all of the sewerage needs information provided in the Connoquenessing Township Special Study and evaluated the cost for these areas to connect to the BASA sewer system as required by the CO&A. The Township's Special Study made no mention of a separate Act 537 Plan Update for the Rt. 68 corridor area.

   The Draft Plan concludes that it is cost prohibitive at this time for BASA to provide centralized sewage collection and treatment service for the limited number of existing customers in the Township's identified future growth areas; even without the multiple pump station upgrades that would be necessary to connect these areas to the existing BASA collection system. Other options, including but not limited to, local, private and/or publicly-owned, decentralized wastewater collection and treatment systems may be more cost-effective until such time that additional growth occurs to make BASA's centralized sewage collection and treatment services by BASA's regional system more affordable. As part of their separate Act 537 Plan Update for the Rt. 68 corridor, the

Township should evaluate other methods of sewage collection and treatment, such as a local, decentralized treatment system, and compare the cost of those options to the cost of connecting to BASA's sewage system in this Draft Plan to determine the most cost-effective sewage system for this area.

It should be noted that the estimated user costs in the Draft Plan only included the construction cost and resulting debt service for the construction of the collection systems to serve the identified growth areas. The user costs did NOT include BASA's base sewer service charge that all these customers would also have to pay for the operation and maintenance of the system, which is expected to increase because of the additional debt costs to finance the proposed interceptor and flow equalization tank facilities that will enable these future customers to be served by the system. In addition, the estimated user costs also did NOT include any necessary improvements to smaller pump stations, force mains, and/or collector sewers within BASA system that may be necessary to provide sewer service to the specific growth areas, because the estimated user costs were already cost prohibitive. Factoring in these other costs, the estimated user cost to connect to BASA's centralized sewage facilities would be significantly higher and even more cost prohibitive. Therefore, a local, decentralized, publicly-owned wastewater collection and treatment system(s) may be a much more cost-effective alternative to provide sewage service for these outlying areas.

BASA has the capabilities and experience to implement, administer, operate and maintain any local, decentralized, publicly-owned collection and treatment system alternatives for Connoquenessing Township. Alternatively, the Township could finance and own the facilities and then enter into an agreement with BASA to administer, operate and maintain such systems. Such systems would have their own cost basis or billing system, independent of BASA's regional system. In addition, BASA's facilities could possibly provide centralized sludge handling facilities for such systems to reduce their construction and operating costs. Therefore, it is recommended that the Township consider BASA and the services BASA can provide in the development of the implementation plan for their separate Act 537 Plan Update.

2. **Section IV.A.3 should note that Oakland Township contains areas that are designated Special Protection waterways as defined by Chapter 93.**

Section IV.A.3 of the Final Plan will be revised to include the Special Protection waterways in Oakland Township that are designated in Chapter 93.

3. **Pages IV-I8 and IV-20 make references to Hurricanes Katrina and Ivan impacting flow rates and discharge limits for the year 2004. It should be noted that Hurricane Katrina was a year 2005 event.**

Hurricane Francis occurred in September 2004 and was incorrectly identified in the Draft Plan as Hurricane Katrina. Pages IV-I8 and IV-20 of the Final Plan will be corrected.

4. **Page IV-31 states that an interceptor sewer model was used to determine flow diversion rates and volumes required to eliminate existing Sanitary Sewer Overflows (SSO's) and to restrict flows to the STP to 28 mgd. The current peak wet weather design flow capacity is 25 mgd. It is understood this is the limit of the trickling filters but is beyond the current design capacity. Discuss any plans for treatment plant upgrades or re-rating to justify the increased capacity and whether this should be part of this Act 537 Update.**

An October 2002 hydraulic analysis of the BASA treatment facility determined that peak flows through the plant are limited to 28 mgd by the capacity of the trickling filter rotary distributors. A one-year review of historical operating data also demonstrated that the plant produces an excellent quality effluent across a wide range of flows and is capable of

meeting applicable discharge limits even during high flow periods. A more detailed analysis of plant treatment performance from 2003 to 2007 was included in the Draft Plan. This evaluation demonstrated that the facility is affected by elevated influent flows during wet weather periods, but consistently meets the effluent limitations required by the NPDES permit. A separate analysis of effluent concentrations was also conducted on days where measured wastewater flows to the BASA treatment plant exceeded 10 mgd, the permitted average daily flow from the plant. The high flow effluent analysis showed that the facility is capable of meeting existing effluent limitations at average daily flow rates up to 15 mgd.

These analyses support an increase in the hydraulic capacity of the BASA wastewater treatment plant based on the historic performance of the facility. No increase in organic capacity is required. A hydraulic re-rating of the existing BASA wastewater treatment plant is an integral component of the recommended plan and will be included in the Final Plan. The proposed diversion and flow equalization storage facilities will not only contain overflows, but also equalize and restrict the peak flow to the wastewater treatment plant to no more than 28 mgd. BASA's consulting engineer has completed a draft re-rating study for the treatment plant. This report has not yet been submitted to the Department because BASA was hoping to conduct some high flow simulation tests at the plant to supplement the report. However, the prolonged dry weather over the last 7 months (no SSOs) has prevented any simulation of high flow operations. The "Wastewater Treatment Plant Re-Rating Study" will be included as an appendix and discussed further in the Final Plan.

5. **Appendix E, Equalization Tank Sizing Analysis states it is not cost effective to size the tanks beyond a 2-year, 24-hour design storm based on existing flows. Yet, the alternative recommended is to size the facilities for future conditions. Will the increased capacity tanks be constructed to address the current needs or in a phased approach?**

The Draft Plan recommends construction of flow equalization storage facilities based on future conditions rather than existing conditions in order to eliminate SSOs to the maximum extent possible. Larger capacity storage tanks sized for future conditions will be constructed and a phased approach will not be used for the project.

The larger facilities will have sufficient storage capacity to capture all of the historic overflow events that have ever been recorded in the BASA system, except for a single overflow that was measured at the Deshon pump station in January 2005, and handle the projected future sewage flows identified in the Special Studies prepared by the tributary Municipalities. It should be noted that many of the historic overflows in the system occurred in response to precipitation events with rainfall amounts in excess of a 100-year, 24-hour design storm. Therefore, the proposed equalization facilities will provide protection against overflows for precipitation events well in excess of a 2-year, 24-hour design storm. In addition, the facilities will also equalize and restrict the peak flow to the wastewater treatment plant to no more than 28 mgd.

6. **It should be noted that a Comprehensive Plan is being developed for the BASA serviced municipalities of Butler Township, Butler City, Summit Township, and East Butler Borough. Discuss whether the proposed wastewater disposal alternative is consistent with this joint Comprehensive Plan.**

BASA acknowledges the need for coordination of planning efforts. However, BASA has already completed the Draft Plan based on the information on current and future sewerage needs from the Special Studies that were prepared and submitted by each Tributary Municipality. It is impossible for BASA to discuss whether the Draft Plan is consistent with a plan that is "being developed" It would seem more appropriate for the municipalities to develop a Comprehensive Plan that is consistent with the Special

Studies, which were prepared by these municipalities and approved by the Department, and the already completed Draft Plan. BASA must proceed with the completion of the Final Official Plan Update Revision to comply with the CO&A, and cannot wait for this Comprehensive Plan to be finalized.

As previously noted, BASA has the capabilities and experience to implement, administer, operate and maintain any local, decentralized, publicly-owned collection and treatment system alternatives within these municipalities. Alternatively, the municipalities could finance and own the facilities and enter into an agreement with BASA to administer, operate and maintain such systems. Such systems would have their own cost basis or billing system, independent of BASA's regional system. In addition, BASA's facilities could potentially provide centralized sludge handling facilities for such systems to reduce their construction and operating costs. Therefore, it is recommended that the municipalities consider BASA and the services BASA can provide in the development of their Comprehensive Plan.

7. **Page VI-56 states that the base sewer service charge is expected to increase to finance the improvements and that BASA intends to apply for PENNVEST funding. Detailed information must be provided for the expected user fees and anticipated funding for this project. What is the expected increase of the service charge to new and existing BASA customers? What is the most cost effective financing scheme available? What is the contingency plan if the preferred financing method is not obtained?**

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements, including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in Section VIII of the Final Official Plan Update Revision. BASA intends to pursue potential grant funding from various sources and a PENNVEST loan to finance the recommended improvements. A conventional revenue bond issue would be the alternative or contingency method of financing.

8. **The conclusion to the information presented in the Special Studies completed by the Tributary Municipalities is that it is not cost effective to provide sewer service to the identified areas. The BASA service area is very close to many areas in these municipalities. It is likely that all of the identified EDU's in the Special Studies will not be able to be served but a portion of them may be. It should be acknowledged that while it is not cost effective to provide service to all the EDU's at this time it is inevitable that some of these areas over the next five to twenty years may be BASA customers. The individual municipalities through Act 537 planning will evaluate the needs and costs to sewer any potential areas and may request service from BASA. Discuss whether BASA will be capable of servicing the tributary municipalities by implementing the proposed alternative or whether there is the potential to create additional SSO's once the EDU's would be added.**

The additional sewage flows from the identified future growth areas were included in the sizing of the recommended interceptor sewer improvements and the proposed flow diversion and equalization tank facilities. As such, the re-rated wastewater treatment plant and proposed facilities should be capable of servicing the areas that can be served by the gravity interceptors without creating additional SSOs when these EDUs are added in the future.

However, BASA does not necessarily agree "it is inevitable that some of these areas over the next five to twenty years may be BASA customers." It should be noted that the estimated user costs in the Draft Plan for these areas only included the construction cost

and resulting debt service for the construction of the collection systems to serve the growth areas. The user costs did not include BASA's base sewer service charge that all these customers would also have to pay for the operation and maintenance of the system, which is expected to increase because of the additional debt costs to finance the proposed interceptor and flow equalization tank facilities that will enable these future customers to be served by the system.. In addition, the estimated user costs also did NOT include any necessary improvements to smaller pump stations, force mains, and/or collector sewers within BASA system that may be necessary to provide sewer service to the specific growth areas, because the estimated user costs were already cost prohibitive.

Factoring in these other costs, the estimated user cost to connect to BASA's centralized sewage facilities would be significantly higher and even more cost prohibitive. Therefore, local, decentralized, private and/or publicly-owned wastewater collection and treatment systems may be a much more cost-effective alternative to provide sewage service for these outlying areas. This alternative should be fully evaluated by the Tributary Municipalities whenever the growth and/or need may warrant public sewer service. As previously noted, BASA has the capabilities and experience to implement, administer, operate and maintain any local, decentralized, publicly-owned collection and treatment system alternatives within these areas. While these areas may become "BASA customers" they may not necessarily be customers connected to BASA's centralized collection and treatment facilities.

9. **Section VIII should include the following:**

   a. **Justify the chosen alternative as it relates to existing and future wastewater disposal needs. Why does this alternative best meet the needs of all communities involved?**

   b. **Operation and maintenance considerations of the selected alternative.**

   c. **Environmental soundness.**

   d. **What is the anticipated financing package to be obtained from PENNVEST?**

Section VIII of the Final Plan will be revised to address the four items listed above.

10. **The Plan discusses the need to reduce the number and severity of the SSO's. The current CO&A requires the elimination of all SSO's as is also mentioned in the Plan. What is the reason for this discrepancy? Once the SSO's are eliminated is it BASA's intention to continue sewer rehabilitation work and programs such as the real estate transfer inspections?**

It is impossible to totally eliminate all sanitary sewer overflows (SSOs). Federal regulations recognize that there are some circumstances where an SSO is unavoidable and even provide legal defenses for such SSO events. While the Department acknowledged this fact during negotiation of the CO&A, the Department was unwilling to acknowledge and document this fact in the CO&A. For example, the BASA sewage treatment plant and one of our major pump stations were flooded and underwater for a period of time in 2004 during the Hurricane Francis and Ivan events. If a similar flooding event occurs, there is nothing BASA can do to prevent SSOs.

Statistical analyses of the overflow events were performed to evaluate tank sizing criteria, which the U. S. EPA and other DEP regional offices have approved for other municipalities, and to determine the overflow capture or containment of various tank sizes. The DEP Northwest Regional Office was unwilling to agree to any statistical criteria, nor offer any guidelines, for sizing the tanks.

Acknowledging our mutual desire to "eliminate" all SSOs, the proposed tanks were sized to handle all of the historic SSOs that were monitored over the last 10 years, with one exception, plus the additional sanitary sewage flows from anticipated future customer growth. These historic SSO events include other antecedent high groundwater and saturation conditions, snowmelt conditions, as well as numerous rainfall amounts in excess of a 100-year, 24-hour design storm that may cause or contribute to SSOs. BASA also considered the possibility that additional tank capacity may have to be added in the future in the selection of the sites for the proposed tanks.

Nevertheless, there is always a statistical probability that some unusual combination of rainfall, snowmelt, groundwater conditions and/or flooding may occur that can cause flows to exceed the finite capacity of the proposed diversion facilities and flow equalization tanks. For this reason, neither BASA, nor anyone else, can guarantee that all SSOs will be absolutely eliminated.

The proposed facilities are sized to handle the existing infiltration and inflow (I&I) into the sanitary sewer system from both public and private sewer defects and illegal connections. As the sewer pipes continue to age and deteriorate, I&I will also continue to increase. Therefore, BASA must implement and maintain an on-going public sewer rehabilitation and/or replacement program, especially in the areas with old vitrified clay or terra cotta sewers. In addition, BASA must also continue its programs to identify and eliminate private I&I sources, such as the mandatory realty transfer testing program and the rainfall simulation testing program, as an essential element of the overall long-term I&I control plan. This must be done to offset the anticipated increased in I&I as the public and private sewers continue to age and prevent this anticipated I&I increase from overloading the new structural improvements that are implemented.

11. **The BASA financial and debt status should be discussed in the Institutional Evaluation.**

The financial and debt status of BASA will be discussed in the Institutional Evaluation section of the Final Plan.

12. **It is unclear why the diversion structure to divert flows to the Central Storage Facility on the Monroe forcemain is necessary. It would seem that the sewage flows will already have been controlled by the proposed EQ tank at the Monroe pump station. Please explain.**

Appendix F in the draft report contains a technical memorandum on the interceptor sewer model that was used to size the wet weather flow diversion and storage facilities. Page 14 of this memorandum states that a diversion facility is needed on the Connoquenessing Interceptor sewer in order to limit the peak flows entering the wastewater treatment plant to 28 mgd.

A second diversion structure was added on the force main from the Monroe pump station so that all flows from this part of the system can be diverted from the Connoquenessing Interceptor sewer. Approximately 600 feet downstream from the proposed location for the diversion and pumping facilities, the Connoquenessing Interceptor sewer enters a 3,000-foot long tunnel. Due to a limited number of manholes and other access restrictions, this part of the interceptor sewer has not been inspected or cleaned since it was installed more than 45 years ago.

The proposed diversion structure on the force main, along with the diversion on the interceptor sewer itself, will allow the wastewater flows to be redirected from the pipeline inside the tunnel, so that this sewer segment can be inspected, cleaned, and/or

rehabilitated as required. The incremental cost of adding a diversion on the force main is small relative to the potential cost of installing temporary bypass pumping facilities that could be required if the sewer within the tunnel needs to be inspected, cleaned, and/or rehabilitated.

A more detailed explanation of the reason for the diversion structure on the force main from the Monroe pump station will be added to the Final Plan.

13. **The final plan should include all costs including the costs to obtain the necessary properties to site all structures.**

At the time the Draft Plan was prepared, land acquisition costs for the required properties were not available. As part of the planning process, BASA has completed property appraisals, archaeological and geomorphologic surveys, property/subdivision surveys, and Phase I and Phase II environmental assessments to evaluate and select the recommended sites for the proposed improvements and to expedite the design, permitting, and construction of the proposed improvements. Where necessary, BASA has also obtained cost estimates for any required environmental remediation work to negotiate the depreciated land acquisition value or cost. The total estimated project costs for the recommended improvements, including land acquisition costs, environmental assessments, and environmental remediation work, if necessary, will be included in the Final Plan.

14. **It is doubtful that the only option available to correct the SSO's and hydraulic issues of BASA is the construction of diversion and storage facilities. Any alternatives considered must be discussed in the plan. Since it is stated the current capacity of the sewage treatment plant (STP) was established in 1978, what about the upgrading of the STP? Or a combination of upgrading the STP and utilization of the diversion/storage facilities? The UER states that under the 2001 CO&A BASA evaluated other alternatives. The conclusions of that evaluation should at least be discussed in this Plan, such as the order of magnitude cost estimates.**

The existing BASA Sewage Treatment Plant (STP) provides a very high level of treatment and produces a high quality effluent that is consistently well below the maximum allowable discharge limits specified in its current NPDES Permit. With monthly average daily dry weather flows of only 4.5 mgd and organic loadings only 70% of design capacity, the existing BASA STP also has more than sufficient capacity to meet the current and projected future sewage needs of the service area. Therefore, there is no need to upgrade the level of treatment or expand the capacity of the existing STP to handle the projected dry weather sewage flows and organic loadings from the anticipated future growth.

Any expansion would be solely to treat excess groundwater and storm water entering the sanitary sewer system. However, since groundwater and storm water contribute no additional organic loading or "food" to support the microorganisms in the expanded biological treatment processes, an expansion of the conventional biological treatment processes at the STP will not operate properly. The additional tanks would have to be removed from service during the 97% of the time when flows are within the capacity of the system. Although the physical treatment tanks could be brought on line quickly during high flow events, the normal start-up time for biological processes would take 1 to 2 weeks, more than four times longer than the duration of the longest overflow period ever recorded. Consequently, the additional processes would not provide any biological treatment when needed, and would simply provide some additional settling tank capacity at a very high cost.

It is significantly more efficient and cost-effective to install high-rate settling tanks and disinfection for the flows exceeding the capacity of the existing STP processes, and then

"blend" or mix this treated excess flow with the fully-treated flow from the existing STP processes. While such blending treatment systems are currently being permitted and approved by other states, such as Ohio, and other U. S. EPA regions, the Pennsylvania DEP and our U. S. EPA Region III office will not approve and permit blending systems. Therefore, this type of treatment system was not an available alternative for BASA.

The Department is currently in the process of imposing very stringent nutrient effluent limitations on the STPs in the eastern part of the state within the Chesapeake River Basin. These new nutrient standards will require most of these STPs to undergo very expensive, upgrades to provide additional nutrient removal processes. In some cases, the proposed limits may not be achievable using existing treatment technologies and the limits may be subject to legal challenge. Department representatives have indicated that they expect to impose similar nutrient standards on all STPs statewide in the very near future. However, the actual limits that may be imposed on the BASA STP will not be known until that time. BASA does not believe that it would be prudent to guess what the actual effluent limits and level of treatment required may be at this time and invest significant capital expenditures to upgrade the BASA STP now.

In addition, there are no biological treatment processes capable of handling peak influent flows of up to 12 to 14 times the average flow, such as the flow variation experienced in the BASA system. Significant flow equalization storage capacity will still be required for any upgrade of the biological treatment processes at the BASA STP. The limited available space at the existing BASA STP site, without expensive acquisition of adjacent properties, will also limit any expansion of the facilities and necessitate more off-site flow equalization. Therefore, the proposed off-site flow equalization tanks will still be necessary and utilized in the future when the BASA STP must be upgraded to meet the new nutrient standards.

For these reasons, the proposed plan of re-rating the existing STP and constructing flow diversion and equalization storage tanks that will limit the peak flows at the STP to less than 28 mgd is the most cost-effective method to address the SSO problems and comply with the CO&A. The proposed plan avoids major expenditures to upgrade and install new treatment processes at the existing STP now, which could be unusable and may have to be replaced or abandoned in a couple of years when it is anticipated that the BASA STP will require a major upgrade to comply with pending nutrient removal standards.

As part of the Corrective Action Plan (CAP) for the 2001 CO&A, BASA did evaluate a number of alternatives, including expansion of existing pumping station and interceptor facilities to convey the flows to the existing STP for treatment. The Final Plan will be revised to discuss these alternatives and the conclusions cited above.

15. **Information was sent to Pennsylvania Department of Conservation and Natural Resources to show consistency with protecting rare, endangered, or threatened species of special concern. Please note consistency must be documented with all jurisdictional agencies including, PA Fish and Boat Commission, Pennsylvania Game Commission and US Fish and Wildlife Service.**

The information that was sent to the Pennsylvania Department of Conservation and Natural Resources will be forwarded for review to the agencies listed above to ensure that the Final Plan complies with all consistency requirements.

16. **The Pennsylvania Historical and Museum Commission have required a Phase 1 survey be completed to locate potentially significant archaeological resources. If this survey is conducted as part of the planning process the costs will be eligible for reimbursement. If this survey is to be completed after the planning process it will not be eligible for reimbursement and the timeline for survey completion should be included in the implementation schedule.**

BASA has completed archaeological and geomorphologic surveys to evaluate alternative sites for the proposed facilities as part of the planning process. BASA is also completing an Industrial Resource Survey of the existing building, which would be demolished, on the Colosimo property as part of the planning process. As part of the planning process, BASA has also completed property appraisals, Phase 1 and Phase II environmental assessments, and property/subdivision surveys to evaluate and select the recommended sites for the proposed improvements. BASA will be submitting a revised TAR outlining these additional costs for the Department's review and consideration for reimbursement.

17. **As a reminder, notice of the Plan must be published in a newspaper of general circulation in accordance with Chapter 71.31.c, comments must be received from the Butler County Planning Commission, the tributary municipalities planning commissions, and this Plan must be adopted by all tributary municipalities.**

A public notice about the plan update will be published in a newspaper of general circulation, the Butler Eagle. The Final Plan will also be submitted to the Butler County Planning Commission and to the planning commissions of the Tributary Municipalities for review and comment. Resolutions of adoptions from the Tributary Municipalities will be included in the Final Plan or will be forwarded to the DEP when received.

If you should have any questions regarding our responses to the Department's review comments on the Draft Official Plan Update Revision, please call me at 724-282-1978. BASA representatives are also available to meet with the Department to discuss any further questions, if the Department wishes.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
Butler Township, Chairman of the Board of Commissioners
Center Township, Chairman of the Board of Supervisors
Summit Township, Chairman of the Board of Supervisors
East Butler Borough, Mayor
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission

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SEP 17 2008
BASA

September 15, 2008
C-38000-2008

M. John Schon, P.E., Manager
Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

COPY

RE: Act 537 Review and Comments

Dear Mr. Schon:

At the request of the City of Butler, we have completed a review of the draft Butler Area Sewer Authority (BASA) Act 537 Sewage Facilities Planning Study Update dated June 2008. The focus of our review was to insure items from the City of Butler Special Study dated February 15, 2007 with revisions dated June 18, 2007 were included within the plan. The plan was also reviewed to determine the impact of the improvements within City limits that are proposed by BASA to prevent present and future overflows.

Summary/Overview:

The projected EDU's used by BASA in the Act 537 study are identical to the EDU's estimated in the City of Butler Act 537 Special Study. In order to determine the size of equalization facilities and sewer lines that were over capacity, a computer model for portions of the BASA system was created. The projected EDU's and a 2 year, 24 hour storm event were used to estimate peak flow events. The following improvements are proposed in the BASA Act 537 Plan to address overflows within the BASA system and account for future growth of the system:

Description	Location	Estimated Costs
Deshon – Diversion, Pumping, and Storage Facilities (2-3 MG Tanks)	Butler Twp.	$5,852,000
Monroe – Diversion, Pumping, and Storage Facilities (2-1 MG Tanks)	City of Butler	$3,118,000
Ballpark/General Tire – Diversion and Pumping Facilities	City of Butler	$3,135,000
Connoquenessing – Diversion and Pumping Facilities	City of Butler	$3,205,000
Central Storage Facilities (3-4.7 MG Tanks)	City of Butler	$8,111,000
Conveyance System Upgrades	Butler Township and City of Butler	$1,886,000
TOTAL		**$25,307,000**

The equalization storage tanks will have sufficient storage capacities to capture all of the historic overflow events that have ever been recorded in the BASA system except for a 7.374 million gallon overflow that was measured at the Deshon pump station in January 2005.

The Monroe Diversion, Pumping and Storage Facilities improvements include 2 one million gallon flow equalization tanks, pump station and force main. The pump station will handle excess flows and pump the excess sewage to the covered storage tank. The tank will drain back to the existing pump station wet well. A chemical building for odor control will also be constructed. The equalization tank will be approximately 110 feet in diameter and 24 feet high. There are two sites that are currently being considered for these facilities. The first site is adjacent to the current Monroe pump station site on a property currently occupied by a car wash. The second site is on the opposite side of Connoquenessing Creek on a property that is currently for sale on Cunningham Street.

The Ballpark/General Tire Diversion and Pumping Facilities improvements include a diversion structure near the Ballpark overflow, a bored pipeline under the creek, a new pump station located on the east side of Sullivan Run, and a force main from the new pump station to the Central Storage Facility. The existing 36-inch sewer between the General Tire and Ballpark overflows would be increased to a 48-inch sewer to eliminate SSO's at the General Tire site.

The Connoquenessing Diversion and Pumping Facilities improvements include two diversion structures, a new pump station, and a force main to the Central Storage Facility. There will be one diversion chamber on the Connoquenessing Creek interceptor and one on the force main from the Monroe Pump Station.

The Central Storage Facility will consist of three 4.7 million gallon flow equalization tanks and a common pipeline to drain the tanks back to the Sullivan Run Interceptor. Each tank will be approximately 171 feet in diameter and 27 feet in height.

The conveyance system upgrades within the City include increasing line sizes in the Sullivan Run sewershed. Portions of the interceptor from West Penn Street to West Cunningham Street will increase in diameter.

BASA intends to apply for Pennvest funding to construct the proposed improvements. The report states that the base sewer service charge will increase in order to finance the improvements, but no proposed rates were estimated. The estimated cost for new BASA customers is a tap fee of $2,640.00/EDU and a connection fee of up to $300.00/EDU.

With regards to providing comments to BASA on the proposed plan, I would suggest the following:

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1. Provide an estimate of the user rates according to the alternative elected.

2. Consider an alternative site for the Monroe Pump Station storage tank currently proposed on Cunningham Street. Possibly property east of the pump station could be considered. The site on Cunningham is on a viable commercial parcel which is very visible and may be detrimental to the neighboring businesses.

3. We are aware that other locations for the Ball Park / General Tire Diversion and Pumping Facilities were considered. We recommend depicting the option of locating the pump station north near the General Tire Overflow instead of in Rotary Park.

In summary, this review consisted of overall general plan review and did not include an in depth review of concepts and costs presented.

Sincerely,
THE GATEWAY ENGINEERS, INC.

Joseph L. Gray, P.E.
City Engineer

cc: City of Butler
John Evans
Mayor Stock

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BUTLER AREA SEWER AUTHORITY

100 LITMAN ROAD • BUTLER, PA 16001-3256
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ASSISTANT MANAGER

RONATA L. LAVORINI, CPA
FINANCE DIRECTOR

JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Mayor Margaret D. Stock
City of Butler
140 West North Street
Butler, PA 16001

Dear Mayor Stock:

RE: CITY OF BUTLER'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority has reviewed the City of Butler's review comments on the Draft Official Plan Update Revision that were prepared by The Gateway Engineers, Inc. (letter date September 15, 2008). The Authority received these written comments on September 17, 2008. The following responses are offered to address each of the City of Butler's written comments:

1.) **Provide an estimate of the user rates according to the alternative elected.**

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements, including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in the Final Official Plan Update Revision.

2.) **Consider an alternative site for the Monroe Street Pump Station storage tank currently proposed on Cunningham Street. Possibly property east of the pump station could be considered. The site on Cunningham is on a viable commercial parcel which is very visible and may be detrimental to the neighboring businesses.**

As part of the planning process, the Authority staff and consulting engineers screened numerous sites to identify the most cost-effective alternative for the construction of the proposed improvements. In the case of the Monroe Street storage tank facilities, the properties to the east were considered during the preliminary screening process. Some of the key criteria used to screen potential sites for the proposed storage tank facilities included: (1) proximity to the existing overflow locations and diversion facilities to

minimize cost and insure that the existing overflows are contained; (2) heavy truck accessibility for construction, operation, and maintenance; (3) availability of utility services (electric power, water, and telephone); (4) potential to be acquired at a reasonable cost and without condemnation; (4) minimization of displacement or disruption of existing businesses to preserve existing tax bases, and (5) historic use of property and potential environmental remediation work that may be required.

The property immediately adjacent to the Monroe Street Pump Station to the northeast and east is all owned by railroads. The property to the northwest of the station on the eastern bank of the Connoquenessing Creek is a wetland area with a major sanitary sewer interceptor running through the middle of the parcel. This property was screened from further consideration as a potential site because of the significant difficulty in acquiring property from the railroad, the necessity and additional cost to re-route the existing major interceptor through this property, and the additional wetland mitigation costs that would be required to eliminate the existing wetland, if elimination of the wetland is even a possibility.

Access to the smaller railroad property to the east along the eastern bank of the Connoquenessing Creek would require an at-grade roadway crossing over an active railroad line and railroad rights-of-way for the underground pipe crossings from the diversion pumping facility to the tanks and back to the pump station. Approval of such crossings may take considerable time to obtain and can be very costly. In addition, the railroad will retain the right to require the Authority to remove its facilities at the Authority's cost from the railroad property at any point in the future that the railroad deems it necessary. Electric power, water, and telephone services are also not readily available for this property, which would necessitate relatively lengthy, and costly, service line extensions. Because of the significant difficulty in obtaining property from the railroad, the time and additional expense to obtain railroad roadway crossing approval and the pipe crossing rights-of-way, and the limited availability of utility services, this railroad property was also screened from further consideration as a potential site.

The larger Sechan property farther to the east and adjacent to the railroad property and the creek is a landlocked parcel with no direct access to any public road. Access to this parcel from Monroe Street or Kittanning Street would require a lengthy access road across railroad property. In addition, access to this parcel would again require an at-grade roadway crossing over an active railroad line and railroad rights-of-way for the underground pipe crossings from the diversion pumping facility to the tanks. Electric power, water, and telephone services are not readily available for this property. The Soil Survey for Butler County also classifies this site as an industrial waste dump and describes the soils as too toxic to support vegetation. As such, considerable time and extensive, expensive environmental testing would be required to further assess this property and to identify potentially expensive, environmental remediation work that could be necessary. Therefore, the Sechan property was screened from further consideration as a potential site because of the challenging access to the property, the time and additional expense to obtain railroad roadway crossing approval and the pipe crossing rights-of-way, the lack of utility services, and the time and additional expense for environmental monitoring, and the potentially costly environmental remediation work that may be required.

3.) **We are aware that other locations for the Ball Park/General Tire Diversion and Pumping Facilities were considered. We recommend depicting the option of locating the pump station north near the General Tire Overflow instead of in Rotary Park.**

Based on input from City representatives and other agencies with planned projects, the Authority has evaluated alternative sites for the Ball Park/General Tire Diversion and Pumping Facilities. The Final Official Plan Update Revision will not recommend that the Ball Park/General Tire Diversion and Pumping Facilities be located at the Rotary Park site based on the recommendations of the City of Butler. The text, cost estimates, and figures in the Final Official Plan Update Revision will be revised as necessary to depict and reflect the new proposed site for the Ball Park/General Tire Diversion and Pumping Facilities.

If you should have any questions regarding our responses to the City of Butler's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

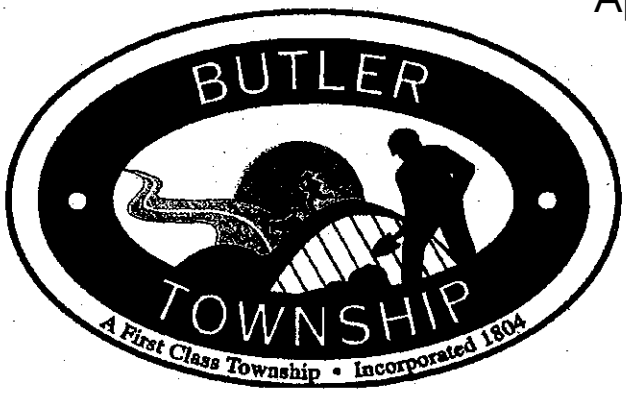
BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
Butler Township, Chairman of the Board of Supervisors
Center Township, Chairman of the Board of Supervisors
Summit Township, Chairman of the Board of Supervisors
East Butler Borough, Mayor
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
Joseph L. Gray, Gateway Engineers

Commissioners:
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Sam J. Zurzolo, Vice President
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Donna M. Druga
Dave Zarnick



Manager:
Edward A. Kirkwood

Secretary:
Donna Donaldson

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COPY

September 5, 2008

Butler Area Sanitation Authority
Attn: John Schon, P. E.
100 Litman Road
Butler, PA 16001-3256

RE: ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE

Dear Mr. Schon:

Please find enclosed a copy of Butler Township's comments regarding the above referenced item as prepared by Daniel S. Deiseroth, Township Engineer. I apologize for the delay in sending them to you. Until receipt of your September 3, 2008 letter, I was under the assumption that you had received this correspondence.

If I can be of any additional service, please do not hesitate to call me at 724-283-0686.

Yours truly,

Edward A. Kirkwood
Certified Municipal Clerk
Butler Township Manager

290 South Duffy Road Butler, PA 16001
Telephone ~ 724/283-3430 Fax ~ 724/283-1442 E-mail ~ info@butlertwp.org

GATEWAY
On Call. On Time. On Target.

THE GATEWAY ENGINEERS, INC.

400 HOLIDAY DRIVE, SUITE 300
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412.921.9960 FAX

www.gatewayengineers.com

July 30, 2008
C-25452-0002

Butler Township Board of Commissioners
290 South Duffy Road
Butler, PA 16001

Att: Ed Kirkwood

COPY

RE: BASA Act 537 Review

Board of Commissioners:

As requested, we have completed a review of the draft Butler Area Sewer Authority (BASA) Act 537 Sewage Facilities Planning Study Update dated June 2008. The focus of our review was to insure items from the Butler Township Special Study dated October 2006 with revisions dated February 2007 and June 2007 were included within the plan. We also reviewed the study to determine the impact of the improvements planned within Butler Township that are proposed by BASA to prevent present and future overflows.

The EDU's (equivalent dwelling units, a measure of sewerage for one single family home) as projected in the Butler Township Act 537 Special Study are identical to the projected EDU's used by BASA in the Act 537 study. The projected EDU's, along with a 2 year, 24 hour storm event, were entered into a computer model for portions of the existing BASA system to aid in sizing of the equalization facilities and detecting sewer lines that may be over their capacity. According to the report, the BASA treatment plant is not expected to be overloaded until the year 2028, but the following improvements are proposed in the BASA Act 537 Plan to address overflows within the BASA system and account for future growth of the system:

Description	Location	Estimated Costs
Deshon – Diversion, Pumping, and Storage Facilities (2-3 MG Tanks)	Butler Twp.	$5,852,000
Monroe – Diversion, Pumping, and Storage Facilities (2-1 MG Tanks)	City of Butler	$3,118,000
Ballpark/General Tire – Diversion and Pumping Facilities	City of Butler	$3,135,000
Connoquenessing – Diversion and Pumping Facilities	City of Butler	$3,205,000
Central Storage Facilities (3-4.7 MG Tanks)	City of Butler	$8,111,000
Conveyance System Upgrades	Butler Township and City of Butler	$1,866,000
TOTAL		**$25,307,000**

CC: BTBC
8-1-08

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The equalization storage tanks will have sufficient storage capacities to capture all of the historic overflow events that have ever been recorded in the BASA system except for a 7.374 million gallon overflow that was measured at the Deshon pump station in January 2005.

The improvements at the Deshon Pump Station site include 2 three million gallon equalization tanks, small pump station, diversion piping, and a small chemical building. The planned location of the facility is within Township property along Saw Mill Run Road. Each tank would be approximately 154 feet in diameter and 24 feet high. The entire area would be enclosed with fencing.

The conveyance system upgrades within Butler Township include increasing line sizes in the Butcher Run sewershed and Sullivan Run sewershed. In the Butcher Run sewershed, the interceptor from the Old Plank/Criswell intersection to the BASA treatment plant would be increased in diameter. In the Sullivan Run sewershed, portions of the interceptor along West Penn Street Extension (downstream of Alameda Park into the City of Butler) will also be increase in diameter. As it relates to system expansion of lines, within the BASA system, current unsewered areas will not be serviced as part of this plan.

BASA intends to apply for Pennvest funding to construct the proposed improvements. The report states that the base sewer service charge will increase in order to finance the improvements, but no proposed rates were estimated. The estimated cost for new BASA customers is a tap fee of $2,640.00/EDU and a connection fee of up to $300.00/EDU.

With regards to providing comments to BASA on the proposed plan, I would suggest the following:

1. More information should be provided justifying equalization tanks as the only method of solving the wet weather problems.

2. Further consideration should be given to servicing unsewered areas in an effort to spur growth in the system as a part of the overall project, rather than stand alone projects as analyzed in the study, which are not economically feasible. Upgrades as proposed will allow for future development, but nothing is planned to facilitate development to use the capacity created in the system.

3. Projections of user rates based upon the selected alternative should be provided.

In summary, this review consisted of overall general plan review and did not include an in depth review of concepts and costs presented.

I am available to address Board questions related to the study as they arise.

Sincerely,
THE GATEWAY ENGINEERS, INC.

Daniel S. Deiseroth, P.E.
Township Engineer

cc: Cindy Davis, Township Zoning Officer
Bruno Muscatello, Township Solicitor
Leo Stepanian, II, Township Solicitor's Office
Matthew Bagaley, P.E., Project Manager

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BUTLER AREA SEWER AUTHORITY

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ASSISTANT MANAGER

RONATA L. LAVORINI, CPA
FINANCE DIRECTOR

JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Chairman of the Board of Commissioners
Butler Township
290 South Duffy Road
Butler, PA 16001

Dear Chairman:

RE: BUTLER TOWNSHIP'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed the written comments on the Draft Official Plan Update Revision that were prepared by The Gateway Engineers, Inc. (letter date July 30, 2008) and submitted to BASA by the Township (letter dated September 5, 2008). BASA received these written comments on September 9, 2008. The following responses are offered to address each of the Township's written comments:

1.) **More information should be provided justifying equalization tanks as the only method of solving the wet weather problems.**

The existing BASA Sewage Treatment Plant (STP) provides a very high level of treatment and produces a high quality effluent that is consistently well below the maximum allowable discharge limits specified in its current NPDES Permit. With monthly average daily dry weather flows of only 4.5 mgd and organic loadings only 70% of design capacity, the existing BASA STP has more than sufficient capacity to meet the current and projected future sewage needs of the service area. Therefore, there is no need to upgrade the level of treatment or expand the capacity of the existing BASA STP to handle the projected dry weather sewage flows and organic loadings from the anticipated future growth.

Any expansion would be solely to treat excess groundwater and storm water entering the sanitary sewer system. However, since groundwater and storm water contribute no additional organic loading or "food" to support the microorganisms in the expanded biological treatment processes at the STP, an expansion of the conventional biological treatment processes to treat clear water will not operate properly. The additional tanks would have to be removed from service during the 97% of the time when flows are within the capacity of the system. Although the physical treatment tanks could be brought on line quickly during high flow events, the normal start-up time for biological processes would take 1 to 2 weeks, more than four times the duration of the longest overflow period ever recorded. Consequently, the additional processes would not provide any biological treatment when needed, and would simply provide some additional settling tank capacity at a very high cost.

It is significantly more efficient and cost-effective to install high-rate settling tanks and disinfection for the flows exceeding the capacity of the existing STP processes, and then "blend" or mix this treated excess flow with the fully-treated flow from the existing STP processes. While such blending treatment systems are currently being permitted and approved by other states, such as Ohio, and other U. S. EPA regions, the Pennsylvania DEP and our U. S. EPA Region III office will not approve and permit blending systems. Therefore, this type of treatment system was not an available alternative for BASA.

The DEP is currently in the process of imposing very stringent nutrient effluent limitations on the STPs in the eastern part of the state within the Chesapeake River Basin. These new nutrient standards will require most of these STPs to undergo very expensive upgrades to provide additional nutrient removal processes. In some cases, the proposed limits may not be achievable using existing treatment technologies and the limits may be subject to legal challenge. DEP representatives have indicated that they expect to impose similar nutrient standards on all STPs statewide in the near future. However, the actual limits that may be imposed on the BASA STP will not be known until that time. BASA does not believe that it would be prudent to guess what the actual effluent limits and level of treatment required may be at this time and invest significant expenditures to upgrade the BASA STP now.

In addition, there are no biological treatment processes capable of handling peak influent flows of up to 12 to 14 times the average flow, such as the flow variation experienced in the BASA system. Significant flow equalization storage capacity will still be required for any upgrade of the biological treatment processes at the BASA STP. The limited available space at the existing BASA STP site, without expensive acquisition of adjacent properties, will also limit any expansion of the facilities and necessitate more off-site flow equalization. Therefore, the proposed off-site flow equalization tanks will still be necessary and utilized in the future when the BASA STP must be upgraded to meet the new nutrient standards.

For these reasons, the proposed plan of re-rating the existing STP and constructing flow diversion and equalization storage tanks that will limit the peak flows at the STP to less than 28 mgd is the most cost-effective method to address the SSO problems and comply with the CO&A. The proposed plan avoids major expenditures to upgrade and install new facilities at the existing STP now, which could be unusable and may have to be replaced or abandoned in a couple of years, when it is anticipated that the BASA STP will require a major upgrade to comply with the pending nutrient removal standards.

It must also be noted that the proposed facilities are sized to handle the existing infiltration and inflow (I&I) into the sanitary sewer system from both public and private sewer defects and illegal connections. As the sewer pipes continue to age and deteriorate, I&I will also continue to increase. Therefore, BASA must also implement and maintain an on-going public sewer rehabilitation and/or replacement program, especially in the areas with old clay or terra cotta sewers, as part of the recommended plan to address the wet weather problems. In addition, BASA must continue its programs to identify and eliminate private I&I sources, such as the mandatory realty transfer testing program and the rainfall simulation testing program, as an essential element of the overall long-term I&I control plan. This must be done to offset the anticipated increase in I&I as the public and private sewers continue to age and prevent this anticipated I&I increase from overloading the new structural improvements that are implemented.

As part of the Corrective Action Plan (CAP) for the 2001 CO&A, BASA did evaluate a number of alternatives, including expansion of existing pumping station and interceptor facilities to convey the flows to the existing STP for treatment. The Final Plan will be revised to discuss these alternatives and the conclusions cited above.

2.) **Further consideration should be given to servicing unsewered areas in an effort to spur growth in the system as a part of the overall project, rather than stand alone projects as analyzed in the study, which are not economically feasible. Upgrades as proposed will allow for future development, but nothing is planned to facilitate development to use the capacity created in the system.**

The extension of public sewers to serve unsewered areas is limited by past precedent, Board policy, and the regional, multi-municipal service area of BASA. All of the customers of BASA have paid for the costs of their original sewage collection systems in some way. Private developers have always been responsible for the costs of sewer extensions to serve new development, and these costs have been paid by customers purchasing or renting property in their development. Historically, the costs for ALL public sewer extensions have been paid by grant funds that were secured by BASA or the municipality, the customer service charges, and/or debt service surcharges assessed to the customers that benefited from the sewer extension. The debt service surcharge fees that were assessed to finance the 1980 public sewer extensions to serve East Butler Borough, Center Township, Summit Township, and outlying portions of Butler Township, and that are still being paid by customers in the Center Township and Butler/Summit debt service surcharge districts, are an example of this method of financing sewer extensions. The current Meridian/Heather Drive debt service surcharge is another example of this method of financing sewer extensions, as is the proposed method of financing Connoquenessing Township's proposed Winterwood Drive sanitary sewer project.

In all these cases, the economic feasibility of the public sewer extensions was dependent upon the user costs that would have to be assessed to the existing customers within the proposed sewer service area to finance the debt for the sewer extension. Future customer growth within many of these areas has enabled BASA to lower and in some cases eliminate the debt service surcharge rate for many of these areas, because the new customers were sharing or paying the same original annual debt service cost. However, there is no guarantee that future growth will occur. It would not be prudent to assume that future customers will be served to make the apparent user charges look more reasonable or feasible for public sewer extensions. Once the costs or debt for the sewer extension have been incurred, it is the existing customers that are served who will be required to pay for the costs or debt if no future growth occurs. The Saxonburg Area Authority recently raised rates to their existing customers due to the limited growth that has occurred in view of the current market conditions.

The multi-municipal nature of BASA's sewer service area is another issue that must be considered in financing the costs of public sewer extensions. In the case of an authority that serves only the municipality that incorporated it, that authority may choose to share or spread the costs of new public sewer extensions to all of the existing users in that municipality to lower the user costs for the "new" customers or potential future customers, to make the costs of public sewer extension more reasonable or feasible. In such cases, the cost increase to the existing customers to subsidize the sewer extension may be justified because that same municipality and all of its residents may directly benefit from the additional tax revenues that future growth in the new sewer service area may bring to that municipality. In the case of a regional authority, such as BASA, it is much more difficult to justify a cost increase to existing customers in other municipalities to share or subsidize the costs of a public sewer extension that will only serve customers in another municipality and directly benefit future growth in that other municipality.

For these reasons, the Draft Official Plan Update Revision evaluated the economic feasibility of the public sewer extensions into future growth areas as stand-alone projects. It should also be noted that the estimated user costs in the Draft Update ONLY represent the debt service surcharge costs for the construction of the new sewer extensions. The user costs did NOT include BASA's base sewer service charge that all these customers would also have to pay for the operation and maintenance of the system, which is

expected to increase because of the additional debt costs to finance the proposed interceptor and flow equalization tank facilities that will enable these future customers to be served by the system.. In addition, the estimated user costs also did NOT include any necessary improvements to smaller pump stations, force mains, and/or collector sewers within the BASA system that may be necessary to provide sewer service to the specific growth areas, because the estimated user costs were already cost prohibitive. Therefore, the user costs for the customers in these future service areas could be significantly higher and even more cost prohibitive.

The costs of the public sewer extensions to serve the future growth areas in Butler Township could be consolidated and an estimated debt service surcharge could be calculated assuming that this debt cost was to be shared or subsidized by all of the existing customers in Butler Township, if Butler Township directs BASA to do so. In view of the high costs to extend public sewers to serve the limited number of existing customers in the identified future growth areas, however, it is anticipated that the cost increase to Butler Township's existing customers and the new customers in these areas would still be significant.

3.) **Projections of user rates based upon the selected alternative should be provided.**

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements, including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in the Final Official Plan Update Revision.

If you should have any questions regarding our responses to the Township's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
East Butler Borough, Mayor
Center Township, Chairman of the Board of Supervisors
Summit Township, Chairman of the Board of Supervisors
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
Daniel S. Deiseroth, Gateway Engineers

OLSEN & ASSOCIATES, LLC

126 South Main Street, Butler, PA 16001
(724) 282-4786 • (724) 282-7619 FAX

October 28, 2008

Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

REF: **Butler Area Sewer Authority (BASA)**
Act 537 Plan Review

Members of the Board:

At the request of Center Township, we have reviewed the BASA Act 537 Sewage Facilities Planning Study DRAFT dated June, 2008.

We have verified that the information submitted by Center Township in its Special Study has been addressed in the BASA Study.

1. BASA has included cost studies to serve existing unsewered developed areas within the Township. BASA has concluded that it would not be economically feasible to service these areas unless grants were obtained to lower per capita costs.
2. The BASA study has included projected future growth within Center Township based upon the Township's Land Assumptions Report.
3. Proposed BASA sewer system improvements include sufficient conveyance and treatment capacity for Center Township growth.
4. Proposed BASA sewer construction projects include upgrading sewer lines within the Sullivan Run sewershed and within other sewersheds that are currently under-sized or will be undersized with anticipated customer growth. Future growth is conservatively assigned 1,000 GPD per EDU in designs of collector sewers improvements/replacements.
5. BASA is proposing diversion, pumping, and temporary tank storage facilities near the Monroe Street Pump Station, the Pullman Ballpark/General Tire and in a Central Storage area within the west end of Butler City to prevent sanitary sewer overflows.

6. The system of sizing these proposed equalization tank structures is not easily understood; using monitored sanitary sewage overflow data complied in "averaged" tables and then trended toward a 2 year frequency 24 hour duration precipitation event which does not necessarily consider antecedent moisture conditions, snow melt, groundwater levels, etc. and then increasing computed tank sizes to limit discharges of existing and future EDU's to 25M or 28M gpd at the Wastewater Treatment Plant.

Center Township would appreciate consideration of the following:

a) Proposed improvements to BASA facilities are expected to cost approximately $25.3 M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.

b) We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSO's will be totally eliminated.

c) In the event that the projected sewer system improvement costs are to be limited to $25.3 M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3 M and the cost of a 3 million gallon uncovered tank is $0.9 M, a difference of $0.4 M. A $1.3 M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent future overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary sewage may be directed to the equalization tanks. Open tanks do not qualify as "enclosed spaces" needing costly fresh air replenishment for workers on catwalks above the sewage. If the tanks are used primarily during wet weather, freezing and icing in an open tank should not be a problem as long as they are drained and flushed clean before cold weather occurs.

d) We suggest that cost of land acquisition and land clean-up be added to facilities estimated total cost. The Horewitz property was used for industrial storage including car battery recycling and may be contaminated with lead. If BASA is strongly considering acquiring this site, we suggest that you contact the Community Development Corporation of Butler County. Their affiliate corporation CDC Environmental, Inc. may partner with you in acquisition and

clean up of this site using ISRP grants of up to 75% for this purpose. Timing could be a problem, however, as this cleanup process could take years. A Phase 2 Environmental Site Assessment may be the first step in determining if ground contamination on this property is a concern.

e) We are not sure that Center Township fully understood the provisions of the October 13, 2006 Consent Order & Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDUs (potential new equivalent dwelling taps) for the entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Township would appreciate being notified how many remain as of October, 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. A moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.

Thank you for your consideration in these matters.

Sincerely,

Olsen & Associates, LLC

Ronald Olsen, PE
Center Township Engineer

RO/jco
200604E.01

cc: Center Township Board of Supervisors
T. Schmeider, PaDEP

BUTLER AREA SEWER AUTHORITY

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ASSISTANT SECRETARY
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RONATA L. LAVORINI, CPA
FINANCE DIRECTOR

JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Dr. Ronald E. Flatt, Chairman
Center Township Supervisors
c/o Stephanie Sellers
Township Secretary
419 Sunset Drive
Butler, PA 16001

Dear Dr. Flatt:

RE: CENTER TOWNSHIP'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed Center Township's review comments on the Draft Official Plan Update Revision that were prepared by Olsen & Associates, LLC (letter dated October 28, 2008). BASA received these written comments on October 29, 2008. The following responses are offered to address each of the Township's written comments:

A.) Proposed improvements to BASA facilities are expected to cost approximately $25.3M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.

The original capital expenditures for extensions of public sanitary sewers have historically been paid by the properties that benefited, either through debt surcharges or developer paid improvements. Once adopted as part of BASA's public sewer system, BASA has utilized its operational and/or capital reserve funds to pay for all repairs, rehabilitation, and/or replacement costs for the public sewers within its entire service area without any regard to the specific surcharge district or municipality in which the public sewers are located.

The proposed re-rating of the existing wastewater treatment plant and the flow diversion and equalization storage tank facilities will address the existing overload conditions, restore capacity within the existing sewer service areas, and provide additional capacity for future customers throughout the entire service area. By restricting the peak flow to the wastewater treatment plant to no more than 28 mgd, the re-rated peak capacity of the treatment plant, the proposed flow diversion and equalization tank facilities are an integral component of the wastewater treatment plant operation. Therefore, the proposed improvements will benefit all of the customers in the BASA system and the costs of these proposed improvements will be shared equally by all of the customers within BASA's service area.

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements, including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in the Final Official Plan Update Revision.

B.) **We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSOs will be totally eliminated.**

It is impossible to totally eliminate all sanitary sewer overflows (SSOs) and the Federal regulations recognize that there are some circumstances where an SSO is unavoidable and even provide legal defenses for such events. While the DEP acknowledged this fact during negotiation of the CO&A, the DEP was unwilling to acknowledge and document this fact in the CO&A. For example, the wastewater treatment plant and one of our major pump stations were flooded and underwater for a period of time in 2004 during the Hurricane Francis and Ivan events. If a similar flooding event occurs, there is nothing BASA can do to prevent SSOs.

Statistical analyses of the overflow events were performed to evaluate tank sizing criteria, which the U. S. EPA and other DEP regional offices have approved for other municipalities, and to determine the overflow capture or containment of various tank sizes. The DEP Northwest Regional Office was unwilling to agree to any statistical criteria, nor offer any guidelines, for sizing the tanks. Acknowledging the desire to "eliminate" all SSOs, the proposed tanks were sized to handle the historic SSOs that were monitored over the last 10 years, with one exception, plus the additional sanitary sewage flows from anticipated future customer growth. These historic SSO events include antecedent groundwater and moisture conditions, rainfall, and snowmelt conditions that may cause or contribute to SSOs, as cited in the review comment letter. In addition, BASA considered the possibility that additional tank capacity may have to be added in the future in the selection of the sites for the proposed tanks.

Nevertheless, there is always a statistical probability that some unusual combination of rainfall, snowmelt, groundwater conditions and/or flooding may occur that can cause flows to exceed the finite capacity of the proposed tanks. For this reason, neither BASA nor anyone else can guarantee that all SSOs will be eliminated. Whether or not a ban or limitation on new connections may be imposed is up to the DEP and would most likely depend on the frequency and circumstances of the SSOs. However, the DEP may impose a ban or limitation on new connections for a variety of reasons at any time.

C.) **In the event that the projected sewer system improvement costs are to be limited to $25.3M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3M and the cost of a 3 million gallon uncovered tank is $0.9M, a difference of $0.4M. A $1.3M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary sewage may be directed to the equalization tanks. Open tanks do not qualify as "enclosed**

spaces" needing costly fresh air replenishment for workers on catwalks above the sewage. If the tanks are used primarily during wet weather, freezing and icing in an open tank should not be a problem as long as they are drained and flushed clean before cold weather occurs.

BASA concurs that uncovered tanks are less costly than covered tanks. BASA also concurs that odor control systems have proven to be unnecessary for many uncovered equalization tanks, because of the infrequent usage and the very dilute nature of sewage that is diverted to the tanks. BASA concurs that the operation and maintenance of covered tanks may also require additional facilities and may be more costly. However, the proposed site of the Monroe Street Pump Station storage tank facilities on Cunningham Street and the Central Storage Tank facilities at the end of Negley Avenue are both located near existing commercial and residential areas. In view of the current public concern about sewage odors at BASA's Wastewater Treatment Plant, the odor concerns expressed by municipal officials in the communities where the tanks will be located, and the anticipated odor concerns of residents and businesses in the vicinity of the proposed tank locations, BASA believes that the additional cost to cover the proposed tanks is warranted. While it is impossible to guarantee that there will never be any odor problems at a tank site, because even the most elaborate odor control systems are subject to breakdown, BASA believes that covering the tanks will provide a greater probability that there will not be any odor problems at these sites. In addition, BASA also believes that it will be necessary to spend some additional costs to minimize or mitigate the aesthetic impact of the tanks so that they blend into the area as well as possible.

D.) **We suggest that the cost of land acquisition and land clean-up be added to facilities estimated total cost. The Horewitz property was used for industrial storage including car battery recycling and may be contaminated with lead. If BASA is strongly considering acquiring this site, we suggest that you contact the Community Development Corporation of Butler County. Their affiliate corporation, CDC Environmental, Inc., may partner with you in acquisition and clean up of this site using ISRP grants of up to 75% for this purpose. Timing could be a problem, however, as this cleanup process could take years. A Phase 2 Environmental Site Assessment may be the first step in determining if ground contamination on this property is a concern.**

As part of the planning process, BASA has already completed property appraisals, archaeological and geomorphologic surveys, property/subdivision surveys, and Phase I and Phase II environmental assessments to evaluate and select the recommended sites for the proposed improvements and to expedite the design, permitting, and construction of the proposed improvements. Where necessary, BASA has also obtained cost estimates for any required environmental remediation work to negotiate the depreciated land acquisition value or cost. BASA has coordinated efforts with the CDC on environmental site assessment work for the proposed facilities on the AK Steel property to take advantage of available grant funds. However, BASA does not have the luxury of time, as you noted, to take advantage of other possible grant sources for other sites. The total estimated project costs for the recommended improvements, including land acquisition costs, environmental assessments, and environmental remediation work, if necessary, will be included in the Final Official Plan Update Revision.

E.) **We are not sure that Center Township fully understood the provisions of the October 13, 2006 Consent Order and Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDU's (potential new equivalent dwelling taps) for the entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection**

prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Township would appreciate being notified how many remain as of October 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. A moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.

It should first be noted that CO&A is an agreement between the DEP, BASA and all of the Tributary Municipalities, including Center Township. Upon execution of the CO&A by all parties, BASA was granted an allocation of 200 EDUs of capacity for new sewer connections in accordance with Paragraph 10(b) of the CO&A. Paragraph 10(g-j) of the CO&A included provisions that BASA may request additional EDUs for sewer connections on an annual basis in conjunction with BASA's Annual Chapter 94 Wasteload Management Report, which must be submitted by March 31st of each year, beginning with the annual report for 2007. BASA submitted a request for additional EDUs for new sewer connections in conjunction with its 2007 Chapter 94 report. On June 18, 2008, the DEP approved an additional 200 EDUs for new connections to be used during the period between April 1, 2008 and March 31, 2009 in response to BASA's request.

As of March 31, 2008, 155 of the original 200 EDU new sewer connection permit allocation approved in the CO&A have been issued and 45 EDUs of permit capacity are still available from this original allocation. As of October 31, 2008, only 25 of the additional 200 EDU new sewer connection permit allocation that was approved by the DEP on June 18, 2008 for use during the period April 1, 2008 through March 31, 2009 have been issued and 175 EDUs of permit capacity are still available. The current status of the availability of new sewer connection permits is updated on a monthly basis in the minutes of BASA's regular meetings and in the quarterly progress reports that BASA prepares and submits to the DEP and each of the Tributary Municipalities, including Center Township.

The continued availability of these new sewer connection permit allocations and DEP approval of any subsequent permit allocations is dependent upon the compliance status of BASA and the Tributary Municipalities with the requirements of the CO&A; and BASA's documentation of any flow removal that was achieved by rehabilitation of public and private property sewers during the previous year. This is another reason why BASA's Deshon and Westwood Manor III rainfall simulation testing and inspection programs are of vital importance. Once all of the original new sewer connection permit allocation and any subsequent permit allocations granted by the DEP are exhausted, BASA and the Tributary Municipalities, including Center Township, all agreed to a prohibition or ban on all new sewer connection permits in the service area (Paragraph 10(c) of the CO&A) with a few limited exceptions as defined in the CO&A and the DEP's Chapter 94 Regulations.

BASA is acutely aware of the economic consequences that a new sewer connection permit ban would have on the service area. BASA is committed to doing everything in its power to expedite the design, permitting, and construction of the proposed improvements to comply with the CO&A and eliminate new permit limitations as quickly as possible. BASA will continue to seek DEP approval of additional new sewer connection permit allocations as allowed by the CO&A. In addition, BASA will continue its efforts to obtain DEP approval of all projects that may qualify as exceptions to the

allocations in order to preserve the existing permit allocations. For example, several major developments such as the Butler Memorial Hospital Expansion, the Pullman Baseball Field Renovation, the Pullman Business Park Expansion, the Shearer Road Business Park, the Northwest Elementary School Expansion, the Butler High School Athletic Field Improvements, and the Winterwood Sewer Extension project in Connoquenessing Township, have all been approved by the DEP as exceptions to the permit allocations. In addition, the majority of IDL Worldwide's industrial expansion in East Butler was also approved as an exception to the allocation.

If you should have any questions regarding our responses to the Township's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
Butler Township, Chairman of the Board of Commissioners
Summit Township, Chairman of the Board of Supervisors
East Butler Borough, Mayor
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
Ronald Olsen, Olsen && Associates, LLC

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BASA

Connoquenessing Township

Board of Supervisors:

Evelyn Hockenberry, Chairman
Jack Kaltenbaugh, Vice Chairman
Steve Misko, Supervisor

Evelyn Hockenberry, Treasurer/Secretary
Rebecca Gizienski, Assistant Treasurer/Secretary

102 Township Dr.
Renfrew, PA. 16053

PHONE: 724-486-3888
FAX: 724-486-3889
E-Mail:Connoquenessingtwp@zoominternet.net

COPY

September 9, 2008

M. John Schon, P.E. Manager
BUTLER AREA SEWER AUTHORITY
100 Litman Road
Butler, PA 16001

Re: BASA Draft Official Act. 537
Plan Update Revision

Dear Mr. Schon:

The Connoquenessing Township Board of Supervisors has received your letter dated 06/02/08 and the Draft Act 537 Update for review and comment. We have enumerated below our comments/concerns.

1. Page IV-3: The statement "A Joint Comprehensive Plan is being formulated" is no longer valid because a Comprehensive Plan has been adopted by Connoquenessing Township. The plan is available for review at the Township Municipal building.
2. Page IV-5: Connoquenessing Township lot sizes are governed by the availability of public sewage and/or public water as described in Chapter 26 of the Code of Ordinances.
3. Page IV-31: After the allocated 200 EDU's have been issued is it not correct that the DEP may issue additional allocations? Of the remaining approximately 48 allocated EDU's, what number have been reserved for Connoquenessing Township?
4. Page IV-35: The Winterwood Drive Sanitary Sewer Project estimated costs were updated in July 2008. The total estimated project cost is

$444,558.00 and based on a 20-year PENNVEST loan, the total customer cost per month is approximately $92.00.

5. Page VI-56: Based on the statement "It does not appear that sewer extensions to the unsewered areas will be economically feasible unless significant grant funds are obtained for individual projects" it may be prudent for Connoquenessing Township to pursue other methods of sewage treatment for these areas.

If the Authority wishes to further discuss any of the above issues/comments, please contact the Township office at 724-486-3888.

Sincerely,
Connoquenessing Township Board of Supervisors

BUTLER AREA SEWER AUTHORITY

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RONATA L. LAVORINI, CPA
FINANCE DIRECTOR

JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Chairman of Board of Supervisors
Connoquenessing Township
102 Township Drive
Renfrew, PA 16053

Dear Chairman:

RE: CONNOQUENESSING TOWNSHIP'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed Connoquenessing Township's review comments on the Draft Official Plan Update Revision that the Township submitted in a letter dated September 9, 2008. BASA received these written comments on September 10, 2008. The following responses are offered to address each of the Township's written comments:

1.) **PAGE IV-3: The statement "A Joint Comprehensive Plan is being formulated" is no longer valid because a Comprehensive Plan has been adopted by Connoquenessing Township. The plan is available for review at the Township Municipal Building.**

The Draft Official Plan Update Revision was based upon Connoquenessing Township's "Report on Special Study for Butler Area Sewer Authority Service Area" (Special Study), prepared by Senate Engineering Company, dated September 2006 with subsequent revisions dated March 2007, July 2007, August 2007, September 2007, and October 2007. A reference to the new Comprehensive Plan and its date of adoption will be added to the Final Official Plan Update Revision.

2.) **PAGE IV-5: Connoquenessing Township lot sizes are governed by the availability of public sewage and/or public water as described in Chapter 26 of the Code of Ordinances.**

The text in section IV.A.2 on Page IV-5 of the Draft Official Plan Update Revision is correct and will not be changed. None of the Special Studies, including the Connoquenessing Township Special Study, contained any discussions about zoning or subdivision regulations that establish lot sizes based on sewage disposal methods. BASA presumes that the Township's consulting engineer would have taken these lot sizes into account in the determination of the estimated future EDUs that could be served in the potential growth areas identified in the Township's Special Study.

3.) **PAGE IV-31: After the allocated 200 EDU's have been issued is it not correct that the DEP may issue additional allocations? Of the remaining approximately 48 allocated EDU's, what number have been reserved for Connoquenessing Township?**

Yes, Paragraph 10(g-j) of the October 13, 2006 Consent Order and Agreement (CO&A) provides provisions for BASA to request additional EDUs for sewer connections on an annual basis in conjunction with BASA's Annual Chapter 94 Wastelaod Management Report. On June 18, 2008, the DEP approved an additional 200 EDUs for new connections for use between April 1, 2008 and March 31, 2009 in response to BASA's request. The current status of the availability of new sewer connection permits is summarized in the quarterly progress reports that BASA prepares and submits to the DEP and the Tributary Municipalities. BASA's Sewer Connection Permit Allocation Policy does not reserve or allocate any new sewer connection permits for any specific municipality.

The text on Page IV-31 will be updated in the Final Official Plan Update Revision to reflect the additional EDUs approved by the DEP and status of these new sewer connection permits at the time.

4.) **PAGE "IV-35" (CORRECT PAGE VI-35): The Winterwood Drive Sanitary Sewer Project estimated costs were updated in July 2008. The total estimated project cost is $444,558.00 and base on a 20-year PENNVEST loan, the total customer cost per month is approximately $92.00.**

No detailed cost information for the Township's Winterwood Drive Sanitary Sewer Project was included in the Township's Special Study. An updated June 2008 cost estimate was submitted to BASA after the Draft Official Plan Update Revision was issued. As such, the estimated costs for this project on Page VI-35 (not Page IV-35) and in Table VI-14 of the Draft Official Plan Update Revision were prepared by BASA's consulting engineer. The updated July 2008 cost estimates have not been submitted to BASA. The text on Page VI-35 will be updated in the Final Official Plan Update Revision to reflect the cost information in the Township's review comments.

HOWEVER, IN ORDER TO MORE ACCURATELY REVISE THE COSTS IN TABLE VI-14, WE ARE HEREWITH REQUESTING THAT THE TOWNSHIP PROVIDE BASA WITH DETAILED ESTIMATED COST INFORMATION FOR THE WINTERWOOD DRIVE SANITARY SEWER PROJECT AS UPDATED IN JULY 2008. IF WE DO NOT RECEIVE THE DETAILED JULY 2008 UPDATED COSTS, THE FINAL PLAN WILL HAVE TO BE REVISED TO REFLECT THE JUNE 2008 COST ESTIMATES THAT WERE SUBMITTED TO BASA.

5.) **PAGE VI-56: Based on the statement "It does not appear that sewer extensions to the unsewered areas will be economically feasible unless siguificant grant funds are obtained for individual projects" it may be prudent for Connoquenessing Township to pursue other methods of sewage treatment for these areas.**

The Draft Plan concludes that it is cost prohibitive at this time for BASA to provide centralized sewage collection and treatment service for the limited number of existing customers in the Township's identified future growth areas; even without the multiple pump station upgrades that would be necessary to connect these areas to the existing BASA collection system. Other options, including but not limited to, a local, private and/or publicly-owned, decentralized wastewater collection and treatment system may be more cost-effective until such time that additional growth occurs that may make centralized sewage collection and treatment services by BASA's regional system more affordable. As part of their separate Act 537 Plan Update for the Rt. 68 corridor, the

Township should evaluate other methods of sewage collection and treatment, such as a local, decentralized treatment system, and compare the cost of those options to the cost of connecting to BASA's sewage system in this Draft Plan to determine the most cost-effective sewage system for this area.

It should be noted that the estimated user costs in the Draft Plan only included the construction cost and resulting debt service for the construction of the collection systems to serve the identified growth areas. The user costs did NOT include BASA's base sewer service charge that all these customers would also have to pay for the operation and maintenance of the system, which is expected to increase because of the additional debt costs to finance the proposed interceptor and flow equalization tank facilities that will enable these future customers to be served by the system. In addition, the estimated user costs also did NOT include any necessary improvements to smaller pump stations, force mains, and/or collector sewers within BASA system that may be necessary to provide sewer service to the specific growth areas, because the estimated user costs were already cost prohibitive. Factoring in these other costs, the estimated user cost to connect to BASA's centralized sewage facilities would be significantly higher and even more cost prohibitive. Therefore, a local, decentralized, publicly-owned wastewater collection and treatment system(s) may be a much more cost-effective alternative to provide sewage service for these outlying areas.

Please note that BASA has the capabilities and experience to implement, administer, operate and maintain any local, decentralized, publicly-owned collection and treatment system alternatives for Connoquenessing Township. Alternatively, the Township could finance and own the facilities and enter into an agreement with BASA to administer, operate and maintain such systems. Such systems would have their own cost basis or billing system, independent of BASA's regional system. In addition, BASA's facilities could possibly provide centralized sludge handling facilities for such systems to reduce their construction and operating costs. Therefore, it is recommended that the Township consider BASA and the services BASA can provide in the development of the implementation plan for their separate Act 537 Plan Update.

If you should have any questions regarding our responses to the Township's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
East Butler Borough, Mayor
Butler Township, Chairman of the Board of Commissioners
Center Township, Chairman of the Board of Supervisors
Summit Township, Chairman of the Board of Supervisors
Oakland Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
William Braun, Senate Engineering Company

OLSEN & ASSOCIATES, LLC
126 South Main Street, Butler, PA 16001
(724) 282-4786 • (724) 282-7619 FAX

October 28, 2008

Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

REF: **Butler Area Sewer Authority (BASA)**
Act 537 Plan Review

Members of the Board:

At the request of East Butler Borough, we have reviewed the BASA Act 537 Sewage Facilities Planning Study DRAFT dated June, 2008.

We have verified that the information submitted by the Borough in its Special Study has been addressed in the BASA Study.

1. BASA has included cost studies to serve existing unsewered developed areas within the Borough. BASA has concluded that it would not be economically feasible to service these areas unless grants were obtained to lower per capita costs.
2. The BASA study has included projected future growth within the Borough based primarily on reuse of existing vacant sites.
3. Proposed BASA sewer system improvements include sufficient conveyance and treatment capacity for flows from East Butler.
4. Proposed BASA sewer construction projects include upgrading sewer lines that are currently under-sized or will be undersized with anticipated customer growth. Future growth is conservatively assigned 1,000 GPD per EDU in designs of collector sewers improvements/replacements.
5. BASA is proposing diversion, pumping, and temporary tank storage facilities near the Monroe Street Pump Station, the Pullman Ballpark/General Tire and in a Central Storage area within the west end of Butler City to prevent sanitary sewer overflows.

ENGINEERS
COMMUNITY PLANNERS
SURVEYORS
LANDSCAPE ARCHITECTS
GRANTS WRITERS/ADMINISTRATORS

6. The system of sizing these proposed equalization tank structures is not easily understood; using monitored sanitary sewage overflow data complied in "averaged" tables and then trended toward a 2 year frequency 24 hour duration precipitation event which does not necessarily consider antecedent moisture conditions, snow melt, groundwater levels, etc. and then increasing computed tank sizes to limit discharges of existing and future EDU's to 25M or 28M gpd at the Wastewater Treatment Plant.

East Butler Borough would appreciate consideration of the following:

a) Proposed improvements to BASA facilities are expected to cost approximately $25.3 M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.

b) We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSO's will be totally eliminated.

c) In the event that the projected sewer system improvement costs are to be limited to $25.3 M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3 M and the cost of a 3 million gallon uncovered tank is $0.9 M, a difference of $0.4 M. A $1.3 M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent future overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary sewage may be directed to the equalization tanks. Open tanks do not qualify as "enclosed spaces" needing costly fresh air replenishment for workers on catwalks above the sewage. If the tanks are used primarily during wet weather, freezing and icing in an open tank should not be a problem as long as they are drained and flushed clean before cold weather occurs.

d) We suggest that cost of land acquisition and land clean-up be added to facilities estimated total cost.

e) We are not sure that Borough Council fully understood the provisions of the October 13, 2006 Consent Order & Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDUs (potential new equivalent dwelling taps) for the

entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Borough would appreciate being notified how many remain as of October, 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. Even though growth in East Butler may be industrial in nature and receive special consideration in tap allocation, a moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.

Thank you for your consideration in these matters.

Sincerely,

Olsen & Associates, LLC

Ronald Olsen, PE
East Butler Borough Engineer

RO/jco
200666A.01

cc: East Butler Borough Council
T. Schmeider, PaDEP

BUTLER AREA SEWER AUTHORITY

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AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Mayor Richard Day
c/o Borough Secretary
East Butler Borough
P. O. Box 87
East Butler, PA 16029

Dear Mayor Day:

RE: EAST BUTLER BOROUGH'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed East Butler Borough's review comments on the Draft Official Plan Update Revision that that were prepared by Olsen & Associates, LLC (letter dated October 28, 2008). BASA received these written comments on October 29, 2008. The following responses are offered to address each of the Borough's written comments:

A.) **Proposed improvements to BASA facilities are expected to cost approximately $25.3M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.**

The original capital expenditures for extensions of public sanitary sewers have historically been paid by the properties that benefited, either through debt surcharges or developer paid improvements. Once adopted as part of BASA's public sewer system, BASA has utilized its operational and/or capital reserve funds to pay for all repairs, rehabilitation, and/or replacement costs for the public sewers within its entire service area without any regard to the specific surcharge district or municipality in which the public sewers are located.

The proposed re-rating of the existing wastewater treatment plant and the flow diversion and equalization storage tank facilities will address the existing overload conditions, restore capacity within the existing sewer service areas, and provide additional capacity for future customers throughout the entire service area. By restricting the peak flow to the wastewater treatment plant to no more than 28 mgd, the re-rated peak capacity of the treatment plant, the proposed flow diversion and equalization tank facilities are an integral component of the wastewater treatment plant operation. Therefore, the proposed improvements will benefit all of the customers in the BASA system and the costs of these proposed improvements will be shared equally by all of the customers within BASA's service area.

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements,

including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in the Final Official Plan Update Revision.

B.) **We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSOs will be totally eliminated.**

It is impossible to totally eliminate all sanitary sewer overflows (SSOs) and the Federal regulations recognize that there are some circumstances where an SSO is unavoidable and even provide legal defenses for such events. While the DEP acknowledged this fact during negotiation of the CO&A, the DEP was unwilling to acknowledge and document this fact in the CO&A. For example, the wastewater treatment plant and one of our major pump stations were flooded and underwater for a period of time in 2004 during the Hurricane Francis and Ivan events. If a similar flooding event occurs, there is nothing BASA can do to prevent SSOs.

Statistical analyses of the overflow events were performed to evaluate tank sizing criteria, which the U. S. EPA and other DEP regional offices have approved for other municipalities, and to determine the overflow capture or containment of various tank sizes. The DEP Northwest Regional Office was unwilling to agree to any statistical criteria, nor offer any guidelines, for sizing the tanks. Acknowledging the desire to "eliminate" all SSOs, the proposed tanks were sized to handle the historic SSOs that were monitored over the last 10 years, with one exception, plus the additional sanitary sewage flows from anticipated future customer growth. These historic SSO events include antecedent groundwater and moisture conditions, rainfall, and snowmelt conditions that may cause or contribute to SSOs, as cited in the review comment letter. In addition, BASA considered the possibility that additional tank capacity may have to be added in the future in the selection of the sites for the proposed tanks.

Nevertheless, there is always a statistical probability that some unusual combination of rainfall, snowmelt, groundwater conditions and/or flooding may occur that can cause flows to exceed the finite capacity of the proposed tanks. For this reason, neither BASA nor anyone else can guarantee that all SSOs will be eliminated. Whether or not a ban or limitation on new connections may be imposed is up to the DEP and would most likely depend on the frequency and circumstances of the SSOs. However, the DEP may impose a ban or limitation on new connections for a variety of reasons at any time.

C.) **In the event that the projected sewer system improvement costs are to be limited to $25.3M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3M and the cost of a 3 million gallon uncovered tank is $0.9M, a difference of $0.4M. A $1.3M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary sewage may be directed to the equalization tanks. Open tanks do not qualify as "enclosed spaces" needing costly fresh air replenishment for workers on catwalks above the sewage. If the tanks are used primarily during wet weather, freezing and icing in an open tank should not be a problem as long as they are drained and flushed clean before cold weather occurs.**

BASA concurs that uncovered tanks are less costly than covered tanks. BASA also concurs that odor control systems have proven to be unnecessary for many uncovered equalization tanks, because of the infrequent usage and the very dilute nature of sewage that is diverted to the tanks. BASA concurs that the operation and maintenance of covered tanks may also require additional facilities and may be more costly. However, the proposed site of the Monroe Street Pump Station storage tank facilities on Cunningham Street and the Central Storage Tank facilities at the end of Negley Avenue are both located near existing commercial and residential areas. In view of the current public concern about sewage odors at the Butler Area Wastewater Treatment Plant, the odor concerns expressed by municipal officials in the communities where the tanks will be located, and the anticipated odor concerns of residents and businesses in the vicinity of the tank locations, BASA believes that the additional cost to cover the proposed tanks is warranted. While it is impossible to guarantee that there will never be any odor problems at a tank site, because even the most elaborate odor control systems are subject to breakdown, BASA believes that covering the tanks will provide a greater probability that there will not be any odor problems at these sites. In addition, BASA also believes that it will be necessary to spend some additional costs to minimize or mitigate the aesthetic impact of the tanks so that they blend into the area as well as possible.

D.) **We suggest that the cost of land acquisition and land clean-up be added to facilities estimated total cost.**

As part of the planning process, BASA has already completed property appraisals, archaeological and geomorphologic surveys, property/subdivision surveys, and Phase I and Phase II environmental assessments to evaluate and select the recommended sites for the proposed improvements and to expedite the design, permitting, and construction of the proposed improvements. Where necessary, BASA has also obtained cost estimates for any required environmental remediation work to negotiate the depreciated land acquisition value or cost. The total estimated project costs for the recommended improvements, including land acquisition costs, environmental assessments, and environmental remediation work, if necessary, will be included in the Final Official Plan Update Revision.

E.) **We are not sure that Borough Council fully understood the provisions of the October 13, 2006 Consent Order and Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDU's (potential new equivalent dwelling taps) for the entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Borough would appreciate being notified how many remain as of October 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. Even though growth in East Butler may be industrial in nature and receive special consideration in tap allocation, a moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.**

It should first be noted that CO&A is an agreement between the DEP, BASA and all of the Tributary Municipalities, including East Butler Borough. Upon execution of the CO&A by all parties, BASA was granted an allocation of 200 EDUs of capacity for new sewer connections in accordance with Paragraph 10(b) of the CO&A. Paragraph 10(g-j) of the CO&A included provisions that BASA may request additional EDUs for sewer connections on an annual basis in conjunction with BASA's Annual Chapter 94

Wasteload Management Report, which must be submitted by March 31st of each year, beginning with the annual report for 2007. BASA submitted a request for additional EDUs for new sewer connections in conjunction with its 2007 Chapter 94 report. On June 18, 2008, the DEP approved an additional 200 EDUs for new connections to be used during the period between April 1, 2008 and March 31, 2009 in response to BASA's request.

As of March 31, 2008, 155 of the original 200 EDU new sewer connection permit allocation approved in the CO&A have been issued and 45 EDUs of permit capacity are still available from this original allocation. As of October 31, 2008, only 25 of the additional 200 EDU new sewer connection permit allocation that was approved by the DEP on June 18, 2008 for use during the period April 1, 2008 through March 31, 2009 have been issued and 175 EDUs of permit capacity are still available. The current status of the availability of new sewer connection permits is updated on a monthly basis in the minutes of BASA's regular meetings and in the quarterly progress reports that BASA prepares and submits to the DEP and each of the Tributary Municipalities, including East Butler Borough.

The continued availability of these new sewer connection permit allocations and DEP approval of any subsequent permit allocations is dependent upon the compliance status of BASA and the Tributary Municipalities with the requirements of the CO&A; and BASA's documentation of any flow removal that was achieved by rehabilitation of public and private property sewers during the previous year. This is another reason why BASA's Deshon and Westwood Manor III rainfall simulation testing and inspection programs are of vital importance. Once all of the original new sewer connection permit allocation and any subsequent permit allocations granted by the DEP are exhausted, BASA and the Tributary Municipalities, including East Butler Borough, all agreed to a prohibition or ban on all new sewer connection permits in the service area (Paragraph 10(c) of the CO&A) with a few limited exceptions as defined in the CO&A and the DEP's Chapter 94 Regulations.

It should also be clarified that growth that is "industrial in nature" does not necessarily receive any special consideration for new sewer connection permits or "tap allocation" as indicated in the review comments. Only "Economic Development" projects, which are specifically defined in Paragraph 10(a)(iii) of the CO&A as local development projects that are specifically created to serve the public good and are supported by at least 50% public funding, or are Special Industrial Areas as specified in Section 305(a) of the Land Recycling and Environmental Remediation Standards Act, may be approved by the DEP as an exception to any prohibition or sewer connection permit allocation imposed by the DEP.

BASA is acutely aware of the economic consequences that a new sewer connection permit ban would have on the service area. BASA is committed to doing everything in its power to expedite the design, permitting, and construction of the proposed improvements to comply with the CO&A and eliminate new permit limitations as quickly as possible. BASA will continue to seek DEP approval of additional new sewer connection permit allocations as allowed by the CO&A. In addition, BASA will continue its efforts to obtain DEP approval of all projects that may qualify as exceptions to the allocations in order to preserve the existing permit allocations. For example, several major developments such as the Butler Memorial Hospital Expansion, the Pullman Baseball Field Renovation, the Pullman Business Park Expansion, the Shearer Road Business Park, the Northwest Elementary School Expansion, the Butler High School Athletic Field Improvements, and the Winterwood Sewer Extension project in Connoquenessing Township, have all been approved by the DEP as exceptions to the permit allocations. In addition, the majority of IDL Worldwide's industrial expansion in East Butler was also approved as an exception to the allocation.

If you should have any questions regarding our responses to the Borough's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
Butler Township, Chairman of the Board of Commissioners
Center Township, Chairman of the Board of Supervisors
Summit Township, Chairman of the Board of Supervisors
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
Ronald Olsen, Olsen && Associates, LLC

Dennis L. Hays, Chairman
Regis V. Thomas, Vice-Chairman
Brian G. Hays, Supervisor
Nadine A. Neff, Secretary/Treasurer

October 15, 2008

RECEIVED
OCT 16 2008
BASA

Butler Area Sewer Authority
Attn: M. John Schon, P.E.
100 Litman Road
Butler, PA 16001-3256

RE: Review of Official Plan

Dear Mr. Schon:

Please be advised that the Oakland Township Board of Supervisors has no comment on the above referenced plan.

If you have any questions or concerns regarding this matter, or if I can provide you with any additional information, please feel free to contact me. My office hours are Tuesday and Wednesday from 8:00 a.m. to 2:00 p.m. and on Thursdays from 8:00 a.m. to 1:00 p.m.

Very truly yours,

Nadine A. Neff
Secretary/Treasurer
Ordinance Officer

OLSEN & ASSOCIATES, LLC
126 South Main Street, Butler, PA 16001
(724) 282-4786 · (724) 282-7619 FAX

October 28, 2008

Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

REF: **Butler Area Sewer Authority (BASA)**
Act 537 Plan Review

Members of the Board:

At the request of Summit Township, we have reviewed the BASA Act 537 Sewage Facilities Planning Study DRAFT dated June, 2008.

We have verified that the information submitted by Summit Township in its Special Study has been addressed in the BASA Study.

1. BASA has included cost studies to serve existing unsewered developed areas within the Township. BASA has concluded that it would not be economically feasible to service these areas unless grants were obtained to lower per capita costs.
2. The BASA study has included projected future growth within Summit Township based upon the Township's Special Study estimates.
3. Proposed BASA sewer system improvements include sufficient conveyance and treatment capacity for Summit Township growth.
4. Proposed BASA sewer construction projects include upgrading sewer lines that are currently under-sized or will be undersized with anticipated customer growth. Future growth is conservatively assigned 1,000 GPD per EDU in designs of collector sewers improvements/replacements.
5. BASA is proposing diversion, pumping, and temporary tank storage facilities near the Monroe Street Pump Station, the Pullman Ballpark/General Tire and in a Central Storage area within the west end of Butler City to prevent sanitary sewer overflows.

6. The system of sizing these proposed equalization tank structures is not easily understood; using monitored sanitary sewage overflow data complied in "averaged" tables and then trended toward a 2 year frequency 24 hour duration precipitation event which does not necessarily consider antecedent moisture conditions, snow melt, groundwater levels, etc. and then increasing computed tank sizes to limit discharges of existing and future EDU's to 25M or 28M gpd at the Wastewater Treatment Plant.

Summit Township would appreciate consideration of the following:

a) Proposed improvements to BASA facilities are expected to cost approximately $25.3 M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.

b) We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSO's will be totally eliminated.

c) In the event that the projected sewer system improvement costs are to be limited to $25.3 M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3 M and the cost of a 3 million gallon uncovered tank is $0.9 M, a difference of $0.4 M. A $1.3 M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent future overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary sewage may be directed to the equalization tanks. Open tanks do not qualify as "enclosed spaces" needing costly fresh air replenishment for workers on catwalks above the sewage. If the tanks are used primarily during wet weather, freezing and icing in an open tank should not be a problem as long as they are drained and flushed clean before cold weather occurs.

d) We suggest that cost of land acquisition and land clean-up be added to facilities estimated total cost.

e) We are not sure that Summit Township fully understood the provisions of the October 13, 2006 Consent Order & Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDUs (potential new equivalent dwelling taps) for the

entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Township would appreciate being notified how many remain as of October, 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. A moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.

Thank you for your consideration in these matters.

Sincerely,

Olsen & Associates, LLC

Ronald Olsen, PE
Summit Township Engineer

RO/jco
200807G

cc: Summit Township Board of Supervisors
T. Schmeider, PaDEP

BUTLER AREA SEWER AUTHORITY

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FINANCE DIRECTOR

JAMES W. TOMAZICH, P.E.
AUTHORITY ENGINEER

DANIEL SLOMERS, P.E.
PROJECT ENGINEER

November 21, 2008

Chairman, Board of Supervisors
Summit Township
c/o Julie Filges
Township Secretary
502 Bonniebrook Road
Butler, PA 16002

Dear Chairman:

RE: SUMMIT TOWNSHIP'S REVIEW COMMENTS ON DRAFT OFFICIAL PLAN UPDATE REVISION (ISSUED JUNE 3, 2008)

The Butler Area Sewer Authority (BASA) has reviewed Summit Township's review comments on the Draft Official Plan Update Revision that that were prepared by Olsen & Associates, LLC (letter dated October 28, 2008). BASA received these written comments on October 29, 2008. The following responses are offered to address each of the Township's written comments:

A.) **Proposed improvements to BASA facilities are expected to cost approximately $25.3M. It is unclear whether the costs of all improvements are to be shared equally by all system users. If so, an expected approximate increase in sewer rates should be included in the study.**

The original capital expenditures for extensions of public sanitary sewers have historically been paid by the properties that benefited, either through debt surcharges or developer paid improvements. Once adopted as part of BASA's public sewer system, BASA has utilized its operational and/or capital reserve funds to pay for all repairs, rehabilitation, and/or replacement costs for the public sewers within its entire service area without any regard to the specific surcharge district or municipality in which the public sewers are located.

The proposed re-rating of the existing wastewater treatment plant and the flow diversion and equalization storage tank facilities will address the existing overload conditions, restore capacity within the existing sewer service areas, and provide additional capacity for future customers throughout the entire service area. By restricting the peak flow to the wastewater treatment plant to no more than 28 mgd, the re-rated peak capacity of the treatment plant, the proposed flow diversion and equalization tank facilities are an integral component of the wastewater treatment plant operation. Therefore, the proposed improvements will benefit all of the customers in the BASA system and the costs of these proposed improvements will be shared equally by all of the customers within BASA's service area.

The estimated user rates were not included in the Draft Plan because the land acquisition costs for the alternative sites of the proposed structural improvements were not available at that time. The total estimated project costs for the recommended improvements, including land acquisition costs, and the estimated user rates necessary to finance and implement the recommended improvements will be included in the Final Official Plan Update Revision.

B.) **We are concerned that if the PaDEP and BASA do not agree to a satisfactory required volume of flow equalization tanks (or if volumes prove insufficient to prevent overflows), that the limitation on new taps may be reinstated in the future. Our previous understanding of the PaDEP CO&A was that future SSOs will be totally eliminated.**

It is impossible to totally eliminate all sanitary sewer overflows (SSOs) and the Federal regulations recognize that there are some circumstances where an SSO is unavoidable and even provide legal defenses for such events. While the DEP acknowledged this fact during negotiation of the CO&A, the DEP was unwilling to acknowledge and document this fact in the CO&A. For example, the wastewater treatment plant and one of our major pump stations were flooded and underwater for a period of time in 2004 during the Hurricane Francis and Ivan events. If a similar flooding event occurs, there is nothing BASA can do to prevent SSOs.

Statistical analyses of the overflow events were performed to evaluate tank sizing criteria, which the U. S. EPA and other DEP regional offices have approved for other municipalities, and to determine the overflow capture or containment of various tank sizes. The DEP Northwest Regional Office was unwilling to agree to any statistical criteria, nor offer any guidelines, for sizing the tanks. Acknowledging the desire to "eliminate" all SSOs, the proposed tanks were sized to handle the historic SSOs that were monitored over the last 10 years, with one exception, plus the additional sanitary sewage flows from anticipated future customer growth. These historic SSO events include antecedent groundwater and moisture conditions, rainfall, and snowmelt conditions that may cause or contribute to SSOs, as cited in the review comment letter. In addition, BASA considered the possibility that additional tank capacity may have to be added in the future in the selection of the sites for the proposed tanks.

Nevertheless, there is always a statistical probability that some unusual combination of rainfall, snowmelt, groundwater conditions and/or flooding may occur that can cause flows to exceed the finite capacity of the proposed tanks. For this reason, neither BASA nor anyone else can guarantee that all SSOs will be eliminated. Whether or not a ban or limitation on new connections may be imposed is up to the DEP and would most likely depend on the frequency and circumstances of the SSOs. However, the DEP may impose a ban or limitation on new connections for a variety of reasons at any time.

C.) **In the event that the projected sewer system improvement costs are to be limited to $25.3M and the PaDEP does not allow even a very low probability of periodic overflows, we suggest that consideration be given to the use of uncovered tanks, with the cost savings diverted into increasing the proposed tank sizes. For example, the cost of a covered 3 million gallon tank is about $1.3M and the cost of a 3 million gallon uncovered tank is $0.9M, a difference of $0.4M. A $1.3M uncovered tank would have a volume of about 4.75 million gallons and this would provide an additional factor of safety to prevent overflows. The need for a tank cover with odor protection may not be nearly as important as the prevention of even very infrequent overflows. These equalization tanks may be used infrequently and could be designed to be filled only after the initial, "sewer-cleaning" surge of sewage is directed to the treatment plant. Low odor storm water with very low concentrations of sanitary**

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D.) **We suggest that the cost of land acquisition and land clean-up be added to facilities estimated total cost.**

As part of the planning process, BASA has already completed property appraisals, archaeological and geomorphologic surveys, property/subdivision surveys, and Phase I and Phase II environmental assessments to evaluate and select the recommended sites for the proposed improvements and to expedite the design, permitting, and construction of the proposed improvements. Where necessary, BASA has also obtained cost estimates for any required environmental remediation work to negotiate the depreciated land acquisition value or cost. The total estimated project costs for the recommended improvements, including land acquisition costs, environmental assessments, and environmental remediation work, if necessary, will be included in the Final Official Plan Update Revision.

E.) **We are not sure that Summit Township fully understood the provisions of the October 13, 2006 Consent Order and Agreement between PaDEP and BASA which limits future growth in the BASA service area. It is now our understanding that BASA was granted 200 EDU's (potential new equivalent dwelling taps) for the entire system until approval of the CO&A but that a prohibition on new connections will go into effect after the 200 allocated EDU's are issued to new customers. BASA may request exceptions to the connection prohibition under certain circumstances but new taps will generally not be available until after new sewer system construction improvements are available to prevent Sanitary Sewer Overflows. These facilities are not expected to be designed, permitted, constructed, and operational until 2012. As of February 2008, 152 of the allocated EDU's had been issued and 48 remained. The Township would appreciate being notified how many remain as of October 2008. We suggest BASA attempt to renegotiate a new tap allocation once the Act 537 Plan is approved or that the 2012 completion timeline be moved up as much as possible. A moratorium on new taps for the next three to four years (until 2012) will most probably have very serious detrimental economic consequences on all BASA communities.**

It should first be noted that CO&A is an agreement between the DEP, BASA and all of the Tributary Municipalities, including Summit Township. Upon execution of the CO&A by all parties, BASA was granted an allocation of 200 EDUs of capacity for new sewer connections in accordance with Paragraph 10(b) of the CO&A. Paragraph 10(g-j) of the CO&A included provisions that BASA may request additional EDUs for sewer connections on an annual basis in conjunction with BASA's Annual Chapter 94 Wasteload Management Report, which must be submitted by March 31st of each year, beginning with the annual report for 2007. BASA submitted a request for additional EDUs for new sewer connections in conjunction with its 2007 Chapter 94 report. On June 18, 2008, the DEP approved an additional 200 EDUs for new connections to be used during the period between April 1, 2008 and March 31, 2009 in response to BASA's request.

As of March 31, 2008, 155 of the original 200 EDU new sewer connection permit allocation approved in the CO&A have been issued and 45 EDUs of permit capacity are still available from this original allocation. As of October 31, 2008, only 25 of the additional 200 EDU new sewer connection permit allocation that was approved by the DEP on June 18, 2008 for use during the period April 1, 2008 through March 31, 2009 have been issued and 175 EDUs of permit capacity are still available. The current status of the availability of new sewer connection permits is updated on a monthly basis in the minutes of BASA's regular meetings and in the quarterly progress reports that BASA prepares and submits to the DEP and each of the Tributary Municipalities, including Summit Township.

The continued availability of these new sewer connection permit allocations and DEP approval of any subsequent permit allocations is dependent upon the compliance status of BASA and the Tributary Municipalities with the requirements of the CO&A; and BASA's documentation of any flow removal that was achieved by rehabilitation of public and private property sewers during the previous year. This is another reason why BASA's Deshon and Westwood Manor III rainfall simulation testing and inspection programs are of vital importance. Once all of the original new sewer connection permit allocation and any subsequent permit allocations granted by the DEP are exhausted, BASA and the Tributary Municipalities, including Summit Township, all agreed to a prohibition or ban on all new sewer connection permits in the service area (Paragraph 10(c) of the CO&A) with a few limited exceptions as defined in the CO&A and the DEP's Chapter 94 Regulations.

BASA is acutely aware of the economic consequences that a new sewer connection permit ban would have on the service area. BASA is committed to doing everything in its power to expedite the design, permitting, and construction of the proposed improvements to comply with the CO&A and eliminate new permit limitations as quickly as possible. BASA will continue to seek DEP approval of additional new sewer connection permit allocations as allowed by the CO&A. In addition, BASA will continue its efforts to obtain DEP approval of all projects that may qualify as exceptions to the allocations in order to preserve the existing permit allocations. For example, several major developments such as the Butler Memorial Hospital Expansion, the Pullman Baseball Field Renovation, the Pullman Business Park Expansion, the Shearer Road Business Park, the Northwest Elementary School Expansion, the Butler High School Athletic Field Improvements, and the Winterwood Sewer Extension project in Connoquenessing Township, have all been approved by the DEP as exceptions to the permit allocations. In addition, the majority of IDL Worldwide's industrial expansion in East Butler was also approved as an exception to the allocation.

If you should have any questions regarding our responses to the Township's review comments on the Draft Official Plan Update Revision, please call me at (724) 282-1978.

Very truly yours,

BUTLER AREA SEWER AUTHORITY

M. John Schon

M. John Schon, P. E.
Manager

cc: Compliance & Monitoring Manager, PA DEP Meadville
City of Butler, Mayor
Butler Township, Chairman of the Board of Commissioners
Center Township, Chairman of the Board of Supervisors
East Butler Borough, Mayor
Oakland Township, Chairman of the Board of Supervisors
Connoquenessing Township, Chairman of the Board of Supervisors
David Johnston, Butler County Planning Commission
Ronald Olsen, Olsen && Associates, LLC

APPENDIX P
MUNICIPAL ADOPTION, PLANNING COMMISSION COMMENTS, PROOF OF PUBLICATION

BUTLER AREA SEWER AUTHORITY
ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE

APPENDIX P
RESOLUTIONS OF ADOPTION

RESOLUTION OF ADOPTION BY TRIBUTARY MUNCIPALITIES

The Resolution of Adoption approved and passed by each of the seven Tributary Municipalities are included in Appendix P of this report.

RESOLUTION NO. 2009-04-23

RESOLUTION OF THE MAYOR AND COUNCIL OF THE CITY OF BUTLER, BUTLER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, the City of Butler, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority (BASA); and

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the **Pennsylvania Code**, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, BASA and its Tributary Municipalities (City of Butler, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, Butler County, Pennsylvania) mutually entered into a Consent Order and Agreement (CO&A) with the Department on October 13, 2006; and

WHEREAS, the CO&A requires that BASA shall submit to the Department, on behalf of BASA and its Tributary Municipalities, an administratively complete Final Update Revision, including a resolution from each Tributary Municipality evidencing adoption of the Final Update Revision as an update to each Tributary Municipality's Official Plan; and

WHEREAS, Chester Engineers has been retained by BASA and has prepared an administratively complete Final Update Revision titled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of the City of Butler, and

The alternative of choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler; which serves portions of City of Butler, Butler Township, and Center Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions

of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- Conveyance system upgrades in both the City of Butler and Butler Township; which serves portions of City of Butler, Butler Township, and Center Township.

The key implementation activities/dates include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction of Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012

WHEREAS, the City of Butler finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the City of Butler hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Melinda F. Gall, City Clerk of the City of Butler hereby certify that the foregoing is a true copy of the City's Resolution No. 2009-04-23, adopted April 23, 2009.

AUTHORIZED SIGNATURE SEAL

Margaret D Stock

RESOLUTION NO. 09-11

RESOLUTION OF THE COMMISSIONERS OF BUTLER TOWNSHIP, BUTLER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Butler Township, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority (BASA); and

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the **Pennsylvania Code**, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, BASA and its Tributary Municipalities (City of Butler, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, Butler County, Pennsylvania) mutually entered into a Consent Order and Agreement (CO&A) with the Department on October 13, 2006; and

WHEREAS, the CO&A requires that BASA shall submit to the Department, on behalf of BASA and its Tributary Municipalities, an administratively complete Final Update Revision, including a resolution from each Tributary Municipality evidencing adoption of the Final Update Revision as an update to each Tributary Municipality's Official Plan; and

WHEREAS, Chester Engineers has been retained by BASA and has prepared an administratively complete Final Update Revision titled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of Butler Township, and

The alternative of choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler; which serves portions of City of Butler, Butler Township, and Center Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions

of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- Conveyance system upgrades in both the City of Butler and Butler Township; which serves portions of City of Butler, Butler Township, and Center Township.

The key implementation activities/dates include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction of Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012

WHEREAS, Butler Township finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Commissioners of Butler Township hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

BUTLER TOWNSHIP BOARD OF COMMISSIONERS

President

Vice-President

ATTEST:

I, Donna Donaldson, Secretary of the Butler Township Board of Commissione
Butler County, PA do hereby certify that the foregoing is a true and correct
copy of the Resolution duly adopted at a regular meeting of the Butler
Township Board of Commissioners on April 20, 2009.

RESOLUTION NO. 2 - 2009

RESOLUTION OF THE COUNCIL OF EAST BUTLER BOROUGH, BUTLER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, East Butler Borough, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority (BASA); and

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the **Pennsylvania Code**, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, BASA and its Tributary Municipalities (City of Butler, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, Butler County, Pennsylvania) mutually entered into a Consent Order and Agreement (CO&A) with the Department on October 13, 2006; and

WHEREAS, the CO&A requires that BASA shall submit to the Department, on behalf of BASA and its Tributary Municipalities, an administratively complete Final Update Revision, including a resolution from each Tributary Municipality evidencing adoption of the Final Update Revision as an update to each Tributary Municipality's Official Plan; and

WHEREAS, Chester Engineers has been retained by BASA and has prepared an administratively complete Final Update Revision titled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of East Butler Borough; and

The alternative of choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler; which serves portions of City of Butler, Butler Township, and Center Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- Conveyance system upgrades in both the City of Butler and Butler Township; which serves portions of City of Butler, Butler Township, and Center Township.

The key implementation activities/dates include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction of Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012

WHEREAS, East Butler Borough finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Council of East Butler Borough hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Kathy Doles, Secretary, East Butler Borough hereby certify that the foregoing is a true copy of the Borough's Resolution No. 2-2009, adopted April 15, 2009.

AUTHORIZED SIGNATURE

Earl D. Fennell, Pres.

Kathy A. Doles

BOROUGH SEAL

TOWNSHIP OF CENTER
BUTLER COUNTY, PENNSYLVANIA
RESOLUTION NO. 2009-04-12

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act", as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires municipalities to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, Center Township, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority ("BASA"); and

WHEREAS, pursuant to Resolution No. 06-10-06 dated October 11, 2006, Center Township entered into a Consent Order and Agreement with DEP and BASA, which states in pertinent part; and

> *3.b.ii. Within 180 days of the Department's approval of the TAR, BASA shall simultaneously submit to the Department and each Tributary Municipality, for review and comment, a draft Official Plan Update Revision that updates each of the Tributary Municipality's Official Plans. The draft Update Revision shall evaluate the alternatives and recommend an alternative which shall adequately address the existing sewage needs and the future sewage needs of each Tributary Municipality as specified in each Tributary Municipality's Special Study. The draft Update Revisions hall be prepared in accordance with 25 Pa. Code §§71.21 and 71.31, and shall contain an implementation schedule that provides for all projects to be completed by July 31, 2012, and provides the elimination of all unpermitted discharges from the POTW and the closure of the Deshon, General Tire, and Ball Park Sanitary Sewer Overflow Structures by July 31, 2012.* (emphasis added)

WHEREAS, Chester Engineers has been retained by BASA and has prepared a Final Update Revision entitled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of Center Township; and

WHEREAS, BASA recommends that the alternative choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of Butler, which serves portions of City of Butler, Butler Township, Center Township, East Butler borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler, which serves portions of City of Butler, Butler Township and Center Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Conveyance system upgrades in both the City of Butler and Butler Township, which serves portions of City of Butler, Butler Township, and Center Township;

and

WHEREAS, the Final Plan Update Revision prepared by Chester Engineers and recommended by BASA has key implementation activities/dates which include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012;

and

WHEREAS, Center Township finds that the Final Plan Update Revision prepared by Chester Engineers and recommended by BASA conforms to applicable zoning, subdivision, other municipal ordinances as well as addresses a comprehensive program of pollution control and water quality management as required by the Consent Order.

THEREFORE, BE IT RESOLVED as follows:

(1) Based upon the recommendation of BASA, the Board of Supervisors of Center Township do hereby adopt and submit to DEP for approval as a revision to the official plan of the municipality, the above-referenced Official Plan Revision Special Study.

(2) Based upon the representations made by BASA to Center Township, Center Township hereby reaffirms its obligations pursuant to the provisions of the Consent Agreement and Order.

(3) Center Township does hereby direct BASA to undertake all reasonable and necessary action to ensure BASA's timely and full compliance with BASA's obligations pursuant to the Consent Agreement and Official Plan Revision Special Study.

RESOLVED AND ADOPTED this 20th day of April 2009.

ATTEST:

Township Secretary

(SEAL)

CENTER TOWNSHIP
BOARD OF SUPERVISORS:

By: _____
Chairperson

By: _____
Vice Chairperson

By: _____
Supervisor

By: _____
Supervisor

By: _____
Supervisor

I, Crystal Wilson, Secretary, Center Township Board of Supervisors, hereby certify that the foregoing is a true copy of the Township Resolution No. 2009-04-12, adopted on the 20th day of April, 2009, at a special meeting of the Board of Supervisors duly advertised.

Crystal Wilson

(Seal of Governing Body)

Municipal Address:
419 Sunset Drive
Butler, PA 16001
Telephone No.: (724) 282-7805

C:\SERVICES\CLIENTS NEW\SUMMIT TWP\ORDINANCES, RESOLUTIONS, EAGLE ADS\RESOLUTION.BASA.03.30.09.DOC

SUMMIT TOWNSHIP
BOARD OF SUPERVISORS

RESOLUTION NO. 274

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act", as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires municipalities to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, Summit Township, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority ("BASA"); and

WHEREAS, pursuant to Resolution No. 241 dated September 20, 2006, Summit Township entered into a Consent Order and Agreement with DEP and BASA, which states in pertinent part; and

> *3.b.ii. Within 180 days of the Department's approval of the TAR, BASA shall simultaneously submit to the Department and each Tributary Municipality, for review and comment, a draft Official Plan Update Revision that updates each of the Tributary Municipality's Official Plans. The draft Update Revision shall evaluate the alternatives and recommend an alternative which shall adequately address the existing sewage needs and the future sewage needs of each Tributary Municipality as specified in each Tributary Municipality's Special Study. The draft Update Revisions hall be prepared in accordance with 25 Pa. Code §§71.21 and 71.31, and shall contain an implementation schedule that provides for all projects to be completed by July 31, 2012, and provides the elimination of all unpermitted discharges from the POTW and the closure of the Deshon, General Tire, and Ball Park Sanitary Sewer Overflow Structures by July 31, 2012.* (emphasis added)

WHEREAS, Chester Engineers has been retained by BASA and has prepared a Final Update Revision entitled "Act 537 Sewage Facilities Planning Study Update, February 2009" on

behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of Summit Township; and

WHEREAS, BASA recommends that the alternative choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of butler, which serves portions of City of Butler, Butler Township, Summit Township, East Butler borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler, which serves portions of City of Butler, Butler Township and Summit Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Summit Township, East Butler Borough, Oakland Township, and Summit Township.
- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions of City of Butler, Butler Township, Summit Township, East Butler Borough, Oakland Township, and Summit Township.
- Conveyance system upgrades in both the City of Butler and Butler Township, which serves portions of City of Butler, Butler Township, and Summit Township;

and

WHEREAS, the Final Plan Update Revision prepared by Chester Engineers and recommended by BASA has key implementation activities/dates which include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012;

and

WHEREAS, Summit Township finds that the Final Plan Update Revision prepared by Chester Engineers and recommended by BASA conforms to applicable zoning, subdivision, other municipal ordinances as well as addresses a comprehensive program of pollution control and water quality management as required by the Consent Order.

THEREFORE, BE IT RESOLVED as follows:

(1) Based upon the recommendation of BASA, the Board of Supervisors of Summit Township do hereby adopt and submit to DEP for approval as a revision to the official plan of the municipality, the above-referenced Official Plan Revision Special Study.

(2) Based upon the representations made by BASA to Summit Township, Summit Township hereby reaffirms its obligations pursuant to the provisions of the Consent Agreement and Order.

(3) Summit Township does hereby direct BASA to undertake all reasonable and necessary action to ensure BASA's timely and full compliance with BASA's obligations pursuant to the Consent Agreement and Official Plan Revision Special Study.

SO RESOLVED this 15th day of April, 2009.

SUMMIT TOWNSHIP
BOARD OF SUPERVISORS:

By: Rodney E. Scott
Chairman

By: James G. Fuller
Vice Chairman

By: _____
Supervisor

ATTEST:
Melissa Crawford
Township Secretary

(Township Seal)

I, Melissa Crawford, Secretary, Summit Township Board of Supervisors, hereby certify that the foregoing is a true copy of the Township Resolution No. 274, adopted on the 15th day of April, 2009, at a special meeting of the Board of Supervisors duly advertised.

Melissa Crawford

(Seal of Governing Body)

Municipal Address:
502 Bonniebrook Road
Butler, PA 16002
Telephone No.: (724) 285-1168

RESOLUTION

RESOLUTION NUMBER 11-09

OF THE TOWNSHIP OF CONNOQUENESSING,

BUTLER COUNTY, PENNSYLVANIA

RESOLUTION OF THE SUPERVISORS OF THE TOWNSHIP OF CONNOQUENESSING TOWNSHIP, BUTLER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Connoquenessing Township, Butler County, Pennsylvania, is a municipality which is served in part by the sanitary treatment facilities of the Butler Area Sewer Authority (BASA); and

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the **Pennsylvania Code**, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, BASA and its Tributary Municipalities (City of Butler, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, Butler County, Pennsylvania) mutually entered into a Consent Order and Agreement (CO&A) with the Department on October 13, 2006; and

WHEREAS, the CO&A requires that BASA shall submit to the Department, on behalf of BASA and its Tributary Municipalities, an administratively complete Final Update Revision, including a resolution from each Tributary Municipality evidencing adoption of the Final Update Revision as an update to each Tributary Municipality's Official Plan; and

WHEREAS, Chester Engineers has been retained by BASA and has prepared an administratively complete Final Update Revision titled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of Connoquenessing Township, and

The alternative of choice is to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.

- Diversion, pumping and storage facilities at the Monroe pump station SSO in the City of Butler, which serves portions of the City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler; which serves portions of the City of Butler, Butler Township, and Center Township.

- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of the City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions of the City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- Conveyance system upgrades in both the City of Butler and Butler Township; which serves portions of the City of Butler, Butler Township, and Center Township.

The key implementation activities/dates include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction of Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012

WHEREAS, Connoquenessing Township finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Supervisors of Connoquenessing Township hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Rebecca Gizienski, Secretary to the Connoquenessing Township Board of Supervisors hereby certify that the foregoing is a copy of the Township's Resolution No. 11-09 adopted April 16, 2009.

Rebecca Gizienski

Supervisor

Supervisor

Supervisor

RESOLUTION 2009-04

RESOLUTION OF THE Supervisors *(Commissioners/Supervisors/Council)* OF Oakland Township *(Municipality)*, BUTLER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Oakland Township *(Municipality)*, Butler County, Pennsylvania is a municipality which is served in part by the sanitary treatment facilities of Butler Area Sewer Authority (BASA); and

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the **Pennsylvania Code**, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, BASA and its Tributary Municipalities (City of Butler, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, Butler County, Pennsylvania) mutually entered into a Consent Order and Agreement (CO&A) with the Department on October 13, 2006; and

WHEREAS, the CO&A requires that BASA shall submit to the Department, on behalf of BASA and its Tributary Municipalities, an administratively complete Final Update Revision, including a resolution from each Tributary Municipality evidencing adoption of the Final Update Revision as an update to each Tributary Municipality's Official Plan; and

WHEREAS, Chester Engineers has been retained by BASA and has prepared an administratively complete Final Update Revision titled "Act 537 Sewage Facilities Planning Study Update, February 2009" on behalf of BASA and its Tributary Municipalities, which provides for sewage facilities in a portion of Oakland Township *(Municipality)*, and

The alternative of choice to be implemented is:

- Diversion, pumping, and storage facilities at the Deshon pump station SSO in Butler Township; which serves portions of Connoquenessing Township and Butler Township.
- Diversion, pumping, and storage facilities at the Monroe pump station SSO in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Diversion and pumping facilities at Ballpark/General Tire SSO, in the City of Butler; which serves portions of City of Butler, Butler Township, and Center Township.
- Diversion and pumping facilities on the Connoquenessing Creek Interceptor in the City of Butler; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.

- A central storage facility in the City of Butler to store wastewater that is pumped from the Ballpark/General Tire and Connoquenessing diversion pump stations; which serves portions of City of Butler, Butler Township, Center Township, East Butler Borough, Oakland Township, and Summit Township.
- Conveyance system upgrades in both the City of Butler and Butler Township; which serves portions of City of Butler, Butler Township, and Center Township.

The key implementation activities/dates include:

• Receive DEP Approval of Act 537 Plan Update	May 2009
• Begin Design of Recommended Facilities	May 2009
• Complete Design of Recommended Facilities	September 2009
• Advertise for Construction Bids	October 2009
• Open Construction Bids	November 2009
• Award Contracts and Begin Construction of Facilities	January 2010
• Complete Construction of Facilities and Seal Overflows	July 2012

WHEREAS, Oakland Township *(Municipality)* finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Board *(Commissioners/Supervisors/Council)* OF Oakland Township *(Municipality)* hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Nadine A. Neff *(Name of the Municipal Secretary or other Authorized Representative)*, Secretary/Treasurer *(Name of the Municipal Position)*, Oakland Township *(Municipality)* Supervisors *(Commissioners/Supervisors/Council)* hereby certify that the foregoing is a true copy of the Oakland Twp *(Municipality's name)* Resolution No. 2009-04, adopted April 21, *(Month and Day)*, 2009.

AUTHORIZED SIGNATURE

Oakland Twp *(MUNICIPALITY)* SEAL

BUTLER AREA SEWER AUTHORITY
ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE

APPENDIX P
PLANNING COMMISSION REVIEW LETTERS

PLANNING COMMISSION REVIEW COMMENTS

The Authority distributed copies of the report entitled "Act 537 Sewage Facilities Planning Study Update," dated February 2009, (Final Official Plan Update Revision) to the Butler County Planning Commission and, where applicable, the Planning Commission of each Tributary Municipality. The review letters received from the Butler County Planning Commission and the Planning Commission of each Tributary Municipality are included in Appendix P of this report.

CONSIDERATION OF PLANNING COMMISSION REVIEW COMMENTS

There were no negative comments in the review comment letters received from the Butler County Planning Commission or the Tributary Municipalities' Planning Commissions; and there were no review comments that require consideration or revisions to the Final Official Plan Update Revision. Accordingly, there are no written responses to the Planning Commission review letters.

Butler County Board of Commissioners
Planning Commission

124 W. Diamond Street, PO Box 1208, Butler, PA 16003-1208
Phone 724.284.5300 Fax 724.284.5315 TDD 724.284.5473

Commissioners
A. Dale Pinkerton, ***Chairman***
James L. Kennedy, ***Vice Chairman***
James C. Lokhaiser, ***Secretary***

Director of Planning
David P. Johnston

RECEIVED
APR 14 2009
BASA

April 14, 2009

M. John Schon, P.E.
Manager
Butler Area Sewer Authority
100 Litman Road
Butler, Pa. 16001-3256

RE: Official Act 537 Plan Update Revision – February 2009 Butler Area Sewer Authority

Dear John:

The Butler County Planning Commission is in receipt of the Act 537 Plan Update Revision in accordance with Paragraph 3(b)(iii) of the October 13, 2006 Consent Order and Agreement (CO&A).

We are aware that BASA has been concentrating efforts to reduce the infiltration and inflow in the conveyance system. Since the conveyance system is hydraulically overloaded, the Plan details efforts to address wet weather sanitary sewer overflows (SSOs). As noted in the Plan Update, earlier rehabilitation efforts did not eliminate SSOs in the system.

The Authority proposes to construct flow equalization facilities and related conveyance system upgrades to reduce the number and severity of SSO events at an estimated cost of approximately $30 million. The Butler County Planning Commission supports the efforts of the Butler Area Sewer Authority in the Act 537 Plan Update and recommends approval by the Pennsylvania Department of Environmental Protection.

Sincerely,

David P. Johnston

David P. Johnston
Planning Director

THE OFFICE OF BUSINESS AND COMMUNITY DEVELOPMENT

City of Butler Government Offices
140 West North Street, Suite 208
Butler, PA 16001-5298
(724) 285-4124 extension 214
FAX (724) 285-3564

JOHN E. EVANS, A.E.T.
ZONING AND CODE MANAGEMENT OFFICER

RECEIVED
APR 14 2009
BASA

April 13, 2009

M. John Schon, Manager
Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001-7656

Re: Act 537 Plan

Dear John,

The City of Butler Planning and Zoning Commission has no comment on the Act 537 Plan. Please continue forward with the process.

If you have any questions, feel free to contact me at (724) 283-8300, Ext. 214. Voice mail is available after business hours.

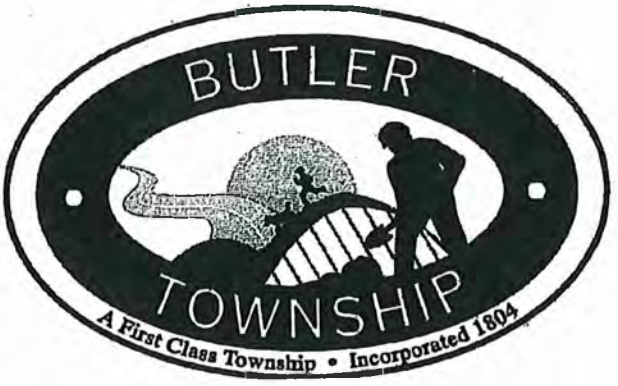
Sincerely,

John E. Evans, Zoning Officer

cc: Mayor and Council
Melinda F. Gall, City Clerk
Joseph L. Gray, City Engineer
James P. Coulter, City Solicitor
File

JEE/js

Cindy L. Davis
Zoning Officer
Building Code Official



290 South Duffy Road
Butler, PA 16001
724/287-7465
724/282-2142 fax
E-mail ~ cdavis@butlertwp.org

April 7, 2009

RECEIVED
APR 14 2009
BASA

Mr. John Schon
Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

Dear Mr. Schon:

On April 7, 2009, at the regular meeting of the Butler Township Planning Commission, the final Act 537 Plan submitted by the Butler Area Sewer Authority was reviewed.

Please be advised that the Planning Commission hereby approves the plan as submitted.

Sincerely,

Mark Swift, Vice-Chairman
Butler Township Planning Commission

C: Ed Kirkwood, Butler Township Manager
Butler Township Board of Commissioners
Cindy L. Davis, Zoning Officer

EAST BUTLER BOROUGH

Box 87
East Butler, Pa. 16029

April 15, 2009

RECEIVED
APR 15 2009
BASA

Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

Dear Mr. Schon,

East Butler Borough Council also serves as the Planning Commission. Council has on comments on the Final Plan at this time.

Thank you.

Sincerely,

Kathy J. Doles, Sec/Treas.

Board of Supervisors:
Ronald Flatt, Chairman
Andrew Erie, Vice Chairman
Brian Hortert, Supervisor
Edward Latuska, Supervisor
Thomas Schiebel, Supervisor

Michael Gallagher, Solicitor
Olsen & Associates, Engineer
Crystal Wilson, Secretary
Anthony Amendolea, Treasurer
Mark Lauer, Public Works Director
Richard Round, BCO/Zoning Official

April 23, 2009

Pennsylvania Department of Environmental Protection
121 N. Mill St.
New Castle, PA 16101

To whom it may concern:

The Center Township Planning Commission on April 22, 2009 have reviewed the Act 537 Plan from BASA and had no comments.

If you have any questions please do not hesitate to contact me at 724-282-7805.

Thank you,

CRYSTAL WILSON
Center Township Secretary

419 Sunset Drive, Butler, PA 16001-1337 (724) 282-7805 Fax: (724) 282-6550 E-Mail: centwp@aol.com
www.centertownship.net

FOUNDED
1854
Summit Township

502 Bonniebrook Road
Butler, PA 16002
Phone: 724-285-1168
Fax: 724-285-7677

April 15, 2009

Butler Area Sewer Authority
100 Litman Road
Butler, PA 16001

RE: Act 537 Plan Update Revision
Summit Township Planning Commission Comments

To Whom It May Concern:

On April 14, 2009, the Summit Township Planning Commission and Butler Area Sewer Authority met in regards to the Official Act 537 Plan Update Revision. The Summit Township Planning Commission members, after being properly educated on the parameters of the plan revision, submitted no comments/no objections.

If you have any questions, please do not hesitate to contact our office.

Sincerely

Chelsea M. Shaffer

Chelsea M. Shaffer
Zoning Enforcement Officer/BCO

C: Supervisors

Connoquenessing Township

Planning Commission

102 Township Dr.
Renfrew,PA. 16053

April 16, 2009

M. John Schon,P.E. Manager
BUTLER AREA SEWER AUTHORITY
100 Litman Road
Butler, PA. 16001

Re: FINAL OFFICIAL ACT 537 PLAN UPDATE REVISION
AND CONNOQUENESSING TOWNSHIP RESOLUTION OF ADOPTION

Dear Mr. Schon:

The Connoquenessing Township Planning Commission reviewed the Act537 Update at our meeting held April 15, 2009. We had no comments/concerns.

Sincerely,
Connoquenessing Township Planning Commission

Sherry Lokhaisee

Sherry Lokhaiser
Planning Commission Secretary

Oakland Township Planning Commission

565 Chicora Road, Butler PA, 16001
(724) 287-8067 office (724) 287-3979 fax

James Zanella, Chairman
Chuck Stephenson
Edward Deary
Craig McConnell, Secretary
Thomas A. Covert

April 23, 2009

Butler Area Sewer Authority
ATTN: M. John Schon, P.E.
100 Littman Road
Butler, PA 16001-3256

RE: Review of Official ACT 537 Plan

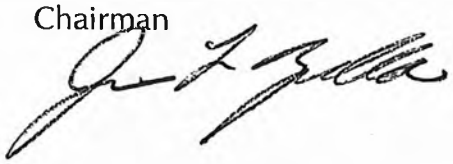
Dear Mr. Schon:

Please be advised that the Oakland Township Planning Commission is in receipt of a copy of the Final Official Act 537 Plan Update Revision, and that they have no comment on the above referenced plan.

If you have any questions or concerns, please feel free to contact me. My office hours are Tuesday and Wednesday 8:00 a.m. to 2:00 p.m., and Thursday from 8:00 a.m. to 1:00 p.m.

Sincerely,
OAKLAND TOWNSHIP
PLANNING COMMISSION

James Zanella
Chairman



Proof of Publication of Notice in Butler Eagle

Under Act No. 587, Approved May 16, 1929

State of Pennsylvania,
County of Butler.

Donna Bobby Of the Eagle Printing Company, Inc., of the County and State aforesaid, being duly sworn, deposes and says that the BUTLER EAGLE, a newspaper of general circulation published at 114 West Diamond Street, City of Butler, County and State aforesaid, was established 1869, since which date the BUTLER EAGLE has been regularly issued in said County, and that the printed notice or publication attached hereto is exactly the same as was printed and published in the regular editions and issues of the said BUTLER EAGLE on the following dates, viz.

_____ and the

15th Day of March A.D. 2009

Affiant further deposes that the Ad Taker is duly authorized by the EAGLE PRINTING COMPANY, a corporation, publisher of said BUTLER EAGLE, a newspaper of general circulation, to verify the foregoing statement under oath, and Affiant is not interested in the subject matter of the aforesaid notice or advertisement, and that all allegations in the foregoing statements as to time, place and character of publication are true.

Donna Bobby

Butler Eagle

Sworn to and subscribed before me this 15th

Day of March 2009

Notary Public

My Commission Expires:

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Ronald A. Vodenichar - Notary Public
CITY OF BUTLER, BUTLER COUNTY
MY COMMISSION EXPIRES JULY 12, 2012

PUBLIC NOTICE
OFFICIAL PLAN APPROVAL

Public notice is hereby given that the Butler Area Sewer Authority (Authority) will receive written, public comments (to the attention of Mr. M. John Schon, Authority Manager) from March 16, 2009 until April 14, 2009 at the Authority office, 100 Litman Road, Butler, Pennsylvania 16001, for the following project:

PROPOSED PLAN ADOPTION ACTION FOR BUTLER AREA SEWER AUTHORITY ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE

The PLAN is on file and available for review and comment at the Authority office between the hours of 8:00 AM to 4:00 PM (prevailing time) Monday through Friday. The Authority has prepared the PLAN on behalf of its tributary municipalities which are Butler City, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, all [illegible] facilities, and some combination of parts or all of the above. The Executive Summary of the PLAN recommends conveyance system upgrades and the construction of diversion/pumping/storage facilities in both Butler City and Butler Township to control SSOs such that current and future sewage needs of all municipalities are met. There are no new discharges to receiving bodies of water proposed. The cost of these recommended improvements is currently estimated to be nearly $31 million. The PLAN concludes that it is not economically feasible at this time to extend new public sewer service into the unsewered parts of the planning area. At this time, the base user fee for existing Authority customers is estimated to increase by nearly $9 per month per equivalent dwelling unit (EDU) to implement the recommended improvements.

Copy ation

Statement of Advertising Costs

Butler Area Sewer Authority

100 Litman Road

Butler PA 16001

TO BUTLER EAGLE, Dr.

For publishing the notice or publication attached Hereto on the above stated dates	$	260.00
Probating same	$	2.00
Total	$	262.00

The EAGLE eipt of th

Publisher's Receipt for Advertising Costs

publisher of the **BUTLER EAGLE**, a newspaper of general circulation, hereby acknowledge ublication costs and certifies that the same have been duly paid.

EAGLE PRINTING CO., a Corporation, Publisher
Of BUTLER EAGLE, a Newspaper of General Circulation.

By _____

publisher of said BUTLER EAGLE, a newspaper of general circulation, to verify the foregoing statement under oath, and Affiant is not interested in the subject matter of the aforesaid notice or advertisement, and that all allegations in the foregoing statements as to time, place and character of publication are true.

Donna Bobby

Butler Eagle

Sworn to and subscribed before me this 15th

Day of March 2009

Notary Public

My Commission Expires:

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Ronald A. Vodenichar - Notary Public
CITY OF BUTLER, BUTLER COUNTY
MY COMMISSION EXPIRES JULY 12, 2012

Statement of Advertising Costs

Butler Area Sewer Authority

100 Litman Road

Butler PA 16001

TO BUTLER EAGLE, Dr.

For publishing the notice or publication attached Hereto on the above stated dates	$	260.00
Probating same	$	2.00
Total	$	262.00

Publisher's Receipt for Advertising Costs

The EAGLE P , publisher of the **BUTLER EAGLE**, a newspaper of general circulation, hereby acknowledge receipt of the ublication costs and certifies that the same have been duly paid.

EAGLE PRINTING CO., a Corporation, Publisher
Of BUTLER EAGLE, a Newspaper of General Circulation.

By_____

Copy **ation**

PUBLIC NOTICE
OFFICIAL PLAN APPROVAL

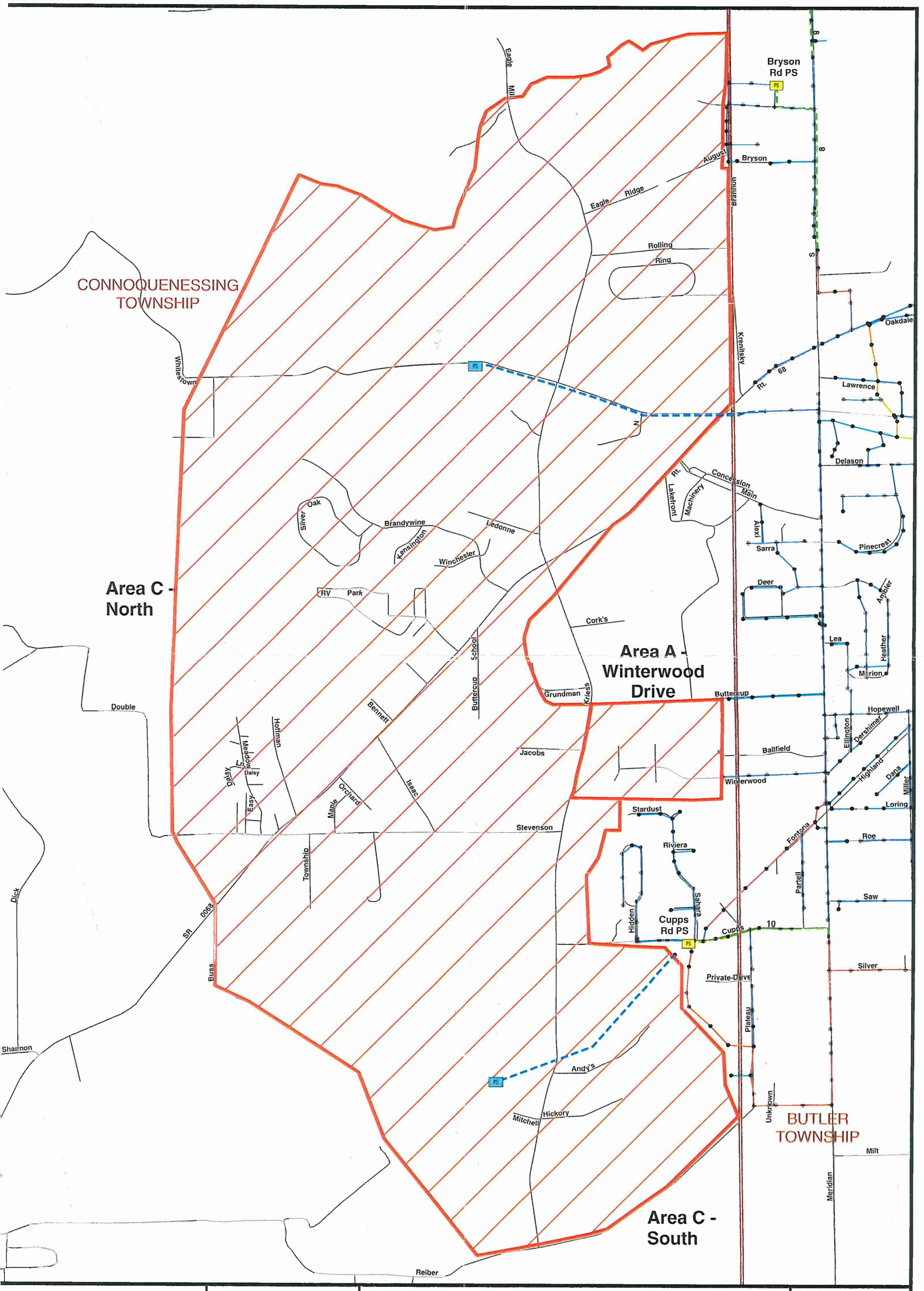
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PROPOSED PLAN ADOPTION ACTION FOR BUTLER AREA SEWER AUTHORITY

ACT 537 SEWAGE FACILITIES PLANNING STUDY UPDATE

The PLAN is on file and available for review and comment at the Authority office between the hours of 8:00 AM to 4:00 PM (prevailing time) Monday through Friday. The Authority has prepared the PLAN on behalf of its tributary municipalities which are Butler City, Butler Township, Center Township, Connoquenessing Township, East Butler Borough, Oakland Township, and Summit Township, all located in central Butler County. These municipalities will be considering action for adopting this PLAN at one of their upcoming, public meetings. The location of the planning area is outlined in the PLAN, but can be generally described as: all of Butler City, most of Butler Township, the southern portion of Center Township, the western portion of Connoquenessing Township, East Butler Borough, a majority of Oakland Township, and the western portion of Summit Township.

This notice provides a 30-day public comment period as required by Title 25, Chapter 71.31(c) of the Pennsylvania Code. The Authority has on file a copy of the PLAN which has a complete description of the nature, scope and location of the planning area, including a list of the sewage facilities alternatives considered, and the estimated costs involved, but can be generally described as the following: The Authority currently owns, operates, and maintains a 10 million gallon per day capacity wastewater treatment plant, over 300 miles of conveyance sewers ranging in size from 6-inches to 48-inches in diameter, and 22 sewage pumping stations. Treated effluent from the plant is discharged to Connoquenessing Creek, a tributary of the Beaver River. The conveyance system is hydraulically overloaded during wet weather periods which cause sanitary sewer overflows (SSOs). The sewage facilities alternatives considered to control SSOs include expanding the existing treatment plant, building a new treatment plant, upgrading the collection and conveyance systems, building diversion/pumping/storage facilities, and some combination of parts or all of the above. The Executive Summary of the PLAN recommends conveyance system upgrades and the construction of diversion/pumping/storage facilities in both Butler City and Butler Township to control SSOs such that current and future sewage needs of all municipalities are met. There are no new discharges to receiving bodies of water proposed. The cost of these recommended improvements is currently estimated to be nearly $31 million. The PLAN concludes that it is not economically feasible at this time to extend new public sewer service into the unsewered parts of the planning area. At this time, the base user fee for existing Authority customers is estimated to increase by nearly $9 per month per equivalent dwelling unit (EDU) to implement the recommended improvements.


CONNOQUENESSING TOWNSHIP
Area C - North
Area A - Winterwood Drive
Area C - South
BUTLER TOWNSHIP
Bryson Rd PS
Cupps Rd PS
PS
Eagle Mill
August
Eagle Ridge
Rolling Ring
Bryson
Brannon
S 8
Krenitsky
Oakdale
Rt. 68
Lawrence
Delason
Rt. Lakefront
Machinery
Concession Main
Alexi
Sarra
Pinecrest
Deer
Ampler
Heather
Lea
Marion
Buttercup
Hopewell
Ellington
Dershimer
Ballfield
Winterwood
Highland
Dana
Miller
Loring
Roe
Fontana
Partell
Saw
Silver
Plateau
Unknown
Milt
Meridian
Private Drive
Cupps
10
Sahara
Hidden
Riviera
Stardust
Grundman
Kriess
Cork's
School
Ledonne
Winchester
Kensington
Brandywine
Silver Oak
RV Park
Bennett
Jacobs
Isaac
Orchard
Maple
Hoffman
Meadow Ln
Daisy
Easy
Stevenson
Township
Double
Whites town
Dick
Shannon
Buss
SR 0068
Andy's
Mitchell
Hickory
Reiber
BASA
BUTLER AREA SEWER AUTHORITY
BUTLER COUNTY, PENNSYLVANIA
EXHIBIT IV-1
SUPPLEMENT MAP
UNSEWERED AREAS WITH EXISTING DEVELOPMENT
APRIL 2008
N
1 inch equals 1,200.044088 feet
0 300 600 1,200 Feet
Sewer Structures
Pump Stations
Force Mains
Proposed PS
Proposed Force
Streams
Street Centerlines
Unsewered Areas
Municipal Boundaries
PIPE DIAMETERS
1" - 8"
10"
12"
15"
18"
20"
24"
27" - 30"
36"
48"
PROJECT: 07-0555-MC-A T. 99
MAP: STOCK
DATE: 04/16/08
FILE: G:\2008\BASA\System_Report_McKee_042308\Maps\System Map_042308.mxd
MAP IS FOR GENERAL USE ONLY
CHESTER ENGINEERS

CENTER TOWNSHIP

OAKLAND TOWNSHIP

CONNOQUENESSING TOWNSHIP

BUTLER TOWNSHIP

SUMMIT TOWNSHIP

CITY OF BUTLER

EAST BUTLER BOROUGH

Fisher Heights PS

Brewster Rd PS

Brewster Booster PS

Northvue PS

Links PS

Greenwood Dr PS

Benbrook Rd PS

Bryson Rd PS

Deshon PS

Deshon SSO

Rocklick PS

Cupps Rd PS

WWTP

Foxcroft PS

Ballpark SSO

General Tire SSO

Diamond St PS

Negley Ave PS

Center Ave PS

Monroe SSO

Monroe St PS

Ziegler PS

Karns Crossing PS

September Dr PS

Garden Grove PS

Township Line PS

Sugar Creek PS

BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

BASA

EXHIBIT III-1

SYSTEM MAP

APRIL 2008

N

1 inch equals 1,200 feet

0 1,200 2,400 4,800 Feet

- Sewer Structures
- SSO
- Pump Stations
- Force Mains
- Streams
- Street Centerlines
- Municipal Boundaries
- Waste Water Treatment Plant

PIPE DIAMETERS

1" - 8" 10" 12" 15" 18" 20" 24" 27" - 30" 36" 48"

LOCATION MAP

BUTLER COUNTY

PROJECT: 07-0555-MC-A T. 99
MAP: STOCK
DATE: 04/16/08
FILE: G:\2008\BASA\System_Report_McKee_042308\Maps\System Map_042308.mxd

MAP IS FOR GENERAL USE ONLY

CHESTER ENGINEERS

BUTLER AREA SEWER AUTHORITY

BUTLER COUNTY, PENNSYLVANIA

EXHIBIT IV-1

UNSEWERED AREAS WITH EXISTING DEVELOPMENT

APRIL 2008

N

1 inch equals 1,200 feet

0 1,200 2,400 4,800 Feet

- Sewer Structures
- SSO
- Pump Stations
- Force Mains
- Streams
- Street Centerlines
- Unsewered Areas
- Unsewered Watersheds
- Waste Water Treatment Plant
- Municipal Boundaries

PIPE DIAMETERS: 1" - 8", 10", 12", 15", 18", 20", 24", 27" - 30", 36", 48"

LOCATION MAP

BUTLER COUNTY

PROJECT: 07-0555-MC-A T. 99
MAP: STOCK
DATE: 04/16/08
FILE: G:\2008\BASA\System_Report_McKee_042308\Maps\System Map_042308.mxd

MAP IS FOR GENERAL USE ONLY

CHESTER ENGINEERS