7.0 FUTURE CONDITIONS

Executive Summary: To develop the Wet Weather Plan (WWP), ALCOSAN needed to coordinate with its customer municipalities to estimate future population and sewershed area growth within its service area and quantify associated impacts to future wastewater flow. The ALCOSAN Consent Decree (CD) currently requires the use of a planning horizon date of 2046 for the development of the WWP, which is 20 years after the CD milestone date for the completion of the facilities, programs and other activities specified in the WWP[7-1]. The CD also requires ALCOSAN to request specific municipal planning information from its customer municipalities and integrate pertinent information into the development and assessment of alternative control measures[7-2].

Section 7.1 begins by describing the processes used by ALCOSAN to obtain the needed population projections and other need planning information from the municipalities and summarizes the information that was requested and obtained. The section continues by explaining how population projections were developed. Future population projections for the ALCOSAN service area were initially obtained from the Southwestern Pennsylvania Commission (SPC), the regional planning agency serving the 10-county area surrounding Pittsburgh. The SPC projected the population increase within the ALCOSAN service area for the planning period would be approximately 16 percent to 969,000. Projected growth within individual customer municipalities varied greatly, and population decreases were projected in some areas. The SPC projections were discussed directly with the customer municipalities. Some municipalities agreed with the SPC projections while others disagreed and provided their own population projections. The municipal responses and projections were used to adjust and refine the SPC projections and quantify the amount of population growth. The system-wide population increase projected by the customer municipalities over the ALCOSAN service area was approximately 13 percent.

Municipalities also provided projections of their anticipated sewershed growth, which are described in Section 7.1.3. The system-wide sewershed area increase projected by the customer municipalities over the ALCOSAN service area was approximately 9 percent. While some of the population growth would require extensions to municipal sewer systems, many of the municipalities reported they are fully built out and would not anticipate any significant expansion of their existing wastewater collection systems. Projected population growth within these municipalities would occur within sewershed areas currently served by municipal sewers via fill-in construction on empty lots, increased population within existing dwelling units, or redevelopment resulting in higher population density.

Customer municipalities provided information on any planned projects that will impact future wastewater flow and have either been recently completed or have a near-term scheduled completion date before implementation of the WWP. These projects are summarized in Section 7.1.4.

[7-1] ALCOSAN CD Appendix P, paragraph 7 and Appendix R, paragraphs 3, 7, and 8
[7-2] ALCOSAN CD paragraph 70

Section 7.2 describes the assumptions and analyses used to quantify wastewater flow under Future Baseline Conditions which reflect the predicted state of the ALCOSAN and municipal collection systems in 2046 if no ALCOSAN or municipal remedial measures were to be implemented. This condition served as a baseline for evaluating wet weather alternatives. The analyses indicated that the combined effects of projected population increases, sewershed growth and planned projects would result in a net increase to the average annual dry weather flow from the customer municipalities to the ALCOSAN system of approximately 5 percent from 197 MGD to 207 MGD. The analyses indicated that under future conditions, projected increases to dry and wet weather flow from the customer municipalities would increase the total annual volume of CSO and SSO discharges by approximately 8 percent to 10.5 billion gallons.

Section 7.3 provides projected estimates of the economic and demographic environment of the ALCOSAN service area in which the Wet Weather Plan will be implemented and operated through the 2046 planning period. These factors include the relative rates of household income and sewer revenue growth against inflation in the capital, operation and maintenance costs associated with the WWP. Projected billed water consumption, changes to the ALCOSAN customer base, and explanations for the composition of the ALCOSAN rate base are also provided.

7.1 Municipal Planning Projections

For ALCOSAN to develop a regional WWP for its service area, planning information was needed from each of the 83 customer municipalities who own and operate their respective wastewater collection systems. The ALCOSAN Consent Decree (CD) designated 2046 as the planning horizon for the development of the WWP and addressed specific municipal information and data ALCOSAN was required to request[7-3]. The CD also set milestone dates for ALCOSAN to request the specified information and for the municipalities to submit this information to ALCOSAN[7-4]. This section summarizes the municipal planning information obtained to estimate future condition wastewater flow for 2046 and the activities ALCOSAN conducted to obtain the information and coordinate with the municipalities. This section also summarizes the means used to estimate service population and sewershed area growth projected through 2046, the analyses that were conducted to estimate future wastewater flow under dry and wet weather conditions, and the planned projects that will impact future wastewater flow. More detailed information on municipal coordination requirements, goals and activities is provided in Section 2 of this WWP.

7.1.1 Municipal Planning Information Obtained

This subsection summarizes the CD requirements and the activities ALCOSAN conducted to request and obtain the municipal planning information and data needed to develop the regional Wet Weather Plan (WWP) and meet CD requirements. The subsection includes a summary of the various coordination activities ALCOSAN used to facilitate the collection of needed planning information from its customer municipalities.

[7-3] ALCOSAN CD paragraph 70; Appendix P paragraph 7; and Appendix R paragraphs 3, 7, and 8.
[7-4] ALCOSAN CD paragraph 70

Applicable Consent Decree Requirements: The CD contains certain requirements regarding the collection and coordination of municipal planning information that would be utilized in the preparation of the WWP[4]. The CD requires ALCOSAN to make the planning assumption that control facilities will need to be designed and constructed with sufficient size and capacity to capture and treat all the dry and wet weather flow the customer municipalities convey to the ALCOSAN system, unless certain conditions are met[7-5]. Municipal flow may be excluded if existing municipal trunk sewers have insufficient hydraulic capacity to convey all the flow to the ALCOSAN system, and/or the municipality decides not to increase the pipe capacity, and/or the municipality elects to provide its own facilities or to use other alternative means to control its wastewater flow.

The CD contains the operational requirement that the ALCOSAN system continue to capture sufficient wastewater flow and provide sufficient treatment to meet established water quality goals for at least 20 years after completing the construction and implementation of the Wet Weather Plan remedial controls and activities[7-6]. Under the current CD schedule, implementation of the WWP would be completed in 2026 and this requirement would necessitate WWP facilities, programs, and activities to provide a sufficient level of wastewater control for projected flow increases through 2046. To meet this CD requirement, ALCOSAN coordinated with its customer municipalities to develop and quantify wastewater estimates for planning year 2046. Section 2 of the WWP provides detailed documentation of the activities conducted by ALCOSAN to implement its municipal coordination and public participation programs and how the information obtained was used by ALCOSAN in developing the WWP. This WWP section summarizes the information required to develop the WWP and the activities conducted to obtain the information; specifically, municipal information needed to project future sewershed area growth, population and wastewater flow.

The CD lists information and data that ALCOSAN is required to request from each of its customer municipalities and to consider and integrate in developing the regional WWP[7-7]. The following are CD requirements which relate directly to the information needed to project future flows from customer municipalities at both a municipal and sewershed (point of connection) level.

- The most recent maps of the configuration of the municipal collection systems
- Available flow monitoring data to characterize wastewater flow generated by the municipalities and routed to the ALCOSAN system
- Forecasts of the total future flow and volume that each point of connection will contribute to the ALCOSAN system when the WWP is implemented and the associated total future service population
- A characterization of the flows from combined and separate municipal collection systems for each point of connection to the ALCOSAN system, a description of how the

[7-5] ALCOSAN CD paragraphs 17 and 18
[7-6] ALCOSAN CD paragraphs 19 and 20
[7-7] ALCOSAN CD paragraph 70

characterization was prepared, and a description of how these flows will be managed in the future by the municipality

- Hydraulic capacity evaluations and system hydraulic characterizations of the municipal wastewater collection systems to determine if peak wet weather flow can be successfully conveyed to the ALCOSAN system
- Description of the municipal program(s) that will be used to manage wastewater flow so system capacities are not exceeded and established water quality goals are met

The CD also includes a requirement to create an ALCOSAN Customer Municipal Advisory Committee with representation from each of the designated watershed planning basins[7-8]. A plan of action was described in the CD for ALCOSAN follow-through should a customer municipality fail to provide some or all of the requested information.

Mechanisms for Obtaining Municipal Information: To obtain the required planning information, ALCOSAN issued a series of certified letters, with return receipt acknowledgements, to each of the customer municipalities with formalized requests for information. The ALCOSAN letters included due dates for submitting the requested information. For larger sewershed points of connection to the ALCOSAN system where multiple municipalities contribute flow and needed to coordinate flow contributions and control strategies, customer municipalities were requested to provide draft feasibility studies by July 2012. This would allow better integration of municipal information into the WWP. After each of the municipal submissions was received, ALCOSAN conducted an assessment to verify the completeness and reliability of the information for integration into the development of the WWP. Responses to the most recent request for draft feasibility studies are expected to be reviewed after submission of the draft WWP, and this updated information is expected to be incorporated into the final WWP.

Mechanisms for Coordinating Municipal Information: There were several means that ALCOSAN utilized to provide the needed coordination associated with the information requested from its customer municipalities. A list of the coordination workgroups is provided below. Detailed descriptions of the workgroups and how they functioned to provide the required coordination are provided in WWP Section 2, *Municipal Coordination and Public Participation*.

- A Customer Municipal Advisory Committee (CMAC)
- Seven Basin Planning Committees (BPCs)
- A Feasibility Study Working Group (FSWG)

Meetings were also conducted on an as needed basis between ALCOSAN, the seven Basin Planner teams, and individual municipalities to discuss and resolve apparent discrepancies between future flow projections developed by ALCOSAN and those developed by the municipalities.

[7-8] ALCOSAN CD paragraph 79

7.1.2 Projections for Population Growth

In order to estimate future 2046 wastewater flows for the development of the WWP, projections for future population and sewershed area growth were needed. Two sources of information were used to quantify population growth: projections from the Southwestern Pennsylvania Commission (SPC) and projections provided by the customer municipalities. This subsection describes the activities and analyses ALCOSAN conducted to obtain, compile, and analyze this information.

Future population projections for the ALCOSAN service area were obtained from the SPC. The SPC is the regional planning agency serving the 10-county area surrounding Pittsburgh and directs the use of all state and federal transportation and economic development funds allocated to the region. SPC is the region's designated Local Development District and Economic Development District by the US Department of Commerce and in this role, SPC establishes regional economic development priorities and provides a wide range of planning services to the region. SPC analysis data provide population projections through 2040. This available information was used as reasonable surrogate data for the 2046 planning year required by the CD. Census data were obtained to provide 2010 populations.

The population data provided by the census and by SPC include people living within areas served by combined and separate sewer systems and people living within areas that are served by individual on-lot treatment systems and do not contribute flow to the ALCOSAN system. For customer municipalities that have sewershed areas where wastewater treatment is provided by another sewer authority, only the population within sewershed areas served by ALCOSAN was included.

The customer municipalities were asked to provide ALCOSAN with future population projections. At the time the municipal projections were being developed, 2010 census data were not available and municipalities used various versions of extrapolated 2000 census data to estimate existing condition population. In addition, at the time the customer municipalities were developing their future population projections, the SPC projections only extended through 2035. It was the 2035 population projections that were discussed with the customer municipalities. The ALCOSAN planning basin teams shared these SPC projections with each of the customer municipalities. The municipalities either agreed with the SPC projection or provided their own population growth projections. The ALCOSAN basin planner teams conducted the municipal coordination and documented the municipal responses. Subsequently, the SPC extended their population projections through 2040 at the request of the ALCOSAN municipalities. The projections from the customer municipalities were incorporated into the hydrologic and hydraulic (H&H) models and used for the development of the WWP.

In Table 7-1, the existing planning basin populations are compared to the SPC future projections and the population projections compiled by the Basin Planners based on municipal input. The information is organized and totaled by each of the seven planning basins that comprise the ALCOSAN service area. In Table 7-2, the existing population from the 2010 census and the population projections from SPC and the municipalities are provided for each of the customer municipalities as compiled by the Basin Planners based on municipal input.

For customer municipalities that have sewershed areas where wastewater treatment is provided by another sewer authority, only the population within sewershed areas served by ALCOSAN was included in the numbers reported in Tables 7-1 and 7-2. Population projections were also obtained for the portion of Cecil Township which has a minor contributing population but is not a direct ALCOSAN customer municipality. Cecil Township customers contribute flow to ALCOSAN via sewer connections and a service agreement to the adjacent downstream neighbor, South Fayette Township.

Projected population growth varies greatly from municipality to municipality. As can be seen from the table information, there were some customer municipalities with relatively aggressive projected growth rates over the 30-year analysis period. In contrast, there also were several municipalities where the population within the ALCOSAN service area was projected to decrease during the analysis period.

Table 7-1: Comparison of SPC and Municipal Population Projections by Planning Basin Area

Planning Basin Area(2)	2010 Census Population(1)	SPC Population Projections(1) Percent Change	Basin Planner Projected Percent Change
Chartiers Creek	154,566	19.1%	26.3%
Lower Ohio - Girty's Run	92,061	17.6%	11.8%
Main Rivers	164,070	15.3%	6.2%
Saw Mill Run	106,722	7.4%	6.6%
Turtle Creek - Thompson Run	89,370	23.0%	26.5%
Upper Allegheny River	112,957	15.4%	3.7%
Upper Monongahela River	116,809	16.9%	10.3%
Total ALCOSAN Service Area	836,556	16.3%	13%

(1) Note: Census and SPC populations include areas served by combined sewers, areas served by separate sewers and non-contributing areas that are served by individual on-lot treatment systems.

(2) Note: Only municipal populations within the ALCOSAN service area were included.

Table 7-2: Comparison of SPC and Municipal Population Projections by Customer Municipality

Customer Municipality	2010 Census Population(1)	SPC Population Projections(1) Percent Change	Basin Planner Projections Percent Change
Aspinwall Borough	2,804	15%	0.0%
Avalon Borough	4,703	14%	0.0%
Baldwin Borough	12,319	0%	11%
Baldwin Township	1,988	10%	5.2%
Bellevue Borough	8,371	7%	8.6%
Ben Avon Borough	1,777	24%	13%
Ben Avon Heights Borough	371	-5%	57%
Bethel Park, Municipality of	11,444	8%	1.7%
Blawnox Borough	1,399	16%	0.0%
Braddock Borough	2,117	29%	30%
Braddock Hills Borough	1,880	11%	27%
Brentwood Borough	9,637	13%	7.6%
Bridgeville Borough	5,137	10%	0.45%
Carnegie Borough	7,962	4%	9.8%
Castle Shannon Borough	8,303	9%	-0.04%
Chalfant Borough	790	-9%	-25%
Churchill Borough	3,005	16%	-5.8%
Collier Township	7,081	55%	126%
Crafton Borough	5,932	7%	18%
Dormont Borough	8,591	-8%	2.6%
East McKeesport Borough	1,548	31%	-18%
East Pittsburgh Borough	1,819	12%	8.9%
Edgewood Borough	3,120	-44%	-0.74%
Emsworth Borough	2,445	12%	6.2%
Etna Borough	3,450	22%	0.0%
Forest Hills Borough	6,518	14%	-19%
Fox Chapel Borough	5,195	25%	11%
Franklin Park Borough	4,718	33%	10%
Green Tree Borough	4,431	13%	14%
Heidelberg Borough	1,246	14%	3.3%

Table 7-2: Comparison of SPC and Municipal Population Projections by Customer Municipality

Customer Municipality	2010 Census Population[1]	SPC Population Projections[1] Percent Change	Basin Planner Projections Percent Change
Homestead Borough	3,157	38%	28%
Indiana Township	881	-34%	0.0%
Ingram Borough	3,331	18%	0.19%
Kennedy Township	7,661	85%	24%
Kilbuck Township	692	25%	34%
McCandless Township	8,829	-12%	0.0%
McDonald Borough	2,129	12%	0.27%
McKees Rocks Borough	6,104	8%	16%
Millvale Borough	3,733	20%	31%
Monroeville, Municipality of	27,903	15%	25%
Mt. Lebanon, Municipality of	33,138	8%	16%
Mount Oliver Borough	3,399	7%	10%
Munhall Borough	11,355	5%	4.5%
Neville Township	1,077	-33%	4.2%
North Braddock Borough	4,899	27%	47%
North Fayette Township	5,831	148%	263%
North Huntingdon Township	2,033	56%	996%
North Versailles Township	3,885	16%	48%
Oakdale Borough	1,457	-3%	3.6%
O'Hara Township	8,346	54%	0.0%
Ohio Township	3,384	25%	32%
Penn Hills, Municipality of	33,682	14%	10%
Penn Township	4,324	67%	185%
Peters Township	176	2%	149%
Pitcairn Borough	3,294	15%	-14%
Pittsburgh City	305,369	16%	6.4%
Pleasant Hills Borough	95	-49%	12%
Plum Borough	1,625	109%	311%
Rankin Borough	2,113	10%	25%
Reserve Township	3,345	27%	6.2%

Table 7-2: Comparison of SPC and Municipal Population Projections by Customer Municipality

Customer Municipality	2010 Census Population[1]	SPC Population Projections[1] Percent Change	Basin Planner Projections Percent Change
Robinson Township	900	94%	474%
Ross Township	30,903	13%	20%
Rosslyn Farms Borough	427	54%	189%
Scott Township	17,018	8%	13%
Shaler Township	28,734	11%	0.0%
Sharpsburg Borough	3,445	14%	0.0%
South Fayette Township[2]	14,402	36%	107%
Stowe Township	6,361	-2%	6.8%
Swissvale Borough	8,988	10%	7.6%
Thornburg Borough	462	17%	120%
Trafford Borough	3,191	3%	6.7%
Turtle Creek Borough	5,342	17%	-0.14%
Upper St. Clair Township	19,112	11%	24%
Verona Borough	2,383	-9%	0.0%
Wall Borough	577	9%	45%
West Homestead Borough	1,931	28%	18%
West Mifflin Borough	6,245	-3%	18%
West View Borough	6,766	13%	8.7%
Whitaker Borough	1,272	32%	1.8%
Whitehall Borough	13,117	16%	8.0%
Wilkins Township	6,362	18%	4.1%
Wilkinsburg Borough	15,922	18%	6.0%
Wilmerding Borough	2,186	25%	13%
Total ALCOSAN Service Area	836,556	16%	13%

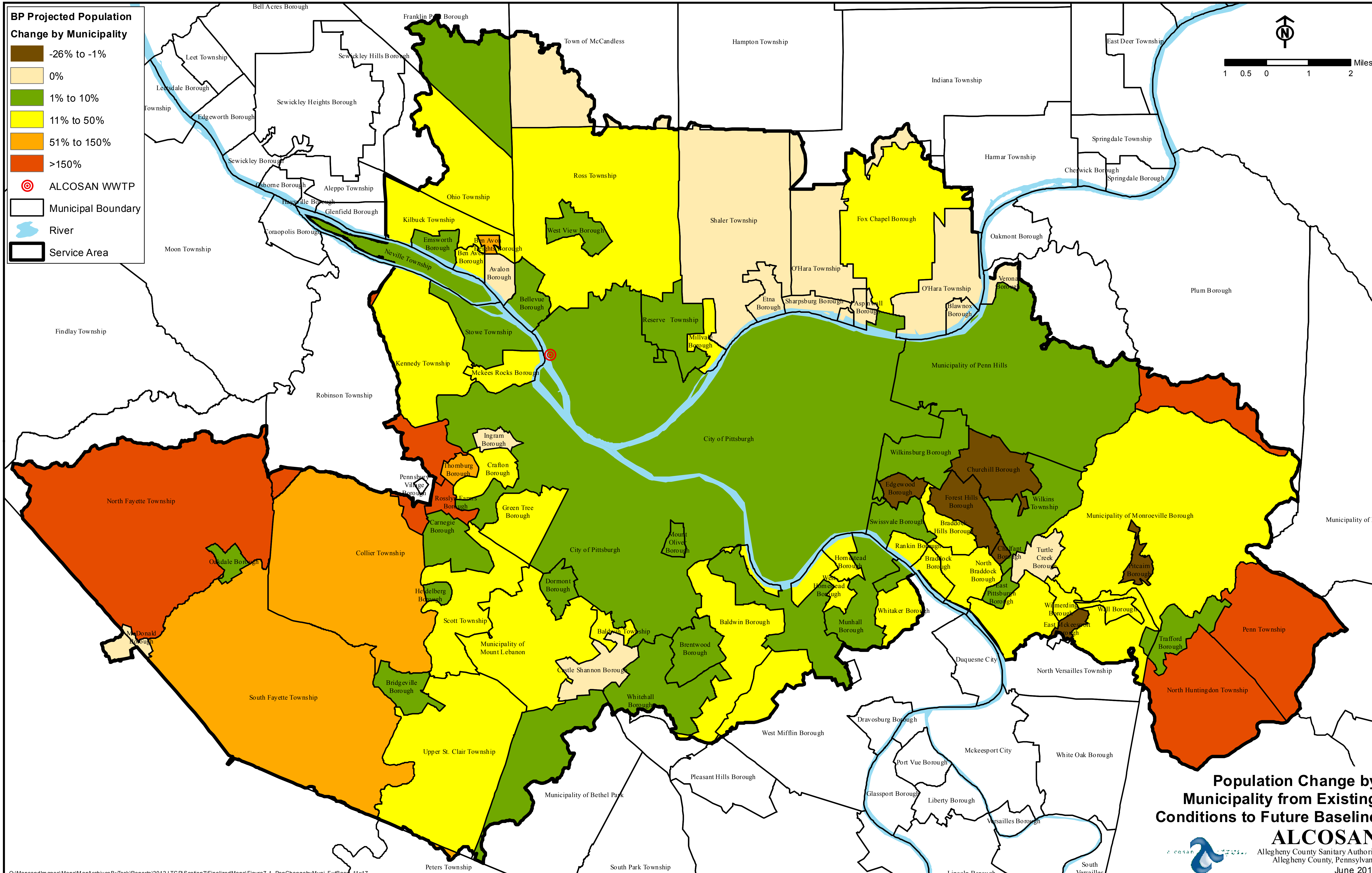
(1) Note: Census and SPC populations include areas served by combined sewers, areas served by separate sewers and non-contributing areas that are undeveloped or served by individual on-lot treatment systems.

(2) Note: South Fayette populations include the minor Cecil Township service area.

Figure 7-1 is a Geographic Information Systems (GIS) map showing the projected percentage change between existing and projected 2046 populations served by the ALCOSAN system, as compiled by the Basin Planners based on information provided by the customer municipalities.

This page was intentionally left blank to facilitate double sided printing.

Figure 7-1: Population Change by Municipality from Existing Conditions to Future Baseline



This page was intentionally left blank to facilitate double-sided printing.

7.1.3 Projected Service Area Growth

The ALCOSAN basin planning teams also discussed with the customer municipalities areas where future development was projected to occur. Many of the municipalities reported they are fully built-out and would not anticipate any significant expansion of their existing sewer systems. Any projected population growth within these municipalities would presumably be:

- A result of fill-in construction on empty lots located within existing areas already served by combined or separate wastewater collection systems
- Demolition and redevelopment within existing sewered areas at a higher density
- Via increased population within existing dwelling units.

Other municipalities have undeveloped areas where future population growth is associated with an expansion of the sewershed area for their existing municipal wastewater collection sewer systems.

Table 7-3: Projected Future Sewershed Area Growth by Planning Basin Area

Planning Basin Area	2010 Sewershed Area (miles^2)	2040 Sewershed Area (miles^2)	Projected Percent Change
Chartiers Creek	47.9	61.2	27.7
Lower Ohio - Girty's Run	27.2	27.2	0.0
Main Rivers	23.0	23.0	0.0
Saw Mill Run	18.3	18.3	0.0
Turtle Creek - Thompson Run	36.0	42.0	16.7
Upper Allegheny River	35.2	35.2	0.0
Upper Monongahela River	26.1	26.1	0.0
Total ALCOSAN Service Area	213.7	233.0	9.0

7.1.4 Planned Projects

To develop the regional WWP and meet CD requirements, ALCOSAN requested that customer municipalities provide information on planned projects that will impact future wastewater flow and would be considered implemented under future baseline conditions (defined in Section 7.2.1). The Basin Planners also compiled planned projects by other entities that could impact future wastewater flows, and recommended some near-term ALCOSAN system improvements. These planned projects include projects that already have been completed after 2008 (the state of the system reflected in the validated existing condition models), are currently underway and have a scheduled completion date, or are currently in the planning stages with a near-term estimated completion date before 2026. The planned projects that have been identified and incorporated into the future baseline condition H&H models are summarized in Table 7-4. A map showing the locations of these planned future projects is provided in Figure 7-2.

Table 7-4: Summary of Planned Projects

Planning Basin	Planned Project	Project Status	Funding Source	Projected Completion Date	POCs Affected
Chartiers Creek	Mayview Hospital property sewer separation. Property purchased from state in 2010 by a private company.	Portions of existing combined system have been abandoned. No separation for remaining combined sewers to date.	Private developer sources	Not Available	C-54-16
Chartiers Creek	Pine Hollow stream removal	Completed	Municipalities, ALCOSAN, and COE	Completed 2-17-12	C-09 and C-13
Chartiers Creek	Sheraden Park stream removal, Section 219, environmental Infrastructure	Completed	75% ACOE 25% PWSA	Completed Spring 2011	C-07
Chartiers Creek	Sheraden Park stream removal, Section 206, aquatic ecosystem restoration	Stepping pools and channel/ stream braid construction for separated stream conveyance to Chartiers Creek. Contract out within a year	65% ACOE 35% ALCOSAN	2013	C-07
Chartiers Creek	Wabash Avenue Stream Removal (Carnegie Park)	Completed	ALCOSAN	Completed 11-02-11	C-34A, C-35, and C-40
Chartiers Creek	Upsize connector pipe from ALCOSAN regulator C-25-00 to C-25-02	Completed	ALCOSAN	2009	C-25
Lower Ohio / Girty's Run	Orr Street stream removal in Stowe Township	Construction Complete	Stowe Township ALCOSAN	Completed April 2010	O-03
Lower Ohio / Girty's Run	Route 28 Widening Project – Section A50	Construction in progress	PENNDOT	2012	A-63, A-64, A-65, A-66
Lower Ohio / Girty's Run	Freid and Reineman Stream Removal Project , Route 28 Widening Project –Section A10	Construction in progress	PENNDOT	Spring 2013	A-66
Lower Ohio / Girty's Run	Route 28 Widening Project – Section A09	Final PS&E re-submission in progress	PENNDOT	August 2014	A-62, A-64, A-65, A-66

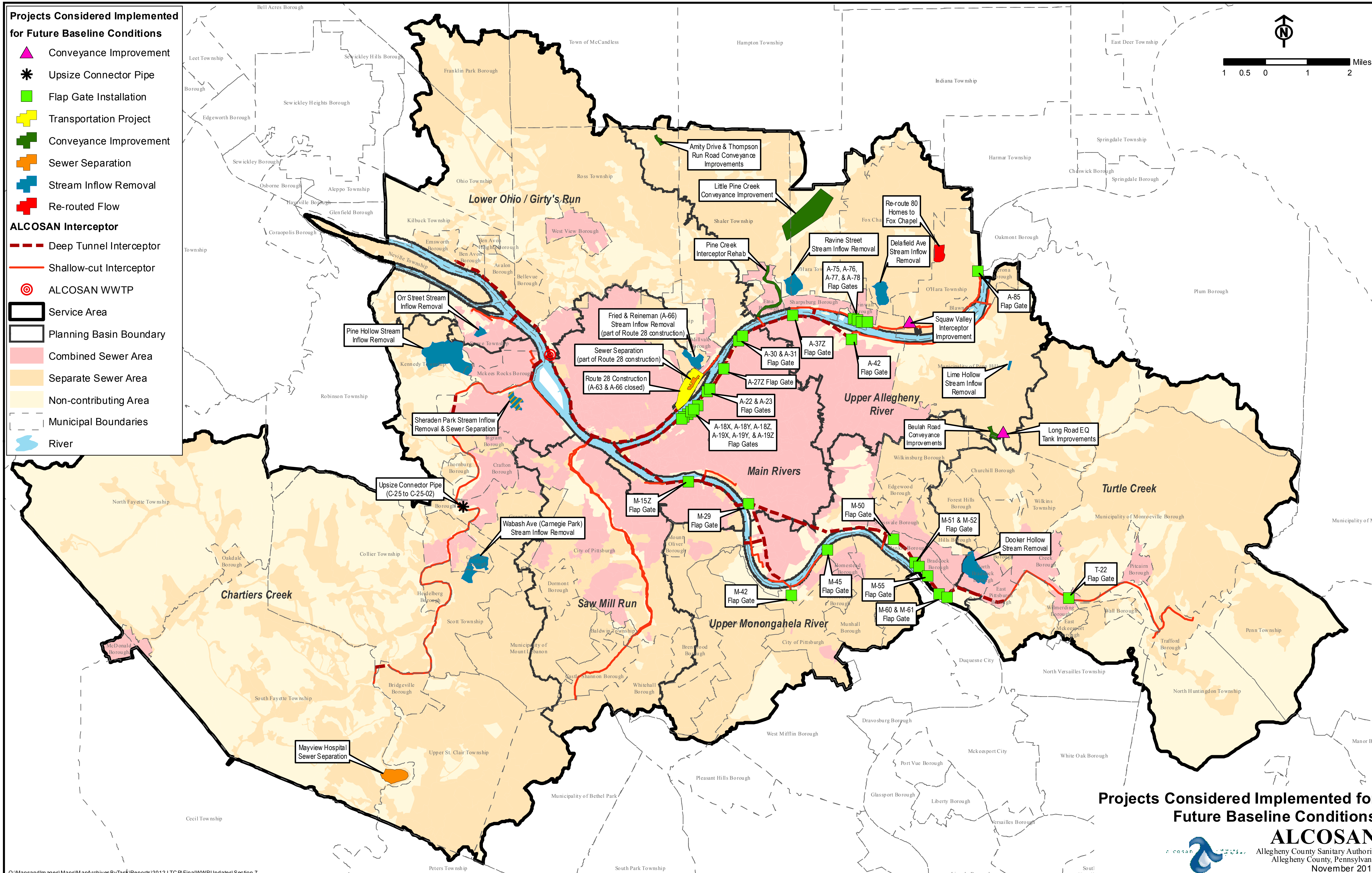
Table 7-4: Summary of Planned Projects

Planning Basin	Planned Project	Project Status	Funding Source	Projected Completion Date	POCs Affected
Main Rivers	Installation of flap gates for 13 structures in basin without flap gates	Planned	ALCOSAN	Not Available	A-18X, A-18Y, A-18Z, A-19X, A-19Y, A-19Z, A-22, A-23, A-27Z, A-30, A-31, M-15 M-29Z,
Turtle Creek / Thompson Run	Dooker Hollow direct stream removal in North Braddock	Design	Growing Greener Plus grant	2013	T-01
Turtle Creek / Thompson Run	Installation of a flap gate on T-22 regulator	Planned	ALCOSAN	2014	T-22
Upper Allegheny River	Ravine Street DSI Removal	Planning	Not Available	Not Available	A-69 and A-70
Upper Allegheny River	Delafield Road DSI Removal	Planning	Not Available	Not Available	A-78
Upper Allegheny River	Lime Hollow stream removal in Penn Hills	Completed	Penn Hills sewer fund	2010	A-42A
Upper Allegheny River	Beulah Road conveyance improvements in Penn Hills	Completed	Capital improvement fund and sewer fund	2010	A-42A
Upper Allegheny River	Long Road equalization facility improvements in Penn Hills	Completed	Capital improvements fund and sewer fund	2010	A-42A
Upper Allegheny River	Little Pine Creek conveyance improvements in O'Hara Township	Design	O'Hara municipal bonds	2012	A-72
Upper Allegheny River	Close Crofton Pump Station and reroute flow from 80 homes in O'Hara to Fox Chapel sewer	Planning	O'Hara municipal bonds	Not Available	A-85 and A-78-02
Upper Allegheny River	Squaw Valley interceptor improvements in O'Hara	Planning	Not Available	Not Available	A-80

Table 7-4: Summary of Planned Projects

Planning Basin	Planned Project	Project Status	Funding Source	Projected Completion Date	POCs Affected
Upper Allegheny River	Various pipe re-lining and rehabilitation on Pine Creek trunk sewers in Etna	Construction in progress	Not Available	Not Available	A-68
Upper Allegheny River	Conveyance improvements at Amity Drive and Thompson Run Road in Ross Township	Planning	Not Available	Not Available	A-68
Upper Allegheny River	Flap gate installation	Planning	ALCOSAN	Not Available	A-37Z, A-42, A-75, A-76, A-77, A-78, A-85
Upper Monongahela River	Flap gate installation	M-42 installed in 2010; rest are planned.	ALCOSAN	Not Available	M-42, M-45, M-50, M-51, M-52, M-55, M-60, M-61

Figure 7-2: Projects Considered Implemented for Future Baseline Conditions



This page intentionally was left blank to facilitate double-sided printing

7.2 Future Wastewater Flow

The ALCOSAN CD requires that for the development of the WWP, future baseline condition flows should be utilized and based upon a planning horizon date of 2046, 20 years after the scheduled implementation of the plan[7-9]. The future population and sewershed area growth projections provided by the customer municipalities, along with other pertinent municipal planning information, were used to calculate dry weather flows. These projected future dry weather flows and new sewershed areas were subsequently incorporated into the hydrologic and hydraulic (H&H) models to quantify total future wastewater flows under both dry and wet weather conditions. This section describes the assumptions used for the calculation of future baseline condition flows, summarizes the calculation results, and documents the impacts of these future flows on annual CSO and SSO volumes.

7.2.1 Definitions and Assumptions

To promote consistency among the seven planning basins in developing projected future wastewater flows, guidance memoranda were produced by ALCOSAN and distributed to the basin planners. Subsequently, 3 Rivers Wet Weather distributed guidance to the customer municipalities and their municipal engineers. Definitions were established and explained for existing conditions and future baseline conditions. These guided the development of the future condition flows that were incorporated into the hydrologic and hydraulic (H&H) models used for the development of the WWP.

Existing Conditions: Existing conditions within the ALCOSAN service area reflect the state of the ALCOSAN system and the municipal collection systems in 2008 and early 2009. This period coincides with the implementation of wastewater flow monitoring activities documented in the *Regional Collection System Flow Monitoring Plan* and the subsequent validation analyses and activities for the H&H models. The typical year precipitation was based upon high-resolution, spatially distributed monitoring data obtained from the regional rain gauge network and radar-rainfall system. The data were modified to better match results of completed statistical analyses of the long-term monitoring record available from the Pittsburgh International Airport gauge. The hydraulic capacity of the WWTP for existing conditions was 250 million gallons per day (MGD). River levels were based on measured river levels during the typical year, or based on interpolations between monitored locations. At the time the flow monitoring and model validation was conducted, the best available estimates for the service population came from SPC extrapolation projections from the 2000 census data. Subsequently, 2010 census population data was substituted when it became available in 2011.

Future Baseline Conditions: Future baseline conditions reflect the predicted state of the ALCOSAN and municipal collection systems in 2046 if no ALCOSAN or municipal remedial measures were to be implemented. This planning year was set by the ALCOSAN CD and based upon continued control of wet weather discharges 20 years after completion of the remedial control measures and activities documented in the WWP[7-10]. This condition served as a baseline for evaluating wet weather alternatives.

[7-9] ALCOSAN CD Appendix P, paragraph 7 and Appendix R, paragraphs 3, 7, and 8
[7-10] ALCOSAN CD paragraphs 19 and 20

The following items ***are*** included in future baseline conditions:

- Projected population and sewershed area growth
- Planned development and redevelopment activities
- Any projects (apart from WWP projects) by ALCOSAN, the customer municipalities, or other entities that already were completed after 2008, are currently underway and have a scheduled completion date, or are in the planning stages with an estimated completion date before 2026.

These projects were summarized in Table 7-6 and shown in Figure 7-2. Examples of the types of these planned projects include collection system rehabilitation to reduce extraneous groundwater and storm water flow into sewers, the disconnection and redirection of surface streams that currently flow into combined sewers, and adding backflow prevention gates (flap gates) at CSO outfalls to prevent the intrusion of stream flow into sewers.

The following ***are not*** included in future baseline conditions:

- An increase in the treatment capacity of the Woods Run plant
- Municipal trunk sewer upgrades to increase conveyance capacities to the ALCOSAN system
- Control facilities or remedial activities documented in the WWP

Assumptions for Projected Future Flow: Certain assumptions were made to implement the analyses used to quantify future baseline flow. Different assumptions and methods were used for projecting future flow for each of the three components that constitute the total wastewater flow that is conveyed by customer municipalities to ALCOSAN. These components are base wastewater flow (BWWF), groundwater infiltration (GWI), and rainfall dependent infiltration and inflow (RDII). To optimize model representation,

BWWF consists of household, commercial and industrial wastewater. Projected increases in BWWF were determined from projected population growth. In some planning basins, future BWWF from each sewershed was simply calculated from existing BWWF using the ratio of future to existing population. In other planning basins, average gallon-per-capita-per-day values were established and applied to the future population projections to calculate the magnitude of the added BWWF component of wastewater flow for the CD-mandated 2046 planning year. As previously mentioned, some basins allowed for BWWF reductions in sewersheds where population reductions were forecast, but in most basins these situations were treated as zero growth.

GWI is the component of the wastewater flow that infiltrates into sewers from leaking and open pipe joints and connections to foundation drains. Projected increases in GWI were determined from projected new sewershed areas where expansions of the municipal collection sewers are constructed to serve new residential, commercial and industrial development. It was assumed that infill development, new construction in areas where sewer service already exists, would not cause a noticeable increase in GWI. Average gallon-per-acre-per-day values were established and applied to the new sewershed acreage to calculate the magnitude of the added GWI component for planning year 2046.

RDII is the third component of wastewater flow and consists of rainfall runoff entering sewers from roof gutter downspout connections, catch basin connections, leaking or open pipe joints along municipal sewers and private service laterals, and streams directly connected to combined sewer systems. Projected increases in RDII were determined by assuming that an average annual value of 6 percent of the rainfall quantity falling over new sewershed areas would make its way into the new sewer system areas. This is a conservative estimate that includes the potential for subsequent deterioration after new sewer construction and was extrapolated from monitored conditions within selected representative municipal collection systems.

Assumptions for System Maintenance and Source Reduction: Given the magnitude of the regional investment into wastewater infrastructure associated with the recommended wet weather control plan, it was deemed unreasonable to assume that either the ALCOSAN or municipal collection systems would be allowed to deteriorate and compromise the effectiveness of the WWP. It was assumed that ALCOSAN and its customer municipalities would implement sustainable management practices in regard to their wastewater infrastructure and manage it as a long-term asset.

More specifically, it was assumed that for future baseline conditions the existing municipal and ALCOSAN collection systems would be maintained and rehabilitated at a sufficient level to prevent increases in the rate of extraneous flow (GWI or RDII) conveyed to the ALCOSAN system. In other words, ALCOSAN and municipal programs would be consistently implemented on a long-term basis to plan and provide regularly scheduled maintenance and rehabilitation activities that would prevent GWI or RDII rates to increase beyond current conditions. The only decreases in the rate of extraneous flow into the collection sewers for future baseline conditions were cases where a municipality proposed sewer rehabilitation as a source reduction measure as part of a planned project. Source reduction measures proposed as part of a municipal wet weather alternative are discussed in Section 9.

Future baseline conditions also assumed that municipal collection systems would be inspected and cleaned at a frequency established in a comprehensive long-term maintenance plan to prevent significant deposits of solids and debris from accumulating. This assumption would preserve the existing hydraulic capacity of municipal trunk sewers and the ability to convey peak wet weather flow to the ALCOSAN system. It was similarly assumed that ALCOSAN would continue to implement its long-term maintenance program to inspect and clean the shallow-cut interceptor sewers and connecting sewers and pipes on a regular basis to preserve their hydraulic capacities.

For the ALCOSAN deep tunnel interceptor system, alternative cleaning technologies and methods are still being tested and evaluated as to their feasibility, effectiveness and sustainability. Therefore, a conservative assumption was made for the development and assessment of alternative control measures for the WWP. The H&H models used to develop the

WWP retained the sediment accumulations along the deep tunnel system at the same levels and distribution as those used in validating the existing condition models. As ALCOSAN continues to implement its deep tunnel cleaning program and seek new cleaning technologies and methods, this conservative assumption could be modified in the future. It is also important to ensure that the sediment levels along the deep tunnel system do not increase over time. For that to happen, municipalities would need to consistently and continually make the necessary investments in cleaning and maintaining their collection systems so that debris and solids would not be conveyed to and deposited into ALCOSAN the deep tunnels.

7.2.2 Projected Wastewater Flows

The future population projections and future increases to sewershed areas provided by the customer municipalities were applied as described above to the three components of total wastewater flow (BWWF, GWI & RDII) to calculate projected wastewater flows for the 2046 planning horizon year. The resulting future baseline condition hydrologic and hydraulic (H&H) models were used to evaluate alternative wet weather controls. A summary comparison of existing condition (typical year) and future baseline condition (2046) dry weather flows, summed by each of the seven ALCOSAN planning basin areas, is provided in Table 7-5.

Table 7-5: Projected Future Increases to Dry Weather Flow by Planning Basin Area

Planning Basin Area	Existing Condition Dry Weather Flow (MGD)	Future Baseline Condition (2046) Dry Weather Flow (MGD)	Percent Difference
Chartiers Creek	27.9	32.2	15.4%
Lower Northern Allegheny River	6.6	6.7	1.5%
Lower Ohio River	11.8	12.0	1.8%
Main Rivers	63.0	64.3	2.0%
Saw Mill Run	22.5	22.9	1.5%
Turtle Creek – Thompson Run	14.1	16.7	18.5%
Upper Allegheny River	22.9	22.9	0.1%
Upper Monongahela River	28.7	29.2	1.8%
Total ALCOSAN Service Area	197.5	206.9	4.7%

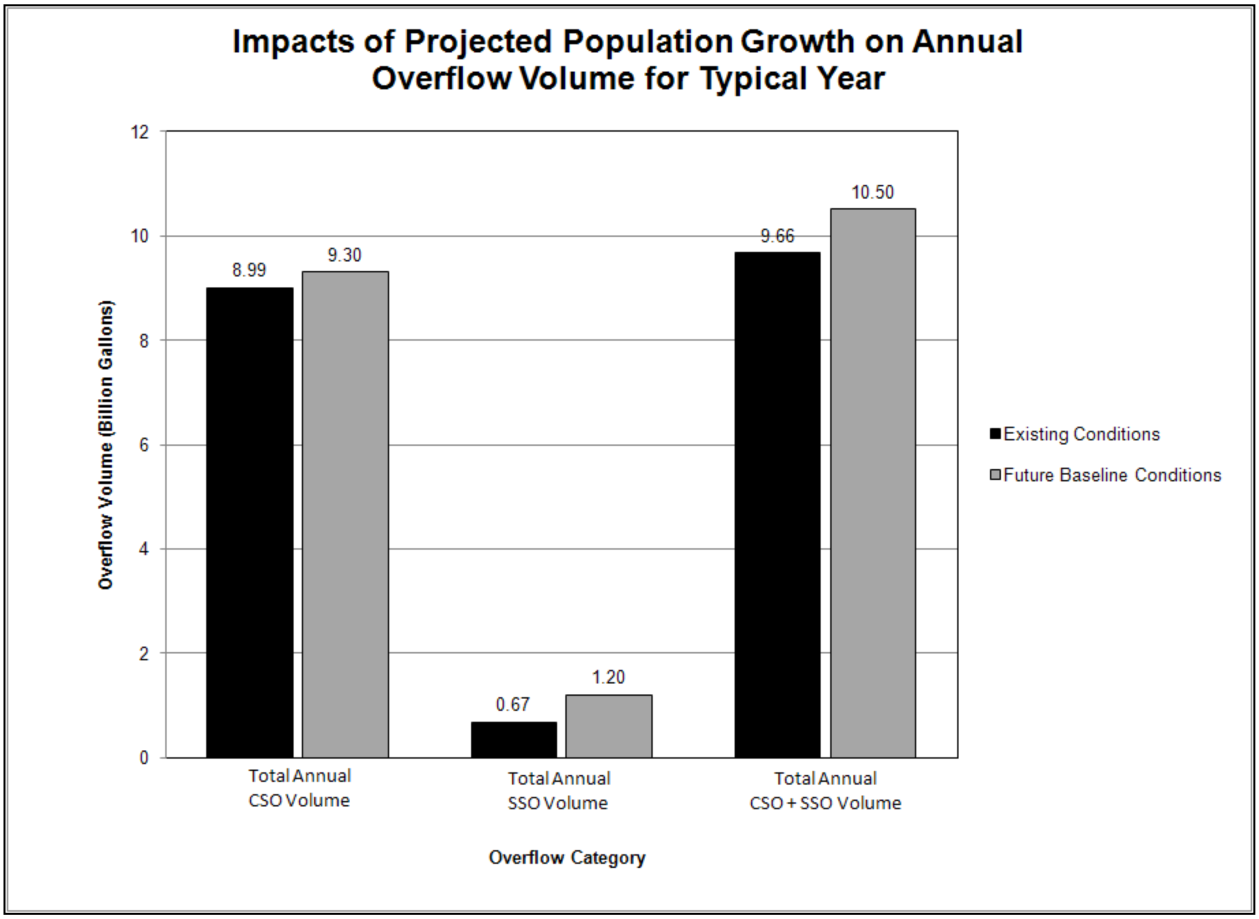
A direct correlation between projected future population growth and calculated future growth in dry weather flow is not to be expected. As was previously demonstrated in Table 7-5, many of the customer municipalities reported that projected population increases would occur only within existing sewershed areas, and that no expansions of their current sewer collection systems were projected. Population increases from fill-in development within existing sewershed areas would only increase the BWWF component of future dry weather flow, whereas population increases within new sewershed areas would increase both the BWWF and

GWI components. The ratio of the BWWF and GWI component to total dry weather flow varies greatly within municipal collection systems. On older combined sewer collection systems that were generally not constructed to be water tight, the magnitude of the GWI component can be very high. In newer separate sewer systems that are designed and constructed to be water tight, the GWI component would tend to be much lower. The varying ratios of GWI flow to BWWF have a strong impact on future projected flow.

The correlation between future increases in dry weather flow and population growth would also be impacted by how projected decreases in population were handled by the basin planning teams. Where population decreases were predicted within the Upper Monongahela and Turtle Creek – Thompson Run planning areas, the basin planners allowed these population decreases to result in a decrease in the base wastewater flow in the H&H model simulations. For the other planning basin areas, the basin planners did not decrease base flow when populations decreased within individual sewersheds, but used a zero-percent growth. Finally some basin planners projected BWWF increases using the same ratio as population growth, while others used gallons-per-capita-per-day values applied to the added population.

Additional H&H model simulations were conducted to predict the impacts of future baseline condition flows on the frequency, duration and volume of typical year CSO and SSO discharges from ALCOSAN and municipal outfalls. The model indicated that system-wide, flow increases from future projected population growth would increase the total annual volume of CSO and SSO discharges by 8 percent to approximately 10.5 billion gallons during a year with average rainfall. Much of the projected future growth is expected to occur within existing and newly constructed separate sewershed areas. The computed increase in the total system-wide volume of SSO discharges would double to approximately 1.2 billion gallons. Future growth within combined sewershed areas would result in a total system-wide increase of 3 percent in the total system-wide annual volume of CSO discharges to approximately 9.3 billion gallons. The increases in total annual CSO and SSO discharge volumes resulting from projected future population growth are depicted in Figure 7-3 below.

Figure 7-3: Impacts of Projected Population Growth on Annual Discharge Volume



7.3 Economic and Demographic Projections

This section documents the potential values that will reflect the economic and demographic environment in which the Wet Weather Plan will be implemented and operated through the planning period (2046). Due to the inherent uncertainty of many key variables such as inflation and income growth, ranges of plausible values are given, along with the best professional judgment as to the appropriate base case value. These values will be used to assess the affordability and financial capability of the recommended control strategy (See Sub-Sections 9.6 and 11.5).

7.3.1 Inflation and Income Growth

Median Household Income: The estimated 2012 median household income (MHI) for the ALCOSAN service area is $46,400. The projected annual income growth rate within the ALCOSAN service area is 2.5%. This reflects the 2009 population weighted annualized growth rate for the eleven largest ALCOSAN service area municipalities from 1989 through 2009 as shown on Table 7-6. The low range value for income growth used in the model is 2%. Using the 2009 American Community Survey 5-year estimate median income data for the eleven municipalities, the 1999 - 2009 growth rate for the service area is estimated to have been 2.06%. The upper range income inflator is 2.7% based on the 1990– 2010 consumer price index (all items) for the Pittsburgh region.

Table 7-6: Basis for Median Household Income Projections

Municipality	Population 2010 Census	1989 Census	1999 Census	2005-2009 American Community Survey 5-Year Estimate	Annualized Growth 1989-2009	Annualized Growth 1999-2009
Bethel Park	32,313	$41,149	$53,791	$59,795	1.89%	1.06%
McCandless	28,457	$46,887	$62,159	$70,480	2.06%	1.26%
Monroeville	28,386	$36,422	$44,653	$58,408	2.39%	2.72%
Mount Lebanon	33,137	$45,801	$60,783	$74,003	2.43%	1.99%
Penn Hills	42,329	$32,376	$39,960	$44,749	1.63%	1.14%
Pittsburgh	305,704	$20,747	$28,588	$35,732	2.76%	2.26%
Plum	27,126	$36,782	$48,386	$64,415	2.84%	2.90%
Ross	31,105	$36,388	$46,542	$56,257	2.20%	1.91%
Shaler	28,757	$36,972	$49,118	$59,533	2.41%	1.94%
Upper St. Clair	19,229	$67,657	$87,581	$109,223	2.42%	2.23%
West Mifflin	20,313	$26,867	$36,130	$43,968	2.49%	1.98%
					2.50%	**2.06%**

Projected annual income levels at the base, low and high growth rates through 2050 are shown on Table 7-7 and Figure 7-4. The base case growth median household income in 2027, the first full year after the 2026 implementation deadline for the WWP is projected to be $67,300.

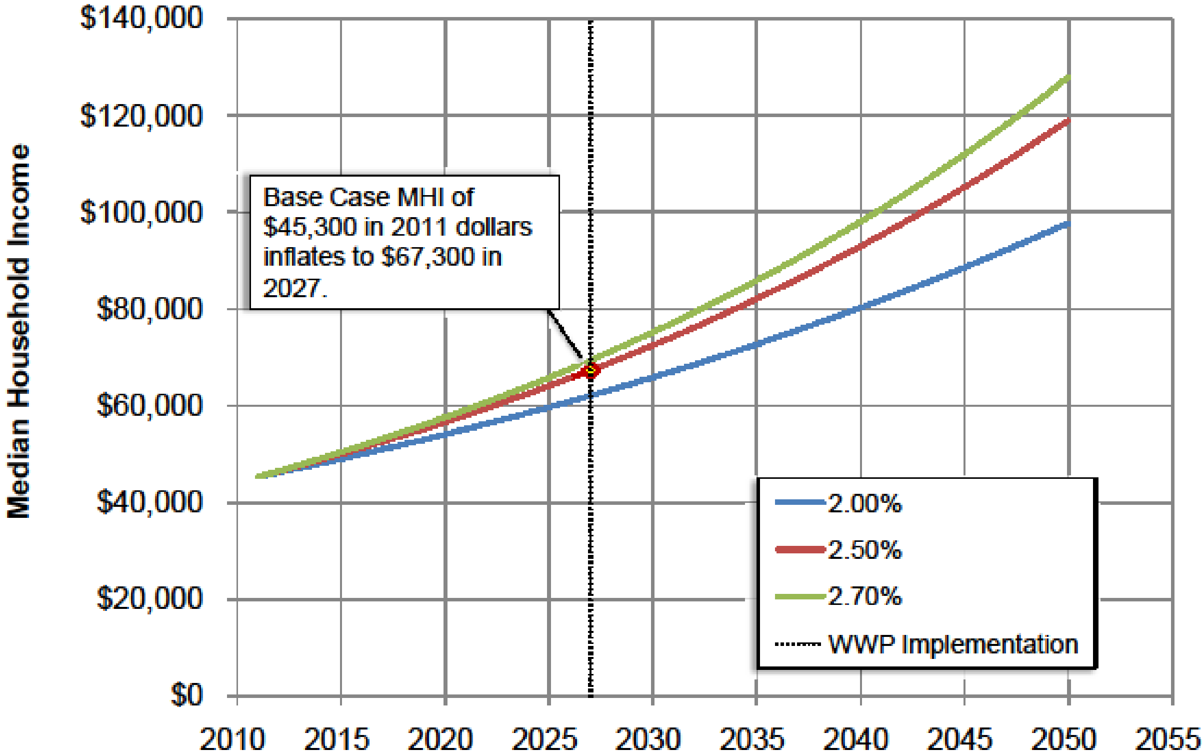
Table 7-7: Projected Service Area Median Household Income

Year	MHI at Various Annual Inflators		
	2.00%	2.50%	2.70%
2012	$46,200	$46,400	$46,500
2013	$47,100	$47,600	$47,800
2014	$48,000	$48,800	$49,100
2015	$49,000	$50,000	$50,400
2016	$50,000	$51,300	$51,800
2017	$51,000	$52,600	$53,200
2018	$52,000	$53,900	$54,600
2019	$53,000	$55,200	$56,100
2020	$54,100	$56,600	$57,600
2021	$55,200	$58,000	$59,200
2022	$56,300	$59,500	$60,800
2023	$57,400	$61,000	$62,400
2024	$58,500	$62,500	$64,100
2025	$59,700	$64,100	$65,800
2026	$60,900	$65,700	$67,600
2027	$62,100	**$67,300**	$69,400
2028	$63,300	$69,000	$71,300
2029	$64,600	$70,700	$73,200
2030	$65,900	$72,500	$75,200
2031	$67,200	$74,300	$77,200
2032	$68,500	$76,200	$79,300
2033	$69,900	$78,100	$81,400
2034	$71,300	$80,100	$83,600
2035	$72,700	$82,100	$85,900
2036	$74,200	$84,200	$88,200
2037	$75,700	$86,300	$90,600
2038	$77,200	$88,500	$93,000
2039	$78,700	$90,700	$95,500
2040	$80,300	$93,000	$98,100
2041	$81,900	$95,300	$100,700

Table 7-7: Projected Service Area Median Household Income

Year	MHI at Various Annual Inflators		
	2.00%	2.50%	2.70%
2042	$83,500	$97,700	$103,400
2043	$85,200	$100,100	$106,200
2044	$86,900	$102,600	$109,100
2045	$88,600	$105,200	$112,000
2046	$90,400	$107,800	$115,000
2047	$92,200	$110,500	$118,100
2048	$94,000	$113,300	$121,300
2049	$95,900	$116,100	$124,600
2050	$97,800	$119,000	$128,000

Figure 7-4: Median Household Income at Various Annual Inflators



Operation and Maintenance Cost Inflation: Future operation and maintenance (O&M) costs are assumed to inflate at an annual rate of 4.0%. This factor was derived from a review of annual ALCOSAN O&M expenses from 1992 through 2009, which resulted in an annualized O&M inflation rate of 3.94%. For sensitivity analysis purposes, an upper inflation rate of 4.5% is used. This upper rate is somewhat conservative, e.g. ALCOSAN's annualized O&M inflation for the period of 1999 through 2009 was 4.67%. This period coincided with the initiation of operation of ALCOSAN's Phase 1 treatment plant upgrades. The lower range of O&M inflation used for sensitivity analysis is 3.4%. This was derived from the Bureau of Labor Statistics Consumer Price Index, All Urban Consumers, Area 11 (Pittsburgh), from 1990 – 2010 using 2009 ALCOSAN cost-center weightings as shown on Table 7-8.

Table 7-8: ALCOSAN Long-Term Operation and Maintenance Cost Growth Projection

Cost Center	2009 Weight	Annual Growth Assumption	Justification
Utilities	18%	4.0%	Pittsburgh Region CPI Growth; "Energy" 1990 - 2010
Chemicals	5%	2.7%	Pittsburgh Region CPI growth; "All Items" 1990 - 2010
Contract Services	11%	3.0%	Pittsburgh Region CPI Growth; "Services Less Medical Care" 1990 – 2010
Wages	39%	2.7%	Pittsburgh Region CPI growth; "All Items" 1990 - 2010
Benefits	22%	4.6%	Pittsburgh Region CPI Growth; "Medical Care" 1990 – 2010
Other	5%	2.7%	Pittsburgh Region CPI growth; "All Items" 1990 - 2010
Cost Growth Projection	**100%**	**3.4%**	**CPI Composite**

The impacts of inflation on O&M costs are shown through 2050 on Table 7-9 and Figure 7-5. A hypothetical $1 million O&M cost in current dollars (2011) would inflate to $1.9 million in 2027.

Capital Cost Inflation: The default capital cost inflator is 3.1% based on the annualized 30 year (1981 – 2010) rate of change in the Engineering News Record's Construction Cost Index for the Pittsburgh region. The 1981 CCI was 3535 and the 2010 (December) CCI was 8802. The CCI lower range capital cost inflator is a 2.58% annual rate, based on the 5 year (2006-2010) rate of change in the CCI. The upper range of capital inflation used in the financial model is 3.67% annual inflator which is based on a five year average annual change for Pittsburgh CCI between 2004 and 2008. Using the 3.1% projected inflation rate, $1 billion in current year capital costs would inflate to approximately $1.6 by 2026.

The implications of capital and O&M cost inflation on the affordability for future wet weather control strategies are addressed in Section 11.1. The cumulative impacts of inflation on $1 billion in current year capital costs through 2050 are shown on Table 7-10 and Figure 7-6.

Table 7-9: Impacts of Operation and Maintenance Cost Inflation

Year	$1 million in O&M Costs Inflated at Annual Rates of:		
	3.4%	4.0%	4.5%
2011	$1.00	$1.00	$1.00
2012	$1.03	$1.04	$1.05
2013	$1.07	$1.08	$1.09
2014	$1.11	$1.12	$1.14
2015	$1.14	$1.17	$1.19
2016	$1.18	$1.22	$1.25
2017	$1.22	$1.27	$1.30
2018	$1.26	$1.32	$1.36
2019	$1.31	$1.37	$1.42
2020	$1.35	$1.42	$1.49
2021	$1.40	$1.48	$1.55
2022	$1.44	$1.54	$1.62
2023	$1.49	$1.60	$1.70
2024	$1.54	$1.67	$1.77
2025	$1.60	$1.73	$1.85
2026	$1.65	$1.80	$1.94
2027	**$1.71**	**$1.87**	**$2.02**
2028	$1.77	$1.95	$2.11
2029	$1.83	$2.03	$2.21
2030	$1.89	$2.11	$2.31
2031	$1.95	$2.19	$2.41
2032	$2.02	$2.28	$2.52
2033	$2.09	$2.37	$2.63
2034	$2.16	$2.46	$2.75
2035	$2.23	$2.56	$2.88
2036	$2.31	$2.67	$3.01
2037	$2.39	$2.77	$3.14
2038	$2.47	$2.88	$3.28
2039	$2.55	$3.00	$3.43
2040	$2.64	$3.12	$3.58
2041	$2.73	$3.24	$3.75
2042	$2.82	$3.37	$3.91
2043	$2.92	$3.51	$4.09
2044	$3.01	$3.65	$4.27
2045	$3.12	$3.79	$4.47
2046	$3.22	$3.95	$4.67
2047	$3.33	$4.10	$4.88
2048	$3.45	$4.27	$5.10
2049	$3.56	$4.44	$5.33
2050	$3.68	$4.62	$5.57

Table 7-10: Impacts of Capital Cost Inflation

Year	$1 Billion in Capital Costs Inflated at Annual Rates of:		
	2.6%	3.1%	3.7%
2011	$1.00	$1.00	$1.00
2012	$1.03	$1.03	$1.04
2013	$1.05	$1.06	$1.08
2014	$1.08	$1.10	$1.12
2015	$1.11	$1.13	$1.16
2016	$1.14	$1.16	$1.20
2017	$1.17	$1.20	$1.24
2018	$1.20	$1.24	$1.29
2019	$1.23	$1.28	$1.34
2020	$1.26	$1.32	$1.39
2021	$1.29	$1.36	$1.44
2022	$1.33	$1.40	$1.49
2023	$1.36	$1.44	$1.55
2024	$1.40	$1.49	$1.60
2025	$1.43	$1.53	$1.66
2026	$1.47	**$1.58**	$1.72
2027	$1.51	$1.63	$1.79
2028	$1.55	$1.68	$1.85
2029	$1.59	$1.73	$1.92
2030	$1.63	$1.79	$1.99
2031	$1.67	$1.84	$2.07
2032	$1.71	$1.90	$2.14
2033	$1.76	$1.96	$2.22
2034	$1.80	$2.02	$2.31
2035	$1.85	$2.08	$2.39
2036	$1.90	$2.15	$2.48
2037	$1.95	$2.21	$2.57
2038	$2.00	$2.28	$2.67
2039	$2.05	$2.35	$2.77
2040	$2.11	$2.42	$2.87
2041	$2.16	$2.50	$2.97
2042	$2.22	$2.58	$3.08
2043	$2.27	$2.66	$3.20
2044	$2.33	$2.74	$3.32
2045	$2.39	$2.82	$3.44
2046	$2.46	$2.91	$3.57
2047	$2.52	$3.00	$3.70
2048	$2.58	$3.09	$3.84
2049	$2.65	$3.19	$3.98
2050	$2.72	$3.29	$4.12

Figure 7-5: Impacts of Operation and Maintenance Cost Inflation

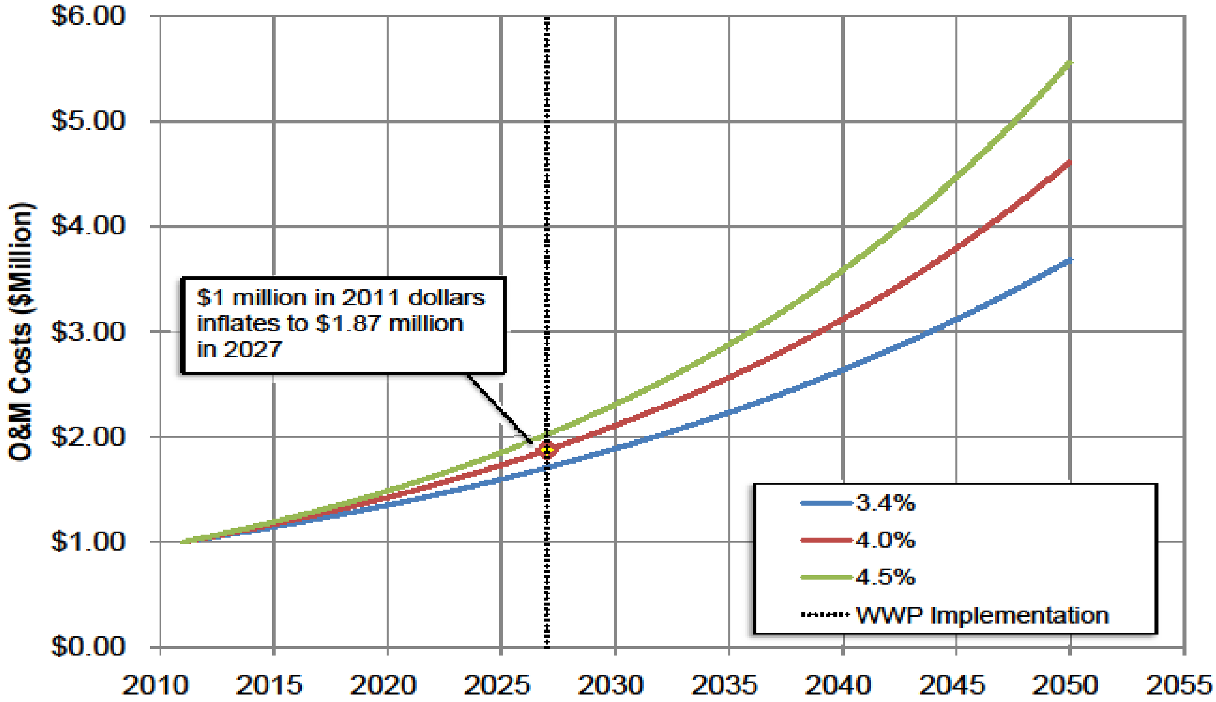
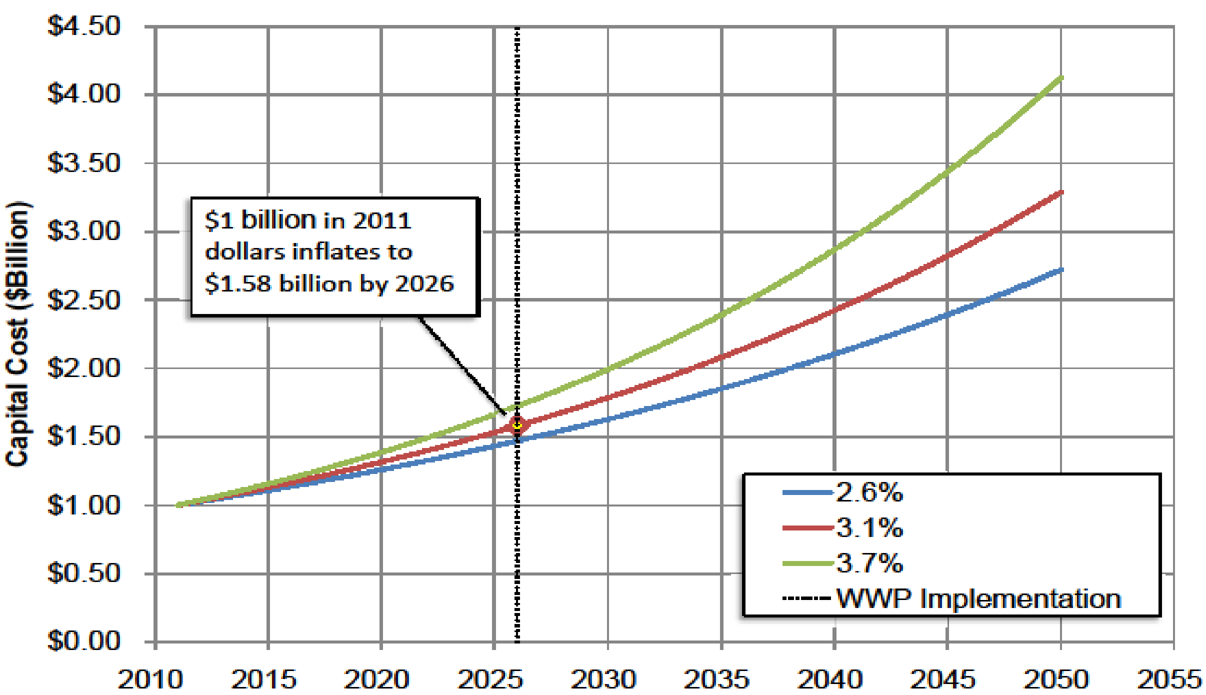


Figure 7-6: Impacts of Capital Cost Inflation



Debt Interest Rates: The average long term debt service interest rate is projected to be 6.0%, reflecting ALCOSAN's experience with recent bond sales. The low and high range interest rates for sensitivity analysis are 4% and 8% respectively. The default bond term used in the model is 30 years. The reasonableness of these interest rates was corroborated through a review of the Bond Buyer 20 Bond General Obligation Index for the period of 1970 through November, 2011. The rolling average interest rate for the period of 1970 through 2011 was approximately 6.2%. The standard deviation of interest rates for this period was 1.8%, therefore the mean plus one standard deviation interest rate would be 8%.

7.3.2 Current System Wastewater Costs

As documented in Sub-Section 6.2.3, the current (2012) typical cost per household for wastewater services within the ALCOSAN service area is approximately $4445. Based on the 2011 service area median household income of $46,400 the current Residential Indicator is approximately 1%. <u>Without</u> the implementation of the Wet Weather Plan and related upgrades to the municipal collection systems the typical cost per household is projected to inflate to $730 annually in 2027. Using the projected ALCOSAN service area-wide median household income of $67,300 the current system Residential Indicator would be approximately 1.08%.

7.3.3 Projected Billed Water Consumption and Customer Base

ALCOSAN's rate structure consists of a fixed quarterly service fee which is charged to all user accounts (regardless of user class) and a uniform commodity charge that is levied per thousand gallon units of billed water consumption. For purposes of evaluating the affordability and financial capability of the recommended wet weather controls (Section 11.1), no net growth in the number of user accounts or billed water consumption are assumed in the base case analysis. Engineering projections of required hydraulic capacities are logically and conservatively based on potential growth, however from a financial perspective, it is logical to base conservative projections excluding potential growth. This approach is reinforced by an analysis of twenty-year trends in the number of ALCOSAN accounts and the billed water consumption by ALCOSAN's users.

The number of accounts and annual billed water consumption for the period of 1992 through 2011 are shown on Table 7-11. Total accounts have increased over the past 20 years by approximately 5% from around 298,200 in 1992 to 314,100 in 2011. Total accounts peaked in 2002 at 319,100 and have been decreasing annually since. Annual billed water consumption during the 1990s averaged around 32 million (thousand gallon) units. Billed consumption has decreased annually since 2000 from a peak of around 34.5 million units to 23.6 million in 2011, for an overall decrease of 26%.

The average water consumption per retail account has decreased despite the slight increase in total accounts between 1992 and 2011. The average monthly water consumption for all user classes (residential and non-residential) dropped by about 29% from 8,900 gallons to 6,300 gallons.

Table 7-11: ALCOSAN Premises and Billed Flow, 1992 through 2011

Year	Premises (all user classes)			Billed Water Consumption (1,000 gallon units)			Average Gallons / Month per Premise	
	Number	Annual Change	Cumulative Change	Number	Annual Change	Cumulative Change	Quantity	Cumulative Change
1992	298,180		0.0%	31,730,000		0.0%	8,900	0.0%
1993	298,761	0.2%	0.2%	32,860,000	3.5%	3.5%	9,200	3.4%
1994	299,258	0.2%	0.4%	33,010,000	0.5%	4.0%	9,200	3.4%
1995	299,658	0.1%	0.5%	32,040,000	-2.9%	1.0%	8,900	0.0%
1996	299,586	0.0%	0.5%	30,800,000	-3.9%	-3.0%	8,600	-3.4%
1997	313,104	4.5%	5.0%	31,190,000	1.3%	-1.7%	8,300	-6.7%
1998	281,583	-10.1%	-5.6%	28,220,000	-9.5%	-11.1%	8,400	-5.6%
1999	308,004	9.4%	3.3%	34,780,000	23.2%	9.6%	9,400	5.6%
2000	317,855	3.2%	6.6%	34,480,000	-0.9%	8.7%	9,000	1.1%
2001	318,097	0.1%	6.7%	29,640,000	-14.0%	-6.6%	7,800	-12.4%
2002	319,095	0.3%	7.0%	30,760,000	3.8%	-3.1%	8,000	-10.1%
2003	317,742	-0.4%	6.6%	28,340,000	-7.9%	-10.7%	7,400	-16.9%
2004	317,212	-0.2%	6.4%	27,180,000	-4.1%	-14.4%	7,100	-20.2%
2005	316,731	-0.2%	6.2%	26,790,000	-1.4%	-15.6%	7,000	-21.3%
2006	316,324	-0.1%	6.1%	25,590,000	-4.5%	-19.4%	6,700	-24.7%
2007	317,095	0.2%	6.3%	25,670,000	0.3%	-19.1%	6,700	-24.7%
2008	316,745	-0.1%	6.2%	24,540,000	-4.4%	-22.7%	6,500	-27.0%
2009	314,865	-0.6%	5.6%	23,710,000	-3.4%	-25.3%	6,300	-29.2%
2010	314,088	-0.2%	5.3%	23,660,000	-0.2%	-25.4%	6,300	-29.2%
2011	314,088	0.0%	5.3%	23,610,000	-0.2%	-25.6%	6,300	-29.2%

7.3.4 ALCOSAN Rate Base Composition

ALCOSAN's rate base is dominated by the residential user class which includes single family residences, multi-family residences, apartments and condominiums. This residential class dominance is reflected both in the number of accounts and in the allocation of billable wastewater flows which are based upon billed water consumption. An overview of user accounts and billed flow for the period of 1994 through 2009 is presented on Table 7-12. The residential user class has historically comprised approximately 96% of all users.

In 2009, the residential class generated 73% of billable flow. The residential share of billable flow has been increasing over the past decades, e.g. up from 69% in 1994. This increase in the residential share of billable flow is attributable at least in part to the steady decline in flows from the industrial class, which at 455,000 (thousand gallon billing units) were less than one-quarter of the industrial flow in 1994. The commercial user class' respective percentage contribution to billable flow has remained relatively stable at 15% to 18% of billed flow. The public user class' relative proportion of billable flow has been increasing gradually to approximately 9% of total billable flow.

ALCOSAN anticipates the trends in the user class distribution will continue into the future, resulting in the bulk of future revenue requirements being allocated to residential users.

Table 7-12: User Class Accounts and Billed Flow, 1994 through 2009

Year	Dwelling Type	Number of Premises	Billed Consumption*	% Premises	% Consumption
1994	Residential	Not Available	22,835,429	Not Available	69.2%
	Commercial	Not Available	5,732,545	Not Available	17.4%
	Industrial	Not Available	1,884,726	Not Available	5.7%
	Public	Not Available	2,548,016	Not Available	7.7%
	Subtotal Non Residential	Not Available	10,165,286	Not Available	30.8%
	Annual Total	**299,258**	**33,000,715**		**100.0%**
1999	Residential	294,513	25,660,382	95.6%	73.8%
	Commercial	10,253	5,230,344	3.3%	15.0%
	Industrial	695	1,105,272	0.2%	3.2%
	Public	2,543	2,784,001	0.8%	8.0%
	Subtotal Non Residential	13,491	9,119,618	4.4%	26.2%
	Annual Total	**308,004**	**34,780,000**	**100.0%**	**100.0%**
2009	Residential	301,411	17,253,841	95.7%	72.8%
	Commercial	10,224	3,830,097	3.2%	16.2%
	Industrial	638	455,314	0.2%	1.9%
	Public	2,592	2,170,748	0.8%	9.2%
	Subtotal Non Residential	13,454	6,456,159	4.3%	27.2%
	Annual Total	**314,865**	**23,710,000**	**100.0%**	**100.0%**

* 1,000 gallon billing units