

Document 029

Feasibility Study Working Group

**Subcommittee on the
ALCOSAN Draft Wet Weather Plan**

**Summary of Information
from the ALCOSAN Draft Wet Weather Plan
for the
Customer Municipalities and Authorities**

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1.0 Introduction

This document provides a summary of information presented in the ALCOSAN Draft Wet Weather Plan (DWWP) that is pertinent to individual municipalities and is to be used as a starting point for municipal representatives to understand, digest, and identify impacts on the municipalities. The DWWP was released to the public on July 31, 2012. Communities wishing to comment on this draft plan must submit comments to ALCOSAN by October 19, 2012.

1.1 Purpose and Objectives of Plan

As stated in the DWWP, ALCOSAN entered into a Consent Decree (CD) on January 23, 2008 which requires ALCOSAN to prepare and submit a Final Wet Weather Plan (WWP) to regulatory agencies by January 30, 2013 (**page 1-1 of the DWWP**). The DWWP presents the process ALCOSAN used to develop and evaluate alternatives and recommends one plan for implementation. The ultimate purpose of the DWWP is to recommend a plan for infrastructure improvements to meet the requirements of the CD. The objectives of the DWWP are to meet CD requirements that are determined by the Clean Water Act (CWA) and Combined Sewer Overflow Control Policy (CSO Policy) and include: 1) elimination of sanitary sewer overflows (SSOs); and 2) control of combined sewer overflows (CSOs). Other key objectives include: 1) identification of wastewater infrastructure needs through 2046; 2) completion of construction and commencement of operation of all necessary improvements by September 30, 2026; 3) improvement of water quality in the rivers and streams; and 4) protection of designated waterway uses such as recreation, aquatic life, and drinking water supplies. (**See Section 1.1 of the DWWP.**)

1.2 Purpose of Summary

This summary has been prepared through a subcommittee of the 3RWW Feasibility Study Working Group (FSWG). In initial meetings, the subcommittee identified a number of issues and questions about the DWWP that would be of particular interest to the customer municipalities. This summary was prepared as a reference guide for the ALCOSAN customer municipalities, to facilitate their timely understanding of the portions of the DWWP having an impact on them. The FSWG Subcommittee decided that this summary document should not draw conclusions, offer opinions, or make comment on the DWWP; any text that appears to do so is a statement or conclusion from the DWWP.

Included in this document is a summary of the system-wide alternatives that were evaluated by ALCOSAN, and discussions of schedule, financial evaluation, water quality, and facilities to be constructed. Also included in this summary is an appendix (Appendix A) which provides municipality-specific information about the existing and proposed conditions presented in the DWWP.

Specific references to pages, figures and tables of the DWWP have been provided throughout this summary in bold text as direction to the more detailed information in the applicable sections of the DWWP. Quotes indicate text directly from the DWWP.

2.0 DWWP Alternatives Evaluated

The DWWP presents several alternatives. **Section 9.6 of the DWWP** presents the “Selected Plan.” As noted in the DWWP, the Selected Plan was “shown to cost effectively achieve the ultimate goals of the elimination of SSOs and reduction of CSOs such that the attainment of water quality standards would not be precluded by remaining CSOs” (**page 9-1 of the Executive Summary of Section 9 in the DWWP**). This plan would cost \$3.6 billion in 2010 dollars. ALCOSAN determined that this alternative would be cost prohibitive under the 2026 deadline. ALCOSAN “concluded that such an aggressive implementation schedule would likely overburden the contractor, labor and material resources available to do the work reliably and cost effectively, introducing unacceptable risk of cost inefficiencies and quality control concerns.” Therefore, ALCOSAN developed three Affordable Alternatives that would each provide some of the same benefits as the Selected Plan for a lower initial cost and each be a sub-set of the Selected Plan that would “serve as initial phase of improvements towards the longer term plan” (**page 9-411 of Section 9.7 in the DWWP**). ALCOSAN developed these Affordable Alternatives such that the residential indicator (RI) would not go above 2% of the median household income (MHI) which is the threshold for being considered a high burden. With this cap, ALCOSAN determined that \$2 billion (in 2010 dollars) in capital costs should be the target cost of the Affordable Alternatives (**page 9-411 of Section 9.7 in the DWWP**). ALCOSAN foresees that the remainder of the Selected Plan components that are not constructed as part of the implemented plan would be constructed as subsequent improvements after 2026 to lead to full implementation of the Selected Plan. It should be noted that the CSO Policy allows for a phased approach if there are adverse impacts to water quality or financial capability if the complete plan is implemented. **Section 9.7 of the DWWP** presents Affordable Alternatives which are lower in cost and achieve different performance goals than the Selected Plan and identifies which of these alternatives is recommended for implementation. These Affordable Alternatives include the “SSO Control Priority” alternative, the “Water Quality Priority” alternative, and the “Balanced Priorities” alternative. These are described in more detail in the following sections and compared in Table 1 of this summary.

Table 1 also shows the alternatives that were presented at the Basin Planning Committee (BPC) Meeting #12. These alternatives are included because the FSWG Subcommittee noted that some alternatives presented at BPC Meeting #12 have names that are different than those presented in the DWWP and was concerned this would be confusing and that the differences could be of interest to the municipalities. Table 1 clarifies what alternatives are comparable between the BPC Meeting #12 presentations and the DWWP and highlights any changes that may have been made to the alternatives between the time of BPC

Meeting #12 and the release of the DWWP on July 31, 2012. Any substantive differences have been indicated on the table with bold underlined text. Other apparent differences on the table between the comparable alternatives are apparently a result of different wording or more or less detail presented in the sources of information.

The alternatives that were evaluated and the selection criteria are described in the following sections. “As prescribed by the National CSO Policy, a range of CSO levels of control were evaluated, including alternatives targeting the Presumption and Demonstration Approach criteria. The “presumption approach” presumes that achievement of certain performance criteria (i.e., 4-6 untreated overflow events per year or 85 percent capture of the combined sewage generated during rainfall events) would provide an adequate level of control to not preclude attainment with water quality standards. Whereas, a “demonstration approach” entails developing and implementing a control plan that demonstrates it will not preclude attainment with water quality standards. A range of SSO control levels were also considered, including the 2-year and 10-year level of control as indicated in ALCOSAN’s Consent Decree. A series of system-wide alternatives analyses were conducted that supported the decision making as to how ALCOSAN proposes to eliminate SSOs from the ALCOSAN system and to control CSOs in compliance with the Clean Water Act (CWA), consistent with the National CSO Policy. ALCOSAN determined that the most cost-effective means of complying with the Consent Decree and CSO Policy requirements is via the Demonstration Approach and selected a control strategy (System-Wide Alternative 3f modified-10pct) to cost-effectively achieve WWP goals to eliminate SSOs and control CSOs such that attainment with water quality standards is not precluded by remaining discharges.” (page ES-10 of the Executive Summary of the DWWP.)

2.1 Selected Plan

The Selected Plan is equivalent to what was presented at BPC Meeting #12 as the “Preliminary Control Strategy.” This alternative is designated as “System-Wide Alternative 3f-modified-10pct.” Details of this plan are presented in **Section 9.6.1 of the DWWP**. This plan was the highest ranked alternative that was evaluated based on economic and non-economic criteria and found to be the most cost effective system-wide alternative that achieves complete compliance with the CD and CSO Policy (**page 9-357 in Section 9.6 of the DWWP**). The overall plan view of this alternative is shown on **Figure 9-112 in Section 9.6 of the DWWP**.

This alternative includes expansion of the treatment capacity of the Woods Run wastewater treatment plant (WWTP), new regional CSO storage/conveyance tunnels that parallel the existing deep tunnel interceptors, a pump station, and remote CSO and SSO storage tanks. The Woods Run WWTP improvements include expansion of primary treatment capacity to 600 million gallons per day (MGD) and adding 295 MGD of secondary treatment capacity. In addition, a 120 MGD tunnel dewatering pump

station would be constructed at the WWTP. The regional storage/conveyance tunnel would include the construction of a 12 to 14-foot diameter tunnel system totaling 20.8 miles along the Ohio, Allegheny, and Monongahela Rivers, and a small segment along Chartiers Creek. This tunnel system would also include 21 drop shafts whose locations are shown on **Figure 9-112 in Section 9.6 of the DWWP**. In addition to this regional tunnel, a 5.8 mile 12-foot diameter tunnel with nine drop shafts and a 0.2 MG pump station would be constructed along Saw Mill Run, and a 2.7 mile 17-foot diameter planning basin SSO storage tunnel with seven drop shafts and a 12.2 MGD pump station would be constructed along the Ohio River downstream of the WWTP. Relief interceptors would be constructed along Chartiers Creek, Saw Mill Run, and in the Upper Allegheny planning basin. Consolidation sewers would convey flow from overflows to the nearest tunnel connection points from regulators in the Lower Northern Allegheny sub-basin (Lower Ohio/Girty's Run planning basin), Main Rivers, Turtle Creek, Upper Allegheny, and Upper Monongahela planning basins. Three CSO storage tanks and one SSO storage tank would be constructed in the Turtle Creek planning basin. One SSO storage tank would be constructed in the Upper Allegheny planning basin. One CSO storage tank would be constructed in the Chartiers Creek planning basin.

The Selected Plan also includes the municipal improvements as part of the plan that are listed in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP**. ALCOSAN assumes that the preferred and assumed municipal improvements identified in the DWWP would be constructed by the municipalities. The complete list of preferred and assumed municipal improvement projects that are included in the Selected Plan is presented in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP** (one table per planning basin). These tables list the municipal flow control strategies (by municipality), ALCOSAN Point of Connection (POC) to which the municipal flow is tributary to, and identify the projects as either an SSO or CSO project. These tables also indicate if the flow control strategies were "assumed" or "preferred." ALCOSAN has designated municipal flow control strategies as "preferred" if the municipality clearly identified them as the preferred method of flow management (**page 9-80 in Section 9.3 of the DWWP**). ALCOSAN designated projects as "assumed" if "information from a particular municipality was still incomplete, was judged to be unreliable, or a preferred control strategy could not be clearly identified. In these cases, the basin planner assumed a control strategy (including the proposed technologies and facility locations and sizes), assumed a level of control and the associated costs, and/or identified areas within the existing municipal sewer system that had adequate hydraulic capacity to convey peak wet weather flow to the ALCOSAN system and where no capital improvements or control facility were required." (**See page 9-80 in Section 9.3 of the DWWP**.)

More details and the cost of each component of the Selected Plan are presented in **Table 9-78 in Section 9.6 of the DWWP**. The total capital cost for the Selected Plan is \$3.6 billion. It should be noted that some municipalities identified green infrastructure projects that they may consider in the future (**Table 9-35 in Section 9.3 of the DWWP**). These alternatives are not included as part of the Selected Plan.

Under the Selected Plan alternative, the larger ALCOSAN CSOs served by the new regional tunnel are controlled to six or less annual overflow events for all CSOs controlled by the tunnel. Each grouping of CSOs controlled by a single storage tank would be controlled to six or less unique annual overflow events. All fifteen ALCOSAN CSOs discharging to sensitive areas would be controlled to zero overflows per year or re-located downstream of the sensitive area, with the exception of one event in Allegheny River Area No. 1. The frequency and overflow volume of the remaining CSOs served only by the existing tunnel would vary by outfall and will depend on the existing drop shaft capacity and the nature of the regulator modifications. The alternative eliminates ALCOSAN SSOs up to a 2-year design storm. The municipal levels of CSO and SSO control vary by municipality, but reflect the incorporation of the latest municipal planning information included in the DWWP. (See page 9-358 in Section 9.6 of the DWWP.)

2.2 SSO Control Priority Alternative

Both the BPC Meeting #12 presentations and the DWWP refer to the “SSO Control Priority” alternative. This alternative is designated as “System-Wide Alternative 3f-modified-SSO.” Details of this plan are presented in **Section 9.7.1 of the DWWP**. The overall plan view of this alternative is shown on **Figure 9-142 in Section 9.7 of the DWWP**.

The main focus of this alternative is SSO control and includes expansion of the Woods Run WWTP, construction of relief interceptors, and planning basin level storage and treatment facilities. A regional storage/conveyance tunnel is not included as part of this alternative.

The Woods Run WWTP improvements would include expansion of primary treatment capacity to 480 MGD and adding 295 MGD of secondary treatment capacity. A 2.7 mile 17-foot diameter planning basin SSO storage tunnel with seven drop shafts and a 12.2 MGD pump station would be constructed along the Ohio River downstream of the WWTP. Relief interceptors would be constructed along Chartiers Creek and Saw Mill Run. Consolidation sewers would convey overflows from regulators to a location downstream of sensitive areas or to treatment/storage facilities in the Lower Northern Allegheny sub-basin, Main Rivers, Turtle Creek, and Upper Monongahela planning basins. Conveyance improvements would be made in the Upper Allegheny planning basin and one regulator would be modified in the Chartiers Creek planning basin. An outfall would be relocated downstream of a sensitive area in the Upper Monongahela planning basin. An interim retention treatment basin (RTB) would be constructed adjacent to Chartiers Creek, and two RTBs would be constructed in the Upper Monongahela planning basin. Three CSO storage tanks and one SSO storage tank would be constructed in the Turtle Creek planning basin. One SSO storage tank would be constructed in the Upper Allegheny planning basin.

The SSO Control Priority alternative also includes the municipal improvements as part of the plan. The complete list of preferred and assumed municipal improvement projects that are included in the SSO Control Priority alternative is identical to that of the Selected Plan and is presented in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP**.

More details and the cost of each component of the SSO Control Priority alternative are presented in **Table 9-87 in Section 9.7 of the DWWP**. The total capital cost for the SSO Control Priority alternative is \$2 billion. As with the Selected Plan, green infrastructure projects that municipalities may be considering for the future are not included in the SSO Control Priority alternative (**Table 9-35 in Section 9.3 of the DWWP**). It should be noted that the SSO Control Priority alternative presented in the BPC Meeting #12 includes an SSO storage tank along Chartiers Creek instead of an RTB.

“This alternative places priority on eliminating all SSOs in the ALCOSAN system. The alternative also includes some CSO control projects which can be implemented without a regional conveyance tunnel.” (**See page 9-412 in Section 9.7 of the DWWP**.) CSOs controlled by CSO RTBs and CSO storage tanks would be controlled to six or less unique annual overflow events. All fifteen ALCOSAN CSOs discharging to sensitive areas would be controlled to zero overflows per year (except for Allegheny River Area No. 1 which would have one overflow per year) or re-located downstream of the sensitive area. The frequency and overflow volume of the remaining CSOs served only by the existing tunnel would depend on the existing drop shaft capacity and any regulator modifications to be done. The alternative eliminates ALCOSAN SSOs up to a 2-year design storm via the SSO capture tunnel in the Lower Ohio sub-basin (Lower Ohio/Girty’s Run planning basin), relief interceptors in the Chartiers Creek and Saw Mill Run planning basins, and SSO storage and conveyance facilities in the Upper Allegheny and Turtle Creek planning basins. This alternative would achieve only a portion of the performance and overall water quality objectives that are achieved by the Selected Plan. In addition, the overflow statistics for some individual CSOs would not be the same as expected for the same outfalls under the Selected Plan (**page 9-411 in Section 9.7 of the DWWP**). “Placing the priority on SSO control limits the ability to significantly reduce CSO discharges, and provides limited water quality benefit within the areas where the greatest recreational use has been observed. These limitations led to the development of a second affordable alternative which targeted water quality improvements along the main rivers.” (**See page 9-412 in Section 9.7 of the DWWP**.)

2.3 Water Quality Priority Alternative

Both the BPC Meeting #12 presentations and the DWWP refer to the “Water Quality Priority” alternative. This alternative is designated as “System-Wide Alternative 3f-modified-WQ.” There is no apparent difference between the plans that were presented at BPC Meeting #12 and in the DWWP. Details of this

plan are presented in **Section 9.7.2 of the DWWP**. The overall plan view of this alternative is shown on **Figure 9-143 in Section 9.7 of the DWWP**.

The main focus of this alternative is to prioritize controls that would most significantly increase the number of days that water quality standards are met in the areas with the greatest recreational use (**page 9-415 in Section 9.7 of the DWWP**). This alternative includes expansion of the treatment capacity of the Woods Run WWTP, a new regional CSO storage/conveyance tunnel that parallels the existing deep tunnel interceptor, a pump station, a remote SSO storage tank, and a CSO RTB facility.

The Woods Run WWTP improvements would include expansion of primary treatment capacity to 600 MGD and adding 295 MGD of secondary treatment capacity. A 120 MGD tunnel dewatering pump station would be constructed at the WWTP. The regional storage/conveyance tunnel would include construction of a 12 to 14-foot diameter tunnel system totaling 14.3 miles along the Ohio, Allegheny, and Monongahela Rivers. This tunnel system would also include 14 drop shafts. A relief sewer would be constructed in the Upper Allegheny planning basin. Consolidation sewers would convey flow from overflows to the nearest tunnel connection points from some of the regulators in the Lower Northern Allegheny sub-basin, Main Rivers, and Upper Allegheny planning basins. One SSO storage tank would be constructed in the Upper Allegheny planning basin. One outfall would be relocated downstream of a sensitive area, and one RTB facility would be constructed in the Upper Monongahela planning basin.

The Water Quality Priority alternative also includes the municipal improvements as part of the plan. The complete list of preferred and assumed municipal improvement projects that are included in the Water Quality Priority alternative is identical to that of the Selected Plan and is presented in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP**.

More details and the cost of each component of the Water Quality Priority alternative are presented in **Table 9-88 in Section 9.7 of the DWWP**. The total capital cost for the Water Quality Priority alternative is \$2 billion. As with the Selected Plan, green infrastructure projects that may be considered in the future by municipalities are not included in the Water Quality Priority alternative (**Table 9-35 in Section 9.3 of the DWWP**).

“The Water Quality Priority Alternative gives highest priority to controls which will most significantly increase the number of days meeting water quality standards within the areas of highest recreational use.” (See **page 9-415 of Section 9.7 of the DWWP**.) CSOs controlled by the Upper Monongahela CSO RTB would be controlled to six or less unique annual overflow events for all CSOs. CSOs controlled by the

regional CSO storage tunnel would be controlled to six or less unique annual overflow events. All fifteen ALCOSAN CSOs discharging to sensitive areas would be controlled to zero overflows per year (except for Allegheny River Area No. 1 which would have one overflow per year) or re-located downstream of the sensitive area. The frequency and overflow volume of the remaining CSOs served only by the existing tunnel would depend on the existing drop shaft capacity and any regulator modifications to be done. ALCOSAN SSOs controlled by this alternative (see the Upper Allegheny planning basin) would be eliminated for up to a 2-year design storm. This alternative would achieve only a portion of the performance and overall water quality objectives that are achieved by the Selected Plan. In addition, the overflow statistics for some individual CSOs would not be the same as expected for the same outfalls under the Selected Plan (**page 9-411 in Section 9.7 of the DWWP**).

2.4 Balanced Priorities Plan

Both the BPC Meeting #12 presentations and the DWWP refer to the “Balanced Priorities” alternative. This alternative is designated as “System-Wide Alternative 3f-modified-BAL.” There is no difference between the plans that were presented at BPC Meeting #12 and in the DWWP. Details of this plan are presented in **Section 9.7.3 of the DWWP**. The overall plan view of this alternative is shown on **Figure 9-145 in Section 9.7 of the DWWP**.

This alternative was developed to strike a balance between meeting the water quality goals and SSO goals of both the CD and CSO Policy. Given that the capital costs were capped at \$2 billion in the development of the Affordable Alternatives, a choice between SSO elimination and CSO control (for water quality) has to be made, putting these goals in competition with each other. The Balanced Priorities alternative includes particular SSO components and CSO components of the Selected Plan to give the most benefit practicable. Specifically, the regional tunnel would control the largest outfalls along the rivers but would not control as many as in the Water Quality Priority alternative. The Balanced Priorities alternative “accomplishes elimination of all SSO discharges to Chartiers Creek, up to a 2 year level of control.” (**page 10-72 in Section 10.9 of the DWWP**.) This alternative focuses on the Chartiers Creek SSOs for two reasons: 1) the future baseline conditions show that the largest volume of SSOs would occur in the Chartiers Creek planning basin; and 2) ALCOSAN and eleven Chartiers Creek municipalities are under an additional requirement besides the USEPA CSO/SSO mandate. ALCOSAN, eleven of the Chartiers Creek municipalities, and the Pennsylvania Environmental Defense Fund (PEDF) are bound by a 2007 Federal Consent Decree which requires SSOs entering Chartiers Creek be eliminated by 2019 (**page 9-421 in Section 9.7 of the DWWP**).

This alternative includes expansion of the treatment capacity of the Woods Run WWTP, a new regional CSO storage/conveyance tunnel that parallels the existing deep tunnel interceptor, a pump station, and a CSO RTB facility.

The Woods Run WWTP improvements would include expansion of primary treatment capacity to 480 MGD and adding 295 MGD of secondary treatment capacity. In addition, a 120 MGD tunnel dewatering pump station would be constructed at the WWTP. The regional storage/conveyance tunnel would include construction of a 12 to 14-foot diameter tunnel system totaling 10 miles along the Ohio (from O-29 to the WWTP proposed tunnel dewatering pump station), Allegheny (from A-23 on the southern riverbank to O-29 [going to the other side of the river between A-19 and A-60]), and Monongahela Rivers (from M-20 to O-29 [going to the other side of the river between M-29 and M-26 and again between M-11 and M-05]). This tunnel system would include 11 drop shafts. The proposed tunnel would have a volume of up to 62 million gallons (MG) and vary in depth from 35 to 55 feet deeper than the existing deep tunnel interceptor, with a constant 0.1% slope and a downstream invert elevation of about 565 feet. Along the tunnel, wet weather overflows from certain groupings of CSO outfalls (consolidated flow groups) would be collected and conveyed to the regional tunnel via consolidation sewers. These “consolidated flow groups” and associated conveyance sewers are shown on **Figure 10-4 in Section 10.4 of the DWWP**. The Recommended Plan tunnel system would be constructed such that the remaining portion of the tunnel of the Selected Plan (to be constructed after 2026) would be an extension to the system and would add another 11 miles of tunnel and additional volume of up to 66 MG (**page 10-19 of Section 10.4 of the DWWP**). A relief interceptor would be constructed along Chartiers Creek. Consolidation sewers would convey flow from overflows to the nearest tunnel connection points from regulators in the Lower Northern Allegheny sub-basin and Main Rivers planning basin. One outfall would be relocated downstream of a sensitive area in the Upper Monongahela planning basin. One interim RTB facility would be constructed along Chartiers Creek and one regulator would be modified in the Chartiers Creek planning basin.

The Balanced Priorities alternative also includes the municipal improvements as part of the plan. The complete list of preferred and assumed municipal improvement projects that are included in the Balanced Priorities alternative is identical to that of the Selected Plan and is presented in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP**.

More details and the cost of each component of the Balanced Priorities alternative are presented in **Table 9-89 in Section 9.7 of the DWWP**. The total capital cost for the Balanced Priorities alternative is \$2 billion. As with the Selected Plan, green infrastructure projects that municipalities may be considering in the future are not included in the Balanced Priorities alternative (**Table 9-35 in Section 9.3 of the DWWP**).

“The Balanced Priorities alternative controls all ALCOSAN SSOs within the Chartiers Creek planning basin to a 2-year level of control, and controls ALCOSAN CSOs upstream of POC C-23 in order to

achieve the goal of not precluding the attainment of water quality standards.” (See **page 10-50 in Section 10.8 of the DWWP**.) CSOs controlled by the Chartiers Creek CSO RTB would be captured to meet water quality standards (**Table 10-13 in Section 10.8 of the DWWP**). All fifteen ALCOSAN CSOs discharging to sensitive areas would be controlled to zero overflows per year (except for Allegheny River Area No. 1 which would have one overflow per year) or re-located downstream of the sensitive area. All CSOs controlled by the regional CSO storage tunnel would be controlled to six or less unique annual overflow events. The frequency and overflow volume of the remaining CSOs served only by the existing tunnel would depend on the existing drop shaft capacity and any regulator modifications to be done. The ALCOSAN SSOs upstream of the Chartiers Creek CSO RTB would be controlled up to a 2-year design storm with a relief interceptor. This alternative would achieve only a portion of the performance and overall water quality objectives that are achieved by the Selected Plan. In addition, the overflow statistics for some individual CSOs would not be the same as expected for the same outfalls under the Selected Plan (**page 9-411 in Section 9.7 of the DWWP**).

2.5 Recommended Plan

The Balanced Priorities Plan was selected as the Recommended Plan. The basis for selection of this alternative as the Recommended Plan is that it provides for a greater percentage of SSO elimination than the Water Quality Priority alternative, and greater CSO control than the SSO Control Priority alternative. “The Balanced Priority Alternative falls in between for both performance measures with the principal trade off being priority to the sanitary sewer overflows that occur in the upper reaches of the Chartiers Creek planning basin. ...Approximately 27% of the current SSO volume is attributable to the Chartiers Creek planning basin. By coupling Chartiers Creek SSO control with the SSO control measures to be implemented by ALCOSAN’s customer municipalities and the hydraulic benefits realized by the treatment plant expansion and regional tunnel, the Balanced Priority Alternative will eliminate approximately 90% of the system-wide sanitary sewer overflow volume. Rather than focusing on the elimination of the last 10% of the SSO discharge volume realized by the SSO Alternative, the Balanced Alternative invests more in CSO controls that can achieve a larger total discharge volume reduction system-wide.” (**pages 9-441 and 9-442 in Section 9.7 of the DWWP**.) The Recommended Plan would result in the elimination of approximately 90% of the system-wide SSO volume (**page 9-442 in Section 9.7 of the DWWP**) and 800 million gallons of CSO capture. The Recommended Plan results in a larger reduction of volume (for the sum of CSO and SSO volumes) than either of the Water Quality or SSO Control alternatives (**page 9-443 in Section 9.7 of the DWWP**). The Recommended Plan is required by the CD to be constructed by September 30, 2026 (**page 10-1 in the Executive Summary of Section 10 of the DWWP**). The general layout of the Recommended Plan is shown on **Figure 10-1 in Section 10.1 of the DWWP** and a more detailed figure showing the proposed regional tunnel system is presented on **Figure 10-4 in Section 10.4 of the DWWP**. **Sections 10 and 11 of the DWWP** present details on the description and implementation of the Recommended Plan.

It should be noted that the Recommended Plan is a sub-set of the Selected Plan. As such, each segment of the Recommended Plan is a component of the Selected Plan and would be designed for cost-effective expansion as recommended by the CSO Control Policy. **Figure 10-28 in Section 10.9 of the DWWP** shows how the Recommended Plan and Selected Plan relate to each other. Each major component (the treatment plant expansion, tunnel dewatering pump station, and the Ohio, Allegheny, and Monongahela tunnel segments) would be designed to eventually accommodate or be readily extended and tied into the future construction for the Selected Plan. **(See page 10-78 of Section 10.9 of the DWWP.)**

2.6 Green Infrastructure Consideration and Sensitivity Analyses

ALCOSAN has completed a number of Complementary and Early Action Projects over the past ten years that have reduced overflows. These projects include source reduction projects such as stream removals. Although these projects are not part of the Recommended Plan, they are presented in **Section 10.2 of the DWWP** for information on past and on-going projects that will complement the controls to be implemented under the Recommended Plan. Green infrastructure is not a component of the Recommended Plan because, “While ALCOSAN has the requisite authority to build new conveyance, storage and treatment facilities, their 2008 consent decree, Pennsylvania statute and existing service contracts limit ALCOSAN’s ability to mandate or implement the reduction of wet weather flows from the municipal collection systems through green infrastructure or other source reduction strategies.” **(See page 11-2 in Section 11.0 of the DWWP.)** Even so, green infrastructure was considered by the basin planners as part of their technology screening and alternative activities as described in the following paragraphs.

The Chartiers Creek basin planner evaluated the ability of green infrastructure to provide wet weather control. The evaluation showed that “green infrastructure must be coupled with improved conveyance capacity and an higher level of understanding of the existing system conveyance capacities in order to support the desired level of CSO control.” Areas where green infrastructure might be applied were identified and hydraulic modeling of these areas was performed. Estimates of the necessary storage volume to achieve various levels of control were determined and sewersheds with the greatest potential were field screened based on land use. As listed on **pages 8-19 and 8-20 of Section 8.3.1 of the DWWP**, the following sewersheds and municipalities were determined to have the greatest potential for green infrastructure in the Chartiers Creek planning basin:

- C-10 – McKees Rocks Borough
- O-06 – Stowe Township and McKees Rock Borough
- O-08 through O-13 – City of Pittsburgh
- Carnegie Borough – various locations

The Lower Ohio/Girty's Run basin planner performed a sensitivity analysis in conjunction with the control technology screening process. Outfalls producing the least frequent overflows under typical year conditions were evaluated to determine the percentage of flow reduction required to lower the frequency of overflow events to desired control levels. The analysis resulted in identifying "that CSOs at ALCOSAN POCs O-01, O-02, and O-05a within Stowe Township have the potential to eliminate the fourth through eighth largest overflows via the use of green infrastructure. ... In addition, sewershed A-67 in Millvale Borough was identified as a host for potential green infrastructure installations. In A-67, the impervious area is relatively small compared to the total A-67 sewershed acreage and the removal of these impervious areas would not significantly reduce A-67-00 CSO frequency. However, they may be effective in reducing the volume and frequency of the GRJSA CSOs." (See page 8-30 in Section 8.4.1 of the DWWP.)

The Main Rivers basin planner performed a sensitivity analysis to relate the anticipated effects of green infrastructure on overflow frequencies. The basin planner modeled various reductions to impervious areas within the sewershed to determine if significant enough overflow reductions resulted to limit overflows to the desired control levels. The analysis showed that implementation of green infrastructure could potentially reduce the capacity, size, and costs of some consolidation sewers. The sewersheds where the greatest benefit from using green infrastructure to reduce CSOs to under 11 events per typical year with 10% or less of impervious area reduction are located in the City of Pittsburgh in the A-05, A-12, A-18Y, A-56, M-08, and O-37 sewersheds. (See pages 8-39 and 8-40 of Section 8.5.1 of the DWWP.)

The Saw Mill Run basin planner deemed technologies related to sewer separation, removal of infiltration and inflow (I/I), green infrastructure and stormwater management, sewer optimization and relief sewers to be more appropriate for addressing small, remote outfalls or for reducing overall volumes and flows at larger overflows. For this reason, these technologies were not evaluated as primary technologies, but will be revisited for implementation as part of optimization of a preferred plan to address wet weather in the Saw Mill Run planning basin. (See page 8-52 of Section 8.6.1 of the DWWP.)

The Turtle Creek basin planner judged it infeasible to explicitly include green infrastructure in the basin alternative analysis because the "appropriateness, applicability, and performance of green infrastructure approaches are highly site specific" (page 8-69 in Section 8.7.5 of the DWWP).

The Upper Allegheny basin planner evaluated the ability of green infrastructure and other source control alternatives to provide wet weather flow reduction as a municipal alternative portion of a broader basin plan. The basin planner performed a basin-wide sensitivity analysis to determine potential locations for

using source control technologies within the municipal systems. The analysis showed that overflow volume was more sensitive than peak rate. In addition, the analysis showed that in most sewersheds, source reductions of 50% or greater would be required in order to achieve significant reductions in CSO activations. Therefore the application of green infrastructure as a standalone technology would not be sufficient to achieve the desired levels of control (**page 8-71 in Section 8.8.1 of the DWPP**).

The Upper Monongahela basin planner performed a sensitivity analysis to relate the anticipated effects of green infrastructure to overflow frequencies. Various reductions to impervious areas in the planning basin were modeled to determine if reductions in impervious area achieved through green infrastructure would result in overflow reductions significant enough to limit overflows to the desired control levels. The analysis showed that reduction in impervious area, in combination with I/I reduction, could meet or exceed the desired level of control in several sewersheds. The sewersheds are M-31Z in the City of Pittsburgh, M-44 in West Homestead Borough, and M-61 in North Braddock Borough. This information was shared with these municipalities. It was also determined that simple modifications made directly to M-31Z and M-61 could reduce overflows to desired levels of control without upstream green infrastructure (**page 8-84 in Section 8.9.1 of the DWWP**).

3.0 Impact of the Recommended Plan on Municipalities

3.1 Schedule

The schedule for implementing the Recommended Plan is discussed in Section 11.1 of the DWWP. It should be noted that “To meet this schedule ALCOSAN is assuming that the final version of this WWP will be approved no later than January 31, 2014. Along with the assumed WWP approval date, the implementation phase is also dependent on another key milestone regarding municipal improvements. Per the municipal orders, municipal feasibility studies must be submitted to the regulatory agencies by July 2013.” The DWWP goes on to say “The implementation schedule assumes that the municipal feasibility studies will be approved by the Pennsylvania Department of Environmental Protection and the Allegheny County Health Department no later than July 31st, 2014.” (**See page 11-1 of the Executive Summary of Section 11.0 of the DWWP.**) The schedule for implementation of the Recommended Plan is discussed in the following sections.

3.1.1 Deadlines and Milestone Dates

The ALCOSAN DWWP was released to the public on July 31, 2012. Public comments are due no later than October 19, 2012. The Final WWP is due to the regulatory agencies by January 30, 2013. The WWP will be submitted to the United States Environmental Protection Agency (USEPA), the

Pennsylvania Department of Environmental Protection (PaDEP), and the Allegheny County Health Department (ACHD). The Final WWP is expected to be approved by January 30, 2014.

Most municipalities are required to submit their wet weather feasibility studies by July 2013 which is six months after the submission of the ALCOSAN Final WWP. The information contained in the final municipal plans would be used as part of the basis of final design during the design phase of the plan negotiated and approved by the regulatory agencies and ALCOSAN.

The construction of the ALCOSAN components of the Recommended Plan is to be completed by September 30, 2026. It is expected that the schedule for the design and construction of municipal improvements would parallel the ALCOSAN improvements schedule (**see page 11-7 of the DWWP**).

For quick reference, these dates are listed below:

- Draft ALCOSAN WWP released to the public: July 31, 2012
- Public comments on Draft ALCOSAN WWP due: October 19, 2012
- Submit Final ALCOSAN WWP to Regulatory Agencies: January 30, 2013
- Submission of Final Municipal Feasibility Studies: July 30, 2013
- Review and Approval of Final ALCOSAN WWP expected: January 31, 2014
- Review and Approval of Final Municipal Feasibility Studies: July 2014
- Complete Construction of Recommended Plan: September 30, 2026

3.1.2 Schedule of Recommended Plan Implementation

Figure 11-1 of the DWWP presents a bar chart of the overall schedule for the Recommended Plan from preliminary design through construction. The schedule shows a timeframe (in years after approval of the WWP) for preliminary design, permitting and approvals, final design, and construction (bidding, construction, initiation of operation) tasks for each major component of the Recommended Plan. The schedule is not broken down by planning basin or municipality. Only general periods for the construction of an entire capital improvement component are provided in the DWWP. For instance if Chartiers Creek Conveyance Facilities are to be constructed in a particular municipality, the most detailed information that is provided by **Figure 11-1** is that construction could be occurring in that municipality between January 2018 and September 30, 2026. [Note: The dates provided in this FSWG Document 029 schedule summary are calculated based on ALCOSAN’s assumed WWP approval date of January 2014, CD-required completion date of September 30, 2026, and the years after approval of the WWP from Figure 11-1.] In addition, because specific municipal schedules are not known and municipalities’ construction

is expected to be concurrent with ALCOSAN construction, the entire period from approval of the municipal plans through the deadline for construction (July 2014 to September 30, 2026) is cited as the schedule for municipal projects.

For quick reference, the calculated construction periods for each component of the ALCOSAN Recommended Plan are listed below:

- Woods Run WWTP Expansion: January 2017 through December 2022
- Tunnel Dewatering Pump Station: January 2019 through December 2022
- Ohio River Segment Tunnel and Facilities: January 2019 through December 2022
- Allegheny River Segment Tunnel and Facilities: January 2021 through December 2024
- Monongahela River Segment Tunnel and Facilities: January 2023 through September 30, 2026
- Chartiers Creek Conveyance and Facilities: January 2018 through September 30, 2026

3.1.3 Schedule for Subsequent Projects

Subsequent projects expected by ALCOSAN are those components of the Selected Plan that were not implemented under the Recommended Plan by September 30, 2026. ALCOSAN expects that the initiation of design, permitting and construction of these remaining components would be after September 30, 2026 (**page 10-1 in the Executive Summary of Section 10 of the DWWP**). No specific deadlines or milestone dates are provided.

3.2 Financial Impact on Municipalities

ALCOSAN conducted a financial capability assessment (FCA) to determine the affordability of the Recommended Plan. Current and future conditions were evaluated and compared. The FCA was conducted to 1) “support the development of a workable implementation schedule for the LTCP (long-term control plan) pursuant to the CSO Control Policy”, and 2) “support the determination of funding needs by agencies providing loans and grants for capital projects.” This was done by comparing residential indicators to the financial capability indicators. (**See page 6-3 of the DWWP.**)

3.2.1 Residential Indicator

ALCOSAN completed a residential indicator (RI) analysis. The RI gives an indication of households’ abilities to pay the total annual wastewater costs. The RI is calculated by dividing the total annual wastewater costs for the typical household by the median household income (MHI) (**Section 6.2 of the DWWP**). ALCOSAN derived 2012 and 2027 RIs as described below. The 2012 and 2027 household

costs (in dollars) and the RIs are included in FSWG Document 029 Appendix A - Municipality Summaries.

3.2.1.1 Current 2012 Residential Indicator

In this analysis there are two components to wastewater costs: ALCOSAN service charges and municipal service charges. The average ALCOSAN annual residential bill for 2012 was estimated to be \$262. This was based the following assumptions:

- \$9.07 quarterly service charge
- \$4.32 commodity charge per 1,000 gallons of water discharged to the sewer system (purchased)
- Average single family residential use of approximately 13 thousand-gallon units (T-gallons) (based on historical billing data) per quarter

Municipal service charges vary by municipality from less than \$30 to more than \$420 per year per typical household. Four municipalities have no direct collection system user charge and recover all the costs of their local systems through property taxes and their general funds. The population-weighted municipal cost per household is \$183 per year. (See page 6-5 of the DWWP.) The MHI for 2012 for the entire service area is \$46,400. As a result, on a regional level, the RI is \$445 (\$262+\$183) divided by \$46,400 which is approximately 1%.

ALCOSAN also evaluated RIs on a municipal level. **Table 6-6 of the DWWP** shows the 2012 MHI for each municipality. ALCOSAN annual wastewater costs are assumed to be \$262 for all municipalities. Municipality-specific annual wastewater costs are added to the ALCOSAN costs and divided by the municipality-specific MHI to derive an RI for each municipality.

3.2.1.2 Future 2027 Residential Indicator

On a regional level, the MHI is projected to increase to \$67,300 in 2027 (2.5% annual increase). ALCOSAN has estimated that the average ALCOSAN annual residential bill would increase to \$800 per year in 2027 (this includes \$410 current costs inflated to 2027 dollars plus \$390 for implementing the Recommended Plan). ALCOSAN has projected that service-area-wide weighted average annual municipal costs would be \$545. These predicted values result in a 2% RI on a regional level.

On a municipal level, the MHI per municipality was inflated to 2027 values. The annual ALCOSAN cost of \$800 per household was added to the municipality-specific projected annual costs per household. The municipality costs were determined by adding current municipal charges (municipality-specific surcharge added for an average single family residential use of 13 thousand-gallon units/quarter) inflated to 2027 dollars added to an evenly allocated household cost for the projected municipal projects that would be

constructed (uniform number spread across ALCOSAN service area for estimated \$530 million municipal capital costs). This results in the RIs shown for each municipality in **Table 11-13 of the DWWP**. An RI of 2% or more is considered by the EPA to be a high burden. As shown on Table 11-13 of the DWWP, 42 of the municipalities would have an RI of 2% or more after implementation of the Recommended Plan.

3.2.2 Financial Capability Indicator

ALCOSAN also performed a financial capability indicator (FCI) analysis of the service area based on current and future conditions. The FCI provides an assessment of ALCOSAN's and the municipalities' abilities to finance the implementation of the DWWP (**page 6-16 of the DWWP**). Several factors were taken into account including bond ratings, debt burden, unemployment rate, median household income, property tax burden, property tax collection rate, population history, income growth trends, distressed municipalities, and poverty rates (**Sections 6.3 through 6.5 of the DWWP and Section 11.58**).

3.2.3 Financial Capability Matrix

Combining the results of the FCI analysis and the RI analysis in a matrix indicates if there is a low, medium or high burden in the region being evaluated as defined by USEPA guidelines. ALCOSAN developed matrices for current and future conditions for the ALCOSAN service area. As shown in **Table 6-21 of the DWWP**, under current conditions the region has a medium burden. **Table 11-6 of the DWWP** shows that implementation of the Recommended Plan would result in a high burden on the region.

3.2.4 Sensitivity Analysis

ALCOSAN performed a sensitivity analysis that identified factors that could affect the future RI. **Table 11-14 of Section 11.5.7 of the DWWP** lists the best, default, and worst case scenarios for the following variables:

- Capital cost inflation
- O&M cost inflation
- Income growth
- ALCOSAN bond interest rate
- Program capital costs

By isolating each factor, ALCOSAN determined that changes in total program capital costs would have the greatest impact on the RI, followed by income growth rate and O&M cost inflation (**page 11-58 of the DWWP**). As shown in **Table 11-14 of the DWWP**, the 2027 best case scenario for the change in RI due to changes in program capital costs would be -0.25% and the worst case scenario would be +0.42%.

It should be noted that the capital and O&M cost estimates for all of the alternatives were made using the ALCOSAN Alternative Costing Tool (ACT) which has an expected accuracy of +50% to -30% in accordance with AACE Class 4 Estimate recommended practices (**page 9-7 in Section 9.1 of the DWWP**).

3.2.5 Projected Annual Capital Expenditures

Section 11.4.1 of the DWWP presents the expected annual capital expenditures for the ALCOSAN and municipal improvements for the Recommended Plan if it is implemented by the September 30, 2026 deadline. The Recommended Plan capital costs would be \$1.45 billion for ALCOSAN and \$0.53 billion for the municipalities. Accounting for inflation, the capital costs would be \$2.8 billion over the next fifteen years. ALCOSAN estimated the annual ALCOSAN and aggregated municipal capital costs (current and inflated) by year. ALCOSAN annual inflated capital costs range from \$15 million to \$277 million per year with the peak expenditure occurring in the year 2020. The municipal annual inflated capital costs range from \$0 million to \$96 million with the peak expenditure occurring in the year 2025. **Table 11-6 on page 11-38 of the DWWP** shows the annual costs for the years 2013 through 2026.

3.3 Water Quality Impact on Municipalities for the Recommended Plan

As a reference for water quality, overflow statistics (volume, frequency and duration) for ALCOSAN and municipal CSOs and SSOs were provided on the existing conditions discharge tables in **Sections 4.4 through 4.10 of the DWWP**. Overflow statistics and water quality information were provided on a system-wide basis for conditions after implementation of the Recommended Plan in **Section 9.7.4** of the DWWP. Affordable Alternatives (including the Balanced Plan [also known as the Recommended Plan]) are compared against the existing conditions, future baseline conditions, and/or the Selected Plan on a number of figures (**Figures 9-146 through 9-159 in Section 9.7 of the DWWP**) for volume, frequency, duration, percent reduction, percent captured, and amount of fecal coliform, on a system-wide or planning basin basis. CSO volume, frequency and duration statistics for the Recommended Plan were also provided on bar charts on an outfall basis for the ALCOSAN regulators in Sensitive Areas (**Figures 9-155 and 9-156 in Section 9.7 of the DWWP**). A table providing CSO and SSO statistics on an outfall basis was not provided for modeled conditions after implementation of the Recommended Plan.

In FSWG Document 029 Appendix A, the existing conditions volume and frequency overflow statistics for each ALCOSAN and municipal outfall for each municipality are presented. No attempts were made to estimate the CSO volume and frequency data from the graphics presented in the DWWP for the Recommended Plan conditions since exact values were not presented and are difficult to determine from the bar charts.

3.3.1 CSO Control

The Recommended Plan was developed such that the larger ALCOSAN CSOs served by the new regional tunnel would be controlled to six or fewer annual overflow events. CSO flow captured upstream of the Chartiers Creek RTB would be controlled to meet water quality standards. “At the downstream end of the Chartiers Creek proposed relief interceptor, dry weather flows will be pumped into the existing interceptor, while excess combined sewage would be pumped into the RTB for treatment before discharging to Chartiers Creek. For four events in the typical year, the portion of pumped combined sewage which exceeds the RTB treatment capacity will be shunted around the RTB and will discharge untreated.” (See page 10-50 in Section 10.8 of the DWWP.) All fifteen ALCOSAN CSOs discharging to sensitive areas would be controlled to zero overflows per year (except for Allegheny River Area No. 1 which would have one overflow per year) or re-located downstream of the sensitive area. The frequency and overflow volume of the remaining CSOs served only by the existing tunnel would depend on the existing drop shaft capacity and any regulator modifications to be done. (See page 9-358 in Section 9.6 and page 9-421 in Section 9.7 of the DWWP.)

3.3.1.1 Sensitive Areas

As mentioned above, all fifteen ALCOSAN outfalls that discharge to sensitive areas would be controlled to zero overflows per year or re-located downstream of the sensitive area. As shown in **Table 9-5 in Section 9.2 of the DWWP**, outfalls included to be controlled to this level are: A-62, A-63, A-64, A-65, A-66, and A-67 in the Lower Northern Allegheny sub-basin (Lower Ohio/Girty’s Run planning basin); A-47, M-18, M-20, M-21, M-22, O-40, O-41, and O-43 in the Main Rivers planning basin; and M-43 in the Upper Monongahela planning basin. The one exception is one overflow per year from the consolidation group LNA_CF10 (CSOs A-62 through A-67) which is associated with the Allegheny River Area No. 1. Bar charts for the volume, frequency and duration statistics for the CSOs in sensitive areas after implementation of the Recommended Plan were provided on **Figures 9-155 through 9-157 in Section 9.7.4 and Figure 10-27 in Section 10.9 of the DWWP**. As noted above, attempts were not made to estimate the CSO volume and frequency data from the graphics presented in DWWP for the Recommended Plan conditions since exact values were not presented and are difficult to determine from the bar charts.

3.3.2 SSO Control

The Recommended Plan would only control the SSOs along Chartiers Creek that are upstream of the proposed CSO RTB facility to a 2 year control level via the proposed relief sewer. The relief sewer would be constructed between POC C-55-02 and continue downstream to the proposed CSO RTB facility.

3.3.3 Summary of Water Quality Results for the Recommended Plan

On a system-wide scale, implementation of the Recommended Plan (including the municipal preferred or assumed improvements) will result in 90% reduction of SSO discharge volume and 56% reduction in CSO discharge volume as compared to the future baseline (2046) conditions. Implementing the Recommended Plan would also result in a reduction of 6.3 billion gallons per year of wet weather overflow volume. This would reduce the pollutant load from bacteria, solids/floatables, total suspended solids (TSS), and biochemical oxygen demand (BOD) (**page 10-2 in Section 10.1 of the DWWP**). Details of the water quality benefits from implementing the Recommended Plan are presented in **Section 10.9 of the DWWP**.

3.4 Construction of Facilities

As noted above, the Recommended Plan includes the construction of the municipal capital improvement projects that are listed in **Tables 9-27 through 9-34 in Section 9.3 of the DWWP**. It is assumed that the municipalities would be constructing these facilities concurrently with ALCOSAN facilities so that the entire Recommended Plan is completed by September 30, 2026. The facilities to be constructed by ALCOSAN under the Recommended Plan are presented on a component basis in **Table 10-1 in Section 10.1 of the DWWP** (these tables are organized differently but present the same information). Because these tables are organized on a component basis rather than by planning basin or municipality basis, the information from the tables must be cross-referenced with figures and text from **Sections 10.1 through 10.8 of the DWWP** to get an understanding of what facilities would actually be constructed in each municipality. These sections and tables were reviewed and the locations and nature of the facilities are summarized for each municipality and presented in Appendix A.

No facilities are planned for the Saw Mill Run, Upper Allegheny, Turtle Creek, or Lower Ohio (sub-basin of Lower Ohio/Girty's Run) planning basins. Facilities are planned for the Chartiers Creek, Main Rivers, Upper Monongahela and Lower Northern Allegheny (sub-basin of Lower Ohio/Girty's Run) planning basins.

3.5 Hydraulic Impact on Municipalities

Relief sewer, tunnel, and consolidation sewer profiles for the Selected Plan are shown on Figures 9-113 to 9-125 on a component basis but hydraulic grade line (HGL) information is not provided. Similar sewer and tunnel profiles were not provided for the Recommended Plan. However, the Recommended Plan would be designed to tie into the Selected Plan (**page 10-78 of Section 10.9 of the DWWP**).

Relief sewer, tunnel, and consolidation sewer profiles for the Selected Plan are shown on **Figures 9-113 to 9-125 in Section 9.6 of the DWWP**. “The conveyance pipes to the new regional tunnel are sized to convey all excess wet weather flows to the regional tunnel drop shaft in the typical year.” (**See page 10-19 in Section 10.4 of the DWWP**.)

It was noted in the DWWP that in order to manage costs, “excess flows from CSOs which have smaller annual overflow volume and /or less frequent discharges are not tied into the regional tunnel. Instead these smaller CSOs are controlled to the extent needed to not preclude attainment with water quality standards. Though the discharges are reduced, many smaller CSOs discharge more than 4 to 6 times per year. The regulator modifications proposed in the plan for these smaller outfalls are nonstructural modifications like adjusting or removing tipping gates or adjusting orifice openings. The regional tunnel will fill and overflow through the existing outfalls for up to six unique overflow events in the typical year, and through new tunnel relief outfalls which act to ensure that the tunnel does not worsen current flooding in the existing collection system. Controls for the outfalls which directly impact Sensitive Areas are designed to eliminate overflows during the typical year, but may overflow during larger events.” (**See page 10-20 in Section 10.4 of the DWWP**.)

4.0 Adaptive Management

ALCOSAN has identified factors that could affect the implementation of the Recommended Plan. ALCOSAN has developed a method by which to respond to this uncertainty which is referred to as “adaptive management” and is discussed in **Section 11.7 of the DWWP**.

Factors were identified as “trends and potential events beyond ALCOSAN’s control that could materially affect the scope or performance of wet weather controls that otherwise would be adequate to meet the requirements of the Clean Water Act, consistent with the EPA’s Combined Sewer Overflow Control

Policy” (**page 11-67 of the DWWP**). The factors identified by ALCOSAN that could affect the scope or performance of the Recommended Plan are listed below:

- Factors beyond ALCOSAN’s control
 - Changes to the Clean Water Act
 - Other emergent regulatory initiatives
 - Revised water quality standards
 - Integrated municipal stormwater and wastewater planning
 - Total maximum daily loads
 - Municipal stormwater regulations
 - Nutrient limits
 - Sewage sludge incineration rule
 - POTW greenhouse gas management
 - Climate change
 - Changes in municipal flow estimates
 - Economic and demographic variables
 - Capital cost inflation
 - Debt interest rates and other financing variables
 - Demographic changes
 - Changes to billable flow composition
 - Changes to household income
 - Municipal compliance costs
- Cost estimation accuracy
- Construction and engineering resource availability
- Green infrastructure controls
- Solids and floatables controls
- Regulatory approvals

In order to monitor these variables, ALCOSAN will track progress through periodic program reviews that will include such topics as schedule conformance, hydraulic loading design and flow assumption changes, new regulatory requirements, economic developments, changes to water quality standards and guidance, innovative technologies that could improve performance or reduce costs, unavailability of supplies, materials, contractors or labor necessary for implementation, and legal impediments (litigation or permitting). ALCOSAN will notify regulatory agencies if they foresee or become aware of any adverse conditions. As listed on **page 11-77 of the DWWP**, adverse conditions that would trigger an adaptive management response are:

- The implementation schedule set forth in the WWP cannot be met;
- The design and performance assumptions used in the development of the WWP are rendered obsolete due to changing conditions;

- The type, size, location or scope of wet weather controls set forth in the WWP must be changed to meet the water quality goals of the WWP;
- Economic, demographic or other conditions change such that the ALCOSAN regional Residential Indicator projected upon full implementation of the WWP would increase by more than one tenth of one percent over the Residential Indicator that was projected in Section 11.5 of this document (e.g. from a RI of 2.0% to a RI of 2.1%); and
- Any other factor which could materially affect ALCOSAN's ability to implement its Wet Weather Plan, including those described in Sub-Sections 11.7.1 through 11.7.5 of this Document (DWWP).

ALCOSAN will prepare a Wet Weather Plan Update (WWPU) that will evaluate the performance of the controls completed under the 2026 Recommended Plan and identify the scope of additional controls necessary for remaining overflows to comply with the CWA and the CSO Policy. ALCOSAN expects to submit the WWPU on or before September 30, 2031 (**page 11-78 of the DWWP**).

Table 1: Comparison of Alternatives Presented at BPC Meetings and in Draft ALCOSAN Wet Weather Plan

Alternative Description	Cost (\$ in Billions)	WWTP Capacity	Regional Tunnel	ALCOSAN CSO Control	ALCOSAN SSO Control	Municipal Controls	Comparison of Figures
Preliminary Control Strategy (Alt. 3f-Mod 10PCT) – BPC Meetings ¹	\$3.6	295 MGD Secondary 600 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, Allegheny River tunnel segment from O-39 to A-42, Monongahela River tunnel segment from O-39 to M-51, Saw Mill Run tunnel segment to tie into O-39	95% CSO capture Enhanced control to sensitive areas 3 CSO storage tanks in Turtle Creek	Eliminates 2-yr storm SSOs 1 SSO storage tank in each of Upper Allegheny, Turtle Creek, Chartiers Creek	Includes municipal CSO and SSO controls	BPC Meeting figure and Figure 9-112 in DWWP appear to be the same.
Selected Plan (Alt. 3f-Mod 10PCT) – DWWP ²	\$3.6	295 MGD Secondary 600 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, Allegheny River tunnel segment from O-39 to A-42, Monongahela River tunnel segment from O-39 to M-51, Saw Mill Run tunnel segment to tie into O-39	95% CSO capture Enhanced control to sensitive areas 3 CSO storage tanks in Turtle Creek	Eliminates 2-yr storm SSOs 1 SSO storage tank in each of Upper Allegheny, Turtle Creek, Chartiers Creek	Includes municipal CSO and SSO controls	
SSO Control Priority – BPC Meetings ³	\$2	295 MGD Secondary 480 MGD Primary	None	70-75% CSO capture <u>2 retention treatment basins on Monongahela and 1 on Chartiers Creek.</u> ⁵ Sensitive area relocation	All controlled to 2-yr storm	All municipal improvements	<u>BPC Meeting figure shows an SSO storage tank along Chartiers Creek where an RTB is shown on Figure 9-142 in DWWP.</u> ⁵
SSO Control Priority (Alt. 3f-Mod SSO) – DWWP ⁴	\$2	295 MGD Secondary 480 MGD Primary	None	75% capture <u>Retention treatment basin at M-42 and M-59</u> ⁵ Portions of all sensitive area controls that can be implemented without tunnel	All controlled to 2-yr storm	All municipal improvements	
Water Quality Priority (Alt. 3f-mod-WQ(v2)) – BPC Meetings ³	\$2	295 MGD Secondary 600 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, Allegheny River tunnel segment from O-39 to A-42, and a portion of Monongahela River tunnel segment from O-39 to M-29	85-90% capture Sensitive area controls Retention treatment basin on Monongahela	~70% SSO volume reduction SSO elimination to 2-yr storm for Allegheny River	All municipal improvements	BPC Meeting figure and Figure 9-143 in DWWP appear to be the same.
Water Quality Priority (Alt. 3f-Mod WQ) – DWWP ⁴	\$2	295 MGD Secondary 600 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, Allegheny River tunnel segment from O-39 to A-42, and a portion of Monongahela River tunnel segment from O-39 to M-29 120 MGD Dewatering PS 6 cross-connections to existing tunnel Up to 3 tunnel outfalls	87% capture Sensitive area controls, including M-43 controls without tunnel Retention treatment basin at M-42 Controls for all major outfalls/flow groups in the Selected Plan for the given tunnel extent	Control all UA SSOs to 2-yr storm All other SSOs left uncontrolled	All municipal improvements	
Balanced Priorities – BPC Meetings ³	\$2	295 MGD Secondary 480 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, Allegheny River tunnel segment from O-39 to A-23, and Monongahela River tunnel segment from O-39 to M-29	75-80% capture Sensitive area controls Retention treatment basin on Chartiers Creek	~90% SSO volume reduction SSO elimination to 2-yr storm for Chartiers Creek	All municipal improvements	BPC Meeting figure and Figure 9-145 in DWWP appear to be the same.
Balanced Priorities (Alt. 3f-Mod BAL) – DWWP ⁴ (Chosen as the “Recommended Plan” in the DWWP)	\$2	295 MGD Secondary 480 MGD Primary	Ohio River tunnel segment from O-39 to WWTP, portion of Allegheny River tunnel segment from O-39 to A-23, and portion of Monongahela River tunnel segment from O-39 to M-29 120 MGD Dewatering PS 5 cross-connections to existing tunnel Up to 3 tunnel outfalls	79% capture Sensitive area controls, including M-43 controls without tunnel Controls for all major outfalls/flow groups in the Selected Plan for the given tunnel extent	Controlled to 2-yr storm in most of CC basin Left uncontrolled in LON, SMR, UA and portions of CC and TC basins	All municipal improvements	

Notes:

- 1) BPC Preliminary Control Strategy information from “Preliminary Control Strategy” slide for the BPC Meeting #12 presentations;
- 2) DWWP Selected Plan information from Figure 9-112 and Section 9.6.1 of the DWWP
- 3) BPC Affordable Alternatives information is from the “Comparison of Affordable Alternatives (\$2B) 2026 Alternatives” slide for the BPC Meeting #12 presentations;
- 4) DWWP Alternative information for the DWWP Affordable Alternatives is from Table 9-90 of the DWWP and Figures 9-142, 9-143, and 9-145;
- 5) Substantive differences between the BPC Meeting and DWWP comparable alternatives are indicated in **bold underlined text**; other differences are a result from more or less detail and different wording from the sources listed above.