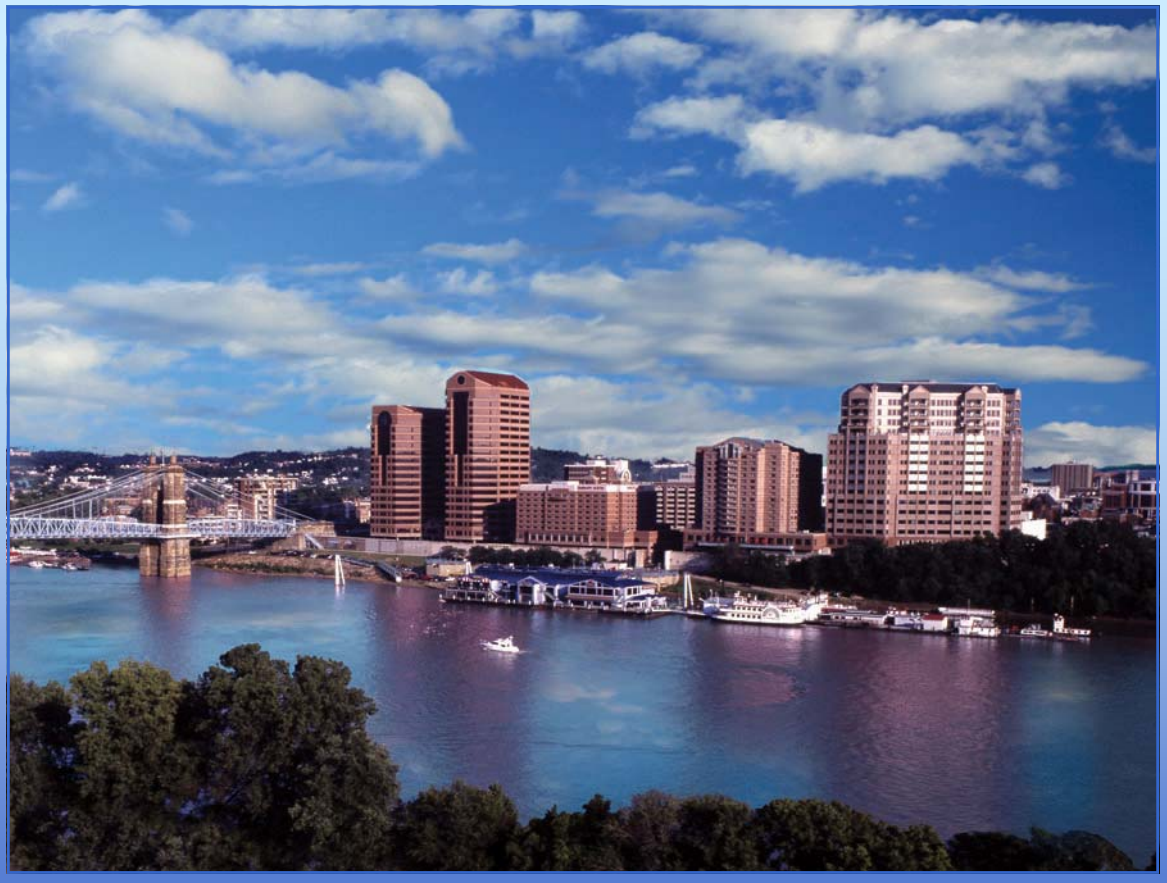
Pump Station Overflow Elimination Plan

Sanitation District No. 1
March 8, 2008



CERTIFICATION

Pump Station Plan
Consent Decree Case No. 2:05-cv-00199-WOB

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jeffery A. Eger
General Manager

September 14, 2007
Date

COMMONWEALTH OF KENTUCKY

COUNTY OF Kenton)ss.

The foregoing instrument was acknowledged before me this 14 day of September, 2007 by Jeffery A. Eger, General Manager of Sanitation District. No. 1.

Linda M. Hamberg
NOTARY PUBLIC

State-at-Large County, Kentucky

My commission expires: May 9, 2010

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PUMP STATION OVERFLOW ELIMINATION PLAN

March 8, 2008

Sanitation District No. 1
1045 Eaton Drive
Ft. Wright, KY 41017

TABLE OF CONTENTS

TABLES

FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

CCTV	Closed Circuit Television
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
District	Sanitation District No. 1
ERTP	Eastern Regional Wastewater Treatment Plant
GPM	Gallons per minute
I/I	Infiltration/Inflow
KPDES	Kentucky Pollutant Discharge Elimination System
MGD	Million Gallons Per Day
MG	Million Gallons
PS	Pump Station
RDII	Rain Derived Infiltration/Inflow
SCADA	Supervisory Control and Data Acquisition
SSO	Sanitary Sewer Overflow
SSS	Sanitary Sewer System
US EPA	United States Environmental Protection Agency
WRTP	Western Regional Wastewater Treatment Plant

EXECUTIVE SUMMARY

Sanitation District No. 1 of Northern Kentucky (the District) entered into a Consent Decree with the United States Environmental Protection Agency (US EPA) and the Commonwealth of Kentucky (Cabinet) on April 18, 2007 that requires the District to finalize, develop, submit, and implement plans for the continued improvement of the separate sanitary sewer system (SSS), combined sewer system (CSS), and the District's wastewater treatment plants (WWTPs). The Consent Decree addresses sanitary sewer overflows (SSOs) and discharges from the combined sewer overflow outfalls (CSO outfalls) which are currently identified or will be identified in the future in any Kentucky Pollutant Discharge Elimination System (KPDES) permit issued to the District.

As part of this agreement, the District was tasked to develop a Pump Station Overflow Elimination Plan titled Pump Station Plan (paragraph 38 in the Consent Decree) to address the elimination of bypasses at selected pump stations within six months of entry of the Consent Decree. As stated in the Consent Decree, the District must submit "a plan to identify watershed projects to eliminate SSOs at the pump stations identified on Exhibit E (the 'Pump Station Plan'). The Pump Station Plan shall include expeditious schedules for design, initiation of construction, and completion of construction of remedial measures; provided however, that such schedules shall not extend beyond the dates set forth on Exhibit E." Each Exhibit E listed pump station overflow has its own unique set of circumstances and is being addressed differently to meet the requirements of the Consent Decree. Due to the high priority of several of these pump station overflows, the District has already begun to implement overflow elimination or reduction solutions for several pump stations. Each pump station is at a different point along the path to overflow elimination; some have finalized solutions while some are being studied to gather more information. The intent of this section is to summarize the schedules and potential solutions for each pump station. Detailed information for each pump station is available in the individual pump station sections within this plan.

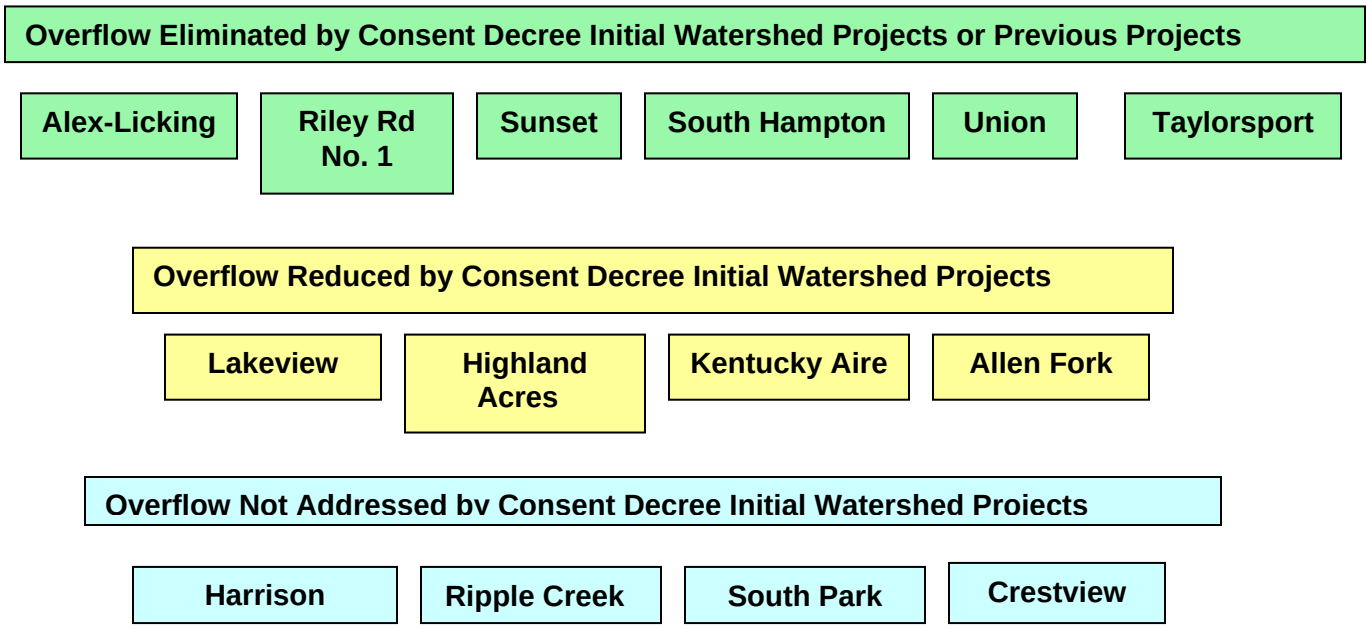
For organizational purposes, the District has identified three categories within the Exhibit E pump stations:

1. Pump stations whose overflow has been eliminated by previous projects or will be eliminated through the implementation of the Consent Decree Initial Watershed Projects.
2. Pump stations whose overflow has been reduced by previous projects or is projected to be reduced through the implementation of the Consent Decree Initial Watershed Projects.
3. Pump stations whose overflow is not projected to be addressed or reduced by the implementation of the Consent Decree Initial Watershed Projects but will be addressed by a future project.

The goal of this categorization is to frame the discussion of overflow elimination for each of the pump stations within the report. Figure 1 shows the breakdown by category.

In developing the Pump Station Plan, the District has taken into account previous projects and ongoing work in documenting how each pump station overflow will be eliminated. A summary of the plan for each pump station is shown below, and a detailed schedule for the remaining work required at each station is also included. The details for each individual station can be found within each respective chapter of this plan.

Figure 1 Pump Station Overflow Categorization



Overflow Eliminated by Consent Decree Initial Watershed Projects or Previous Projects

Pump Station	Deadline	Summary of Plan for Overflow Elimination
Alex - Licking	December 31, 2010	As part of the Eastern Regional Collection System Improvements Initial Watershed Projects, the existing pump station is being eliminated and replaced with a new pump station sized to convey peak wet weather flows under ultimate build-out conditions. The proposed completion date for the construction and the overflow elimination is currently scheduled for July 2008.
Riley Rd No. 1	December 31, 2010	As part of the Eastern Regional Collection System Improvements Initial Watershed Projects, the existing pump station is being eliminated. The proposed completion date for the construction and the overflow elimination is currently scheduled for spring 2009.
Sunset	December 31, 2010	As part of the Eastern Regional Collection System Improvements Initial Watershed Projects, the existing pump station is being eliminated and replaced with a new pump station sized to convey peak wet weather flows under ultimate build-out conditions. The proposed completion date for the construction and the overflow elimination is currently scheduled for spring 2009.
South Hampton	December 31, 2015	As part of the construction of the Western Regional Collection System Initial Watershed Projects, the existing pump station will be eliminated and flows conveyed to the new Western Regional wastewater treatment plant (WWTP) by a new gravity sewer sized to convey peak wet weather flows under ultimate build-out conditions The proposed completion date for the construction and the overflow elimination is currently scheduled for 2013.
Union	December 31, 2015	As part of the construction of the Western Regional Collection System Initial Watershed Projects, the existing pump station will be eliminated and flows conveyed to the new WRTP by a new gravity sewer

		sized to convey peak wet weather flows under ultimate build-out conditions The proposed completion date for the construction and the overflow elimination is currently scheduled for 2013.
Taylorsport	December 31, 2010	The pump station was upgraded as part of a previous project to convey wet weather flows and the overflow was eliminated as part of the pump station upgrade. This project is complete and the overflow has been eliminated.

Overflow Reduced by Consent Decree Initial Watershed Projects or Previous Projects

Pump Station	Deadline	Summary of Plan for Overflow Elimination
Lakeview	3 years after startup of the WRTP but no later than December 31, 2013	The District has made substantial reductions in overflow volumes based on projects that have already been completed. Several of the Initial Watershed Projects are also projected to further reduce the overflow volume when implemented. The final solution will incorporate the impact of earlier projects and will be selected based on a detailed alternatives analysis. The schedule for the selection, design, and construction of the final solution is set to eliminate the overflow based on the 2013 deadline.
Highland Acres	December 31, 2010	The District projects that the construction of the Western Regional Collection System will help to reduce the overflow volumes at this pump station, but will not completely eliminate the overflow. The final solution will be selected based on a detailed alternatives analysis and the schedule is set for the selection, design, and construction of the final solution to be completed by the 2010 deadline.
Kentucky Aire	December 31, 2015	The construction of the Western Regional Collection System will help to reduce the overflow volumes at this pump station. Several upstream pump stations tributary to the Kentucky Aire PS will be removed from service by the new collection system reducing the overflow at this PS, but will not completely eliminate the overflow. The final solution will be selected based on a detailed alternatives analysis and the schedule is set for the selection, design, and construction of the final solution to be completed by the 2015 deadline.
Allen Fork	December 31, 2015	The District has made substantial reductions in overflow volumes based on projects that have already been completed. The final solution to eliminate the overflow will take into account the results of the completed projects and will be selected based on a detailed alternatives analysis. The schedule for the selection, design and construction of the final solution is set to eliminate the overflow based on the 2015 deadline.

Overflow Not Addressed by Consent Decree Initial Watershed Projects

Pump Station	Deadline	Summary of Plan for Overflow Elimination
Harrison Harbor	December 31, 2010	The District has reviewed their historical records and have found evidence of only one overflow at this pump station. This overflow occurred when the Ohio River was at flood stage. Aside from this isolated instance, there is no additional evidence of overflows based on the District's records and field investigations. The planned solution to remove this PS from the Exhibit E list is to monitor this pump station over the next year and document the lack of wet weather concerns and overflows.
Ripple Creek	December 31, 2010	The District is in the process of performing extensive inspection and flow monitoring upstream of this pump station. The intent is to add this pump station into the District's hydraulic model based on the collected information and assess alternatives. The schedule for the alternatives analysis, design, and construction of the final solution is set to meet the 2010 deadline.
South Park	December 31, 2010	The District is in the process of performing extensive inspection and flow monitoring upstream of this pump station. The intent is to add this pump station into the District's hydraulic model based on the collected information and assess alternatives. The schedule for the alternatives analysis, design, and construction of the final solution is set to meet the 2010 deadline.
Crestview	December 31, 2015	The District is in the process of performing extensive inspection and flow monitoring upstream of this pump station. The intent is to add this pump station into the District's hydraulic model based on the collected information and assess alternatives. The schedule for the alternatives analysis, design, and construction of the final solution is set to meet the 2015 deadline.

Pump Station Overflow Elimination Plan Schedule Summary

A summary of the schedule for the overflow elimination at each PS is presented below. Following this summary is the detailed schedule presented in graphical format. The tasks presented for the schedule for each PS represent the critical path tasks that must be performed in order to eliminate the overflow at each PS. The tentative dates listed for each task represent the most expeditious schedule that can be achieved to eliminate the overflow at each PS. In many cases, the PS overflow is shown to be eliminated before the Consent Decree Exhibit E deadline. These schedules assume that unknowns beyond our control do not arise during the course of the work that could cause delays in meeting these schedules. If unknowns occur beyond our control that cause delays in meeting the ultimate elimination dates shown, we reserve the right to seek to extend the schedule for PS overflow elimination at the affected PS(s) up to, but not beyond, the Exhibit E deadline**,** pursuant to paragraph 82 as a non-material modification.

Alex Licking Pump Station

As part of the Eastern Regional Collection System Improvements Initial Watershed Projects, the new Alex Licking PS design has been completed and construction is currently underway. The proposed completion date for the construction and the overflow elimination is currently scheduled for July 2008, well before the Exhibit E deadline of December 31, 2010. The new PS will convey peak dry and wet weather flows under ultimate build-out conditions through a new force main and gravity sewer conveyance system to the new ERTP.

Riley Road No. 1 Pump Station

As part of the Eastern Regional Collection System Improvements Initial Watershed Projects, the existing pump station is being eliminated by a gravity sewer that will convey flows to a new Riley Road PS that is being constructed adjacent to the current location of the existing Riley Road No. 2 PS. The existing Riley Road No. 2 PS will be eliminated as part of the new PS construction. The new Riley Road PS has been sized to convey peak dry and wet weather flows to the new Eastern Regional WWTP. The proposed completion date for the construction and overflow elimination is currently scheduled for spring 2009, well before the Exhibit E deadline of December 31, 2010.

Sunset Pump Station

The District is currently partnering with a local developer to remove the existing Sunset PS, add a new gravity sewer, and construct a new Sunset PS farther downstream in the watershed. This new location for the new PS will allow additional future development to be served by the new Sunset PS. The new Sunset PS will discharge through a new force main and gravity sewer collection system to the new Alex Licking PS currently under construction as described in the Alex Licking PS schedule summary above.

The new Sunset PS is currently under design with construction expected to begin in the spring of 2008. The new pump station, forcemain and gravity sewers are being designed to convey peak dry and wet weather flows under ultimate build-out conditions to the Alex Licking PS which is also designed to convey peak dry and wet weather flows to the new Eastern Regional WWTP. The proposed completion date for the construction

and the overflow elimination is currently scheduled for spring 2009, well ahead of the Exhibit E deadline of December 31, 2010.

South Hampton Pump Station

As part of the construction of the Western Regional Collection System Initial Watershed Projects, the existing PS will be eliminated and flows conveyed to the new Western Regional wastewater treatment plant (WRTP) via a new gravity sewer, titled Frogtown sewer, sized to convey peak wet weather flows under ultimate build-out conditions. Disconnection and decommissioning of this PS is tied to the construction and startup of the Frogtown sewer and the WRTP. The Frogtown sewer and WRTP construction is currently scheduled to be completed by December 31, 2012. A connection sewer will then be constructed to convey flows from the South Hampton PS to the Frogtown sewer and the PS and associated overflow will be taken offline and demolished by March 31, 2013, well ahead of the Exhibit E deadline of December 31, 2015.

Union Pump Station

As part of the construction of the Western Regional Collection System Initial Watershed Projects, the existing PS will be eliminated and flows conveyed to the new WRTP via a new gravity sewer, titled Union Sewer, sized to convey peak wet weather flows under ultimate build-out conditions. Disconnection and decommissioning of this pump station is tied to the construction and startup of the WRTP and the rest of the associated collection system. The WRTP construction is currently scheduled to be completed by December 31, 2012. A connection sewer will then be constructed to convey flows from the Union PS to the Union sewer and the PS and associated overflow will be taken offline and demolished by March 31, 2013, well ahead of the Exhibit E deadline of December 31, 2015.

Lakeview Pump Station

The Lakeview PS is the largest separate sanitary PS in the District's system and serves an extensive portion of the District's separate sanitary system within Kenton, Boone, and Campbell Counties. The District has made substantial reductions in overflow volumes at the PS based on projects that have already been completed. Several of the Initial Watershed Projects are also projected to further reduce the overflow volume when implemented. The final solution will incorporate the impact of earlier projects and will be selected based on a detailed alternatives analysis identified during the Watershed Planning process required in the CD. Detailed alternatives analysis for the overflow elimination is slated to begin in June 2008 at the conclusion of the current hydraulic model development and will coincide with the development and submission of the first set of Watershed Plans required in the CD due by June 30, 2009. Preliminary and detailed design of the selected solution as well as land acquisition and bidding are currently scheduled to occur from June 2009 until August 2011. Approximately two years for preliminary and detailed design along with land acquisition and bidding is reasonable for a project of this magnitude. Construction will commence immediately following the bidding phase of the selected solution and is currently scheduled to be completed by December 31, 2013 inline with the Exhibit E deadline of December 31,

2013. Given the complexity of the system and the construction of the associated solution allotting two years and 3 months for construction is reasonable for a project of this magnitude.

Highland Acres Pump Station
The construction of the Western Regional Collection System will help to reduce the overflow volumes at this PS, but will not completely eliminate the overflow. The final solution will be selected based on a detailed alternatives analysis that will follow the development of the updated hydraulic model and will coincide with the development of the Watershed Plans required in the CD. Detailed alternatives analysis for the overflow elimination is currently slated to begin in June 2008 after completion of the hydraulic model development and be completed by December 2008. Preliminary and detailed design of the selected solution as well as land acquisition and bidding are currently scheduled to occur from December 2008 until September 2009. Construction is expected to begin after design and bidding and will last approximately 15 months, until December 2010, inline with the Exhibit E deadline of December 31, 2010.

Kentucky Aire Pump Station
The construction of the Western Regional Collection System will help to reduce the overflow volumes at this PS. Upstream PSs tributary to the Kentucky Aire PS will be removed from service by the new collection system reducing the overflow at this PS, but will not completely eliminate the overflow. The final solution will be selected based on a detailed alternatives analysis that will follow the development of the updated hydraulic model and will coincide with the development of the Watershed Plans. It is also assumed that the Kentucky Aire Pump Station overflow elimination analysis, design, and construction will coincide with the schedule for the Lakeview PS as Kentucky Aire is tributary to Lakeview.

Detailed alternatives analysis for the overflow elimination is slated to begin in June 2008 at the conclusion of the current hydraulic model development and will coincide with the development and submission of the first set of Watershed Plans required in the CD due by June 30, 2009. Preliminary and detailed design of the selected solution as well as land acquisition and bidding are currently scheduled to occur from June 2009 until August 2011. Approximately two years for preliminary and detailed design along with land acquisition and bidding is reasonable for a project of this magnitude. Construction will commence immediately following the bidding phase of the selected solution and is currently scheduled to be completed by December 31, 2013, well ahead of the Exhibit E deadline of December 31, 2015. Given the complexity of the system and the construction of the associated solution allotting two years and 3 months for construction is reasonable for a project of this magnitude.

Allen Fork Pump Station
The recently completed Allen Fork Collection System Phase I improvements will help to reduce the overflow volumes at this PS. The Allen Fork Collection System Phase II Improvements are the second phase of improvements that are intended to increase the

capacity of the Allen Fork service area and address peak wet weather flows at the PS. The second phase is currently underway and consists of flow monitoring upstream of the Allen Fork and Burlington PSs as part of the 2007 – 2008 system-wide flow monitoring program. This data will be used to update the District's collection system hydraulic model which is scheduled to be completed by June 2008.

After completion of the model, Sanitary Sewer Evaluation Survey (SSES) activities, such as smoke and dye testing, are currently scheduled to be conducted through January of 2009 to identify sources of I/I with the design and construction of identified rehabilitation and other SSES-related improvements to be completed by April 2010. The District will then monitor the effectiveness of the rehabilitation through flow monitoring from April 2010 until January 2011 to take advantage of the spring and fall rain seasons. From January 2011 until January 2012, the results of the monitoring will be used to update the hydraulic model, conduct detailed alternatives analysis and select the final solution. Preliminary and detailed design, land acquisition, and bidding are currently scheduled to be conducted from January 2012 until January 2013. Construction is currently scheduled to be completed by December 31, 2014, which is a full year ahead of the required Consent Decree Exhibit E deadline of December 31, 2015.

Harrison Harbor Pump Station
Recent field investigations have confirmed that there is not a constructed bypass located at the PS and District records show no overflows have occurred at the PS due to wet weather.. A detailed review of all overflow records shows one overflow occurred from January 9 through January 13, 2005 due to flood conditions along the Ohio River. While there are no records of overflows at this PS due to wet weather, the District has conducted detailed smoke testing and other field investigations to-date to try to identify any potential I/I sources into the station. The District has installed flow meters in the gravity sewers tributary to the PS and is tracking via SCADA, pump run times and high level alarm data to confirm that there are no capacity issues at the PS.

This data is being gathered as part of the overall infrastructure characterization effort in preparation for the development of the first set of Watershed Plans as required by the CD. As such, the processing of the field data and analysis will mirror the update of the District's collection system model, which is scheduled to be completed by June 2008. If the field data reveals any capacity issues, alternatives analysis for addressing these issues will be completed by December 2008, with any needed design, land acquisition, bidding and construction to be completed by the required Exhibit E deadline of December 31, 2010.

Ripple Creek Pump Station
The District is currently collecting flow monitoring and assessment data for this PS as part of the infrastructure characterization effort. Smoke testing and CCTV inspection of the tributary sewers have been completed and flow meters are currently installed to monitor flow into the pump station. The final solution will be selected based on a

detailed alternatives analysis that will follow the development of the updated hydraulic model and will coincide with the development of the first set of Watershed Plans required in the CD. Detailed alternatives analysis for the overflow elimination is currently slated to begin in June 2008 after completion of the hydraulic model development and be completed by December 2008. Preliminary and detailed design of the selected solution as well as land acquisition and bidding are currently scheduled to occur from December 2008 until September 2009. Construction is expected to begin after design and bidding and will last approximately 15 months, until December 2010, inline with the Exhibit E deadline of December 31, 2010.

South Park Pump Station

The District is currently collecting flow monitoring and assessment data for this PS as part of the infrastructure characterization effort. Smoke testing and CCTV inspection of the tributary sewers have been completed and flow meters are currently installed to monitor flow into the pump station. The final solution will be selected based on a detailed alternatives analysis that will follow the development of the updated hydraulic model and will coincide with the development of the first set of Watershed Plans required in the CD. Detailed alternatives analysis for the overflow elimination is currently slated to begin in June 2008 after completion of the hydraulic model development and be completed by December 2008. Preliminary and detailed design of the selected solution as well as land acquisition and bidding are currently scheduled to occur from December 2008 until September 2009. Construction is expected to begin after design and bidding and will last approximately 15 months, until December 2010, inline with the Exhibit E deadline of December 31, 2010.

Crestview Pump Station

The proposed schedule for the Crestview PS is based on the initial approach to try to remove I/I first before extensive capital improvements are undertaken to eliminate the PS overflow. This is due to the fact that the Crestview PS is located at the very top of the collection system and the costs associated with conveyance of higher flows downstream would propagate through the entire interceptor system. Therefore the schedule for overflow elimination at this PS reflects SSES activities, such as smoke and dye testing, being conducted in conjunction with flow monitoring and collection system hydraulic model development. This work is currently being conducted and is planned to be completed by June 2008.

Following June 2008, design and construction of identified rehabilitation and other SSES-related improvements will occur and be completed by April 2010. The District will then monitor the effectiveness of the rehabilitation through flow monitoring from April 2010 until January 2011 to take advantage of the spring and fall rain seasons. From January 2011 until January 2012, the results of the monitoring will be used to update the hydraulic model, conduct detailed alternatives analysis and select the final solution. Design, land acquisition, bidding, and construction are currently scheduled to be completed by December 31, 2014, which is a full year ahead of the required Consent Decree Exhibit E deadline of December 31, 2015.

The schedules described above for eliminating the overflows at the South Hampton, Union, and Kentucky Aire pump stations are contingent upon the completion of the Western Regional Wastewater Treatment Plant (WRTP) and Western Regional Conveyance Tunnel (WRCT). As part of the preliminary design phase to be conducted for eliminating the overflows at each of these three pump stations, options that assume the WRWWTP and WRCT will not be online by December 31, 2015 will also be considered. The activities for the overflow elimination for these pump stations is scheduled to begin after the hydraulic models are finalized in June 2008. The WRCT is scheduled to be advertised for bid in April 2008 and the WRWWTP in June 2008, with construction to begin in the summer and fall of 2008. The construction duration for each project is currently scheduled for 3.5 years and construction will occur on both projects concurrently. This schedule along with construction progress will be evaluated as part of the preliminary design phase for eliminating the overflows at each of these three pump stations. If it appears that the WRWWTP and WRCT will not be completed in time for the District to meet the required milestones stipulated in the Pump Station Overflow Elimination Plan, the District will evaluate a contingency plan to proceed with an option that does not rely on the WRWWTP and WRCT.

Sanitation District No. 1 of Northern Kentucky
PUMP STATION OVERFLOW ELIMINATION PLAN SCHEDULE

ID	Task Name	2007 1st Half	2007 2nd Half	2008 1st Half	2008 2nd Half	2009 1st Half	2009 2nd Half	2010 1st Half	2010 2nd Half	2011 1st Half	2011 2nd Half	2012 1st Half	2012 2nd Half	2013 1st Half	2013 2nd Half	2014 1st Half	2014 2nd Half	2015 1st Half	2015 2nd Half
1																			
2	**Alex Licking PS**																		
3	Construction						7/31												
4	**Riley Road No. 1 PS**																		
5	Construction						3/30												
6	**Sunset PS**																		
7	Construction						4/10												
8	**South Hampton**																		
9	Model Development				6/12														
10	Frogtown Sewer Design								9/1										
11	WR Treatment Plant Construction													12/31					
12	Frogtown Sewer and Connector Construction														3/31				
13	**Union**																		
14	Union Sewer Construction			12/31															
15	WR Treatment Plant Construction													12/31					
16	Union Sewer Connector Construction														3/31				
17	**Lakeview**																		
18	Model Development				6/12														
19	Alternatives Analysis					6/30													
20	Design, Land Acquisition, and Bidding								8/30										
21	Construction															12/31			
22	**Highland Acres**																		
23	Model Development				6/12														
24	Alternatives Analysis					12/1													
25	Design, Land Acquisition, and Bidding						9/30												
26	Construction									12/31									
27	**Kentucky Aire**																		
28	Model Development				6/12														
29	Alternatives Analysis					6/30													
30	Design, Land Acquisition, and Bidding								8/30										
31	Construction															12/31			
32	**Allen Fork**																		
33	SSES Activities					1/15													
34	Design and Implement SSES Findings						4/15												
35	Monitor Effectiveness and ID add'l rehab							1/14											
36	Alternatives Analysis								1/17										
37	Design, Land Acquisition, and Bidding										6/14								
38	Construction																12/31		
39	**Harrison Harbor**																		
40	Model Development				6/12														
41	Alternatives Analysis					12/1													
42	Design, Land Acquisition, and Bidding						9/30												
43	Construction									12/31									
44	**Ripple Creek**																		
45	Model Development				6/12														
46	Alternatives Analysis					12/1													
47	Design, Land Acquisition, and Bidding						9/30												
48	Construction									12/31									
49	**South Park**																		
50	Model Development				6/12														
51	Alternatives Analysis					12/1													
52	Design, Land Acquisition, and Bidding						9/30												
53	Construction									12/31									
54	**Crestview**																		
55	SSES, Flow Monitoring, and Model Development				6/13														
56	Design and Implement SSES Findings						4/15												
57	Monitor Effectiveness and ID add'l rehab							1/14											
58	Alternatives Analysis								1/17										
59	Design, Land Acquisition, and Bidding										6/14								
60	Construction																12/31		

Project: PS Elimination Schedule-REVIS
Date: Wed 10/31/07

Task — Progress — Summary — External Tasks — Split
Split — Milestone — Project Summary — External MileTask

Page 1

SECTION 1: INTRODUCTION

1.1 Background and Consent Decree Requirements

Sanitation District No. 1 of Northern Kentucky (the District) entered into a Consent Decree with the United States Environmental Protection Agency (US EPA) and the Commonwealth of Kentucky (Cabinet) on April 18, 2007 that requires the District to finalize, develop, submit, and implement plans for the continued improvement of the separate sanitary sewer system (SSS), combined sewer system (CSS), and the District's wastewater treatment plants (WWTPs). The Consent Decree addresses sanitary sewer overflows (SSOs) and discharges from the combined sewer overflow outfalls (CSO outfalls) which are currently identified or will be identified in the future in any Kentucky Pollutant Discharge Elimination System (KPDES) permit issued to the District.

As part of this Consent Decree the District was tasked to develop a Pump Station Overflow Elimination Plan titled Pump Station Plan (paragraph 38 in the Consent Decree) to address the elimination of bypasses at selected pump stations within six months of entry of the Consent Decree. As stated in the Consent Decree, the District must submit "a plan to identify watershed projects to eliminate SSOs at the pump stations identified on Exhibit E (the 'Pump Station Plan'). The Pump Station Plan shall include expeditious schedules for design, initiation of construction, and completion of construction of remedial measures; provided however, that such schedules shall not extend beyond the dates set forth on Exhibit E." The pump stations (PSs) and the required overflow elimination dates as listed in Exhibit E of the Consent Decree are shown in Table 1.1 below.

Table 1.1 Exhibit E Pump Stations

Pump Station	Required Overflow Elimination Date
Lakeview	3 years after startup of the WRTP but no later than December 31, 2013
Ripple Creek	December 31, 2010
Alex-Licking	December 31, 2010
Reiley Road #1*	December 31, 2010
Harrison Harbor	December 31, 2010
Sunset	December 31, 2010
South Park	December 31, 2010
Taylorsport	December 31, 2010
Highland Acres	December 31, 2010
Crestview	December 31, 2015
Kentucky Aire	December 31, 2015
Union	December 31, 2015
South Hampton	December 31, 2015
Allen Fork	December 31, 2015
* There is a spelling mistake for “Reiley Road #1 PS”. The correct spelling is Riley Road #1 PS.	

This Pump Station Plan is designed to address all of the requirements as stated in the Consent Decree for all of the Exhibit E pump stations. A thorough evaluation and discussion of each PS is included in this document, including the District’s plans to identify watershed projects to eliminate SSOs at the Exhibit E pump stations, a discussion of potential solutions, and expeditious design and construction schedules for each of the pump stations developed to meet or exceed the deadlines listed within Exhibit E. Evaluation of the potential solutions to eliminate SSOs at these pump stations will be conducted based on the Consent Decree schedule identified for each PS and the solutions will be examined within the context of the Watershed Plans. Each section of this report corresponds to one of the Exhibit E Pump Stations and examines that PS in greater detail.

1.2 Pump Station Plan Content

This document is divided into two main sections; the first is an introduction and the second is the collection of 14 individual PS reports that satisfy the requirements of the Pump Station Plan as specified in Exhibit E. Each of the 14 individual PS reports is compiled using the same structure and format and contains information under the same categories for ease of understanding and review.

1.2.1 Pump Station Background

This section provides an overview of the pump station, including, but not limited to the following information:

- Photos and description
- Location and tributary area
- Date of construction
- Estimated or measured capacity

1.2.2 Known Pump Station Issues and Historical Data

This section of the report documents the known issues associated with each pump station, including details about wet weather operation, overflow and release reports, and any other important issues regarding the PS operation. This section will describe in detail the District's knowledge of each pump station, including information obtained through discussions with the District field operations and maintenance staff. Through previous investigation and monitoring, the District has developed an understanding of the issues facing each pump station. The incorporation of this historical information will be an important component of the development of the selected solution for the SSO elimination.

1.2.3 Ongoing Characterization and Monitoring Efforts

With knowledge of the wet weather capacity limitations within their system, the District has been proactive in examining and tracking the causes and frequency of overflows which occur at the listed pump stations. These pump stations have been identified as critical overflows to address, and as such, there has been significant past and current examination at both the PS and within the upstream sewers in order to develop effective control plans.

Several projects are being undertaken by the District that either have addressed or will address wet weather flows and overflows at the pump stations identified in Exhibit E. The results of the District's monitoring and efforts to reduce and eliminate overflows at these pump stations is documented within these sections. The following provides a sample listing of the topics that will be discussed within this section of each PS report:

- Inflow & Infiltration (I/I) Studies
- Hydraulic modeling
- Capital improvement projects
- Flow monitoring
- Supervisory Control and Data Acquisition (SCADA) data
- Smoke and dye testing
- Closed-Circuit Television (CCTV)

- Backup power inspections and recommendations
- Drawdown and PS testing

1.2.4 Potential Solutions

This section examines potential solutions and a plan for assessing the feasibility of each solution in more detail in order to identify and select the final alternative for implementation. Any solutions that may be considered impractical based on District knowledge or past investigation are noted in this section. This section also lists any tasks that must be conducted prior to the selection of the final design. For example, more detailed flow monitoring or hydraulic analysis may have to be conducted before the final design is selected. Those tasks and how they will be incorporated into the design selection process are detailed within this section.

1.2.5 Schedule

The final section of each PS report provides an outline of the schedule for the selection, design, initiation of construction, and completion of construction of a solution for each PS that will meet the deadlines detailed in Exhibit E. This schedule includes timing for any additional work that will be done prior to the selection of a recommended alternative. Significant milestones for each individual PS are also documented.

1.3 Overflow Elimination Options

1.3.1 Summary of Potential Solutions

Several potential solutions have been examined during the Pump Station Plan development that was conducted for each individual PS. The purpose of this section of the plan is to define and evaluate the potential solutions for all listed pump stations, including the following:

- Elimination of flows by gravity sewer
  - Construction of gravity sewers will be reviewed for not only the PS but also for removal of flow from points upstream of the PS to reduce the tributary area to the PS.
- PS capacity upgrade
  - The potential for PS rehabilitation or the construction of a new PS will be examined in order to provide sufficient wet weather pumping capacity to eliminate the PS overflow,.
- Wet weather equalization storage
  - Local storage at the PS will be examined and assessed for practicality at each of the pump stations. This solution will also examine the potential for any satellite storage to be constructed that would reduce the peak wet weather flows tributary to the pump station.

- I/I removal/reduction
  - The feasibility/predicted benefit of aggressive I/I removal will be assessed for each of the pump stations.

The applicability of each of these solutions has been assessed and documented within this plan and all selected potential solutions are listed for each PS. The schedules listed within this document will define the timeline for the final selection, design, and construction of the best alternative based on the available solutions. The final selected alternative may contain a combination of the potential solutions listed above. The District will attempt to exceed the Exhibit E deadlines where possible.

1.3.2 District Watershed Approach

Concurrent with the implementation of this Pump Station Plan, the District is developing for submittal to the US EPA and the Cabinet the Watershed Plans as required by the Consent Decree. Within the Watershed Plans, the District will determine a combination of affordable watershed and infrastructure controls to improve water quality, eliminate SSOs, and comply with the CSO Policy. The first Watershed Plans are due June 30, 2009. The results of that plan development will be reflected in the analysis of the potential solutions for each of the Exhibit E pump stations discussed within this report. The evaluation of alternatives prior to the selection of the final design solution for each PS will include an examination of the projected water quality benefits associated with the solution implementation and the incorporation of that solution within the system-wide Watershed Plans.

SECTION 2: ALEX LICKING PUMP STATION

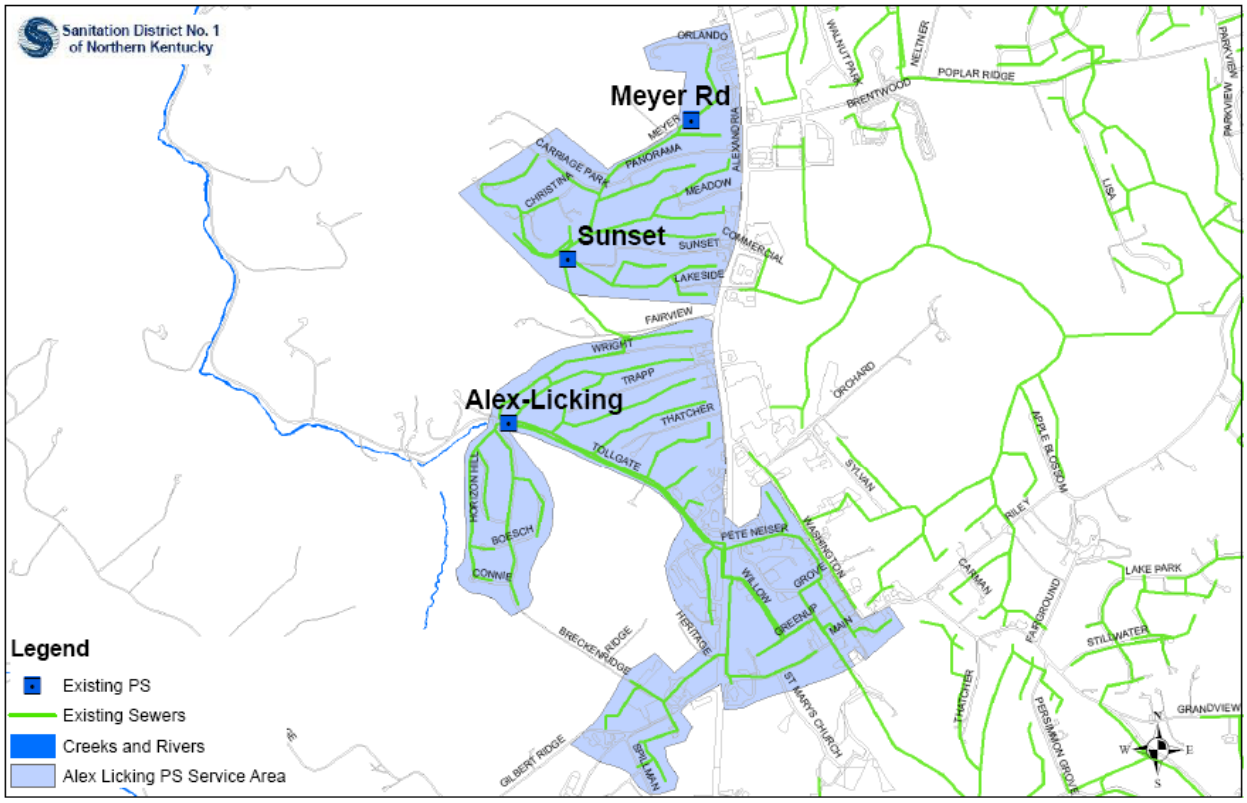
2.1 Alex Licking Pump Station Background

The Alex Licking PS is located in Alexandria, Kentucky, and was taken over by the District in 1997. The PS discharges to the Alexandria Wastewater Treatment Plant which is currently being replaced by the new Eastern Regional Wastewater Treatment Plant (ERTP) scheduled for startup in September 2007. The PS utilizes two Smith and Loveless vacuum prime pumps. The firm capacity of the PS is 740 gpm. With two pumps running, the flow is 860 gpm. The PS has a constructed bypass that discharges to a tributary of Riffle Creek, which discharges to the Licking River. Figure 2.1 shows a picture of the Alex Licking PS.

Figure 2.1 Alex Licking PS

The current gravity service area for the Alex Licking PS is relatively small but it receives flow from the Sunset PS, which is also included in the Pump Station Plan and discussed beginning on page 14. Figure 2.2 shows the current Alex Licking service area.

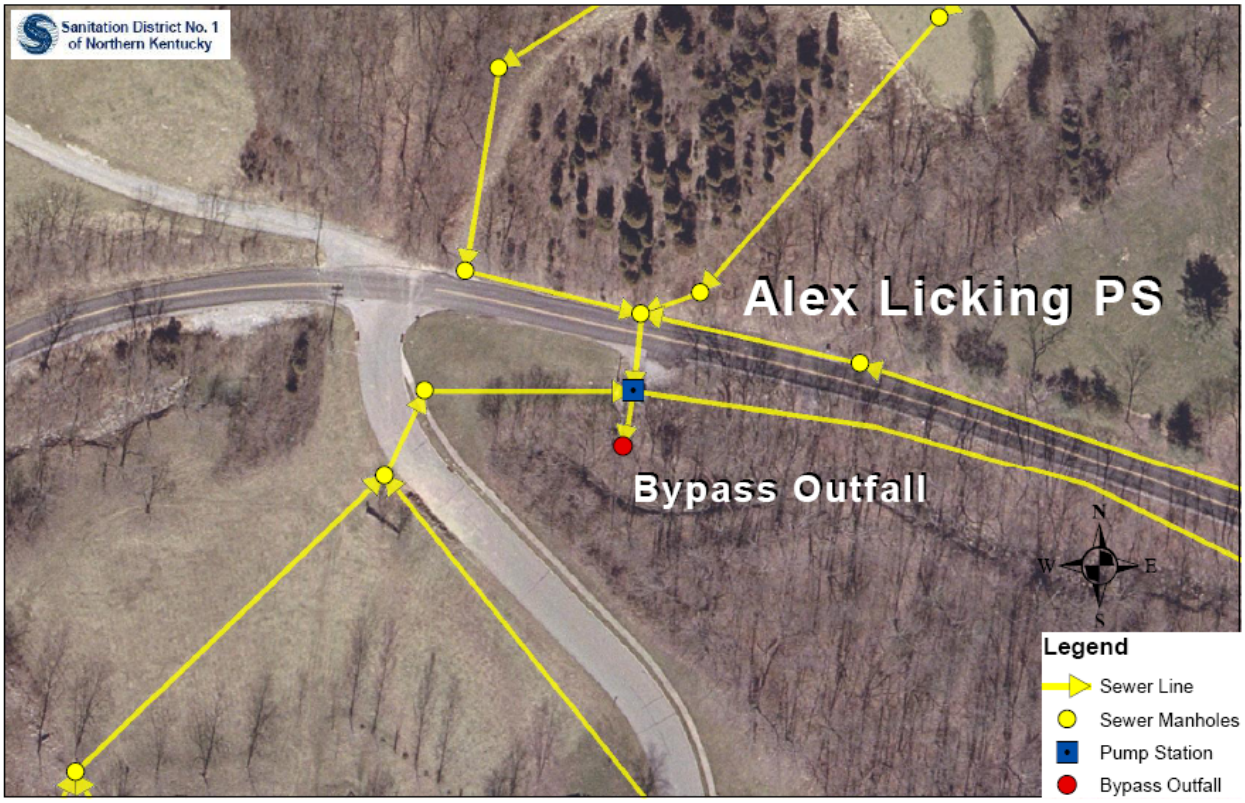
Figure 2.2 Current Alex Licking PS Service Area



Under dry weather flow, the PS has enough capacity. However, during heavy rainfall the capacity of the PS is exceeded and flow exits the PS via a constructed bypass into a tributary of Riffle Creek. This PS is one of several in the Alexandria area susceptible to high peak wet weather flows and was part of the reason that a connection ban was placed on Alexandria in 1997 by the Kentucky Division of Water.

Figure 2.3 shows the bypass configuration at Alex Licking PS.

Figure 2.3 Alex Licking PS Bypass Configuration



2.2 Known Issues and Historical Data

The overflows at the Alex Licking PS are primarily due to excess flow during wet weather. According to available overflow reports, the overflow at the Alex Licking PS activated approximately 9 times from August 2005 to July 2006 for a total spill volume of approximately 210,000 gallons. A complete list of the District pump station spill records for this period is available in Appendix A.

2.3 Ongoing Efforts

Before 1999, several studies were conducted in the Alexandria Service Area to try to identify I/I sources. The investigations did not reveal any new obvious or direct connection I/I sources. Known direct connections were removed and sewers and manholes were repaired, however spills in the area persisted.

In 2000, the District conducted a detailed study of the entire Alexandria Service area. The study included the development of a detailed hydraulic model and the installation of

over 20 flow meters. The study evaluated various options for dealing with the overflows. The resulting recommendation was to replace the Alex Licking PS with a new PS designed to convey peak wet weather flows under ultimate build-out conditions and to eliminate the bypass. This replacement is part of an overall upgrade of the Alexandria system to handle peak dry and wet weather flows into the future. The overall plan was summarized as part of the Eastern Regional portion of the District's Facilities Plan that was approved in 2002.

During the preliminary engineering phase of the design of the new pump station, the District decided to evaluate development on a more regional basis. Therefore, the new PS was planned to convey both current and ultimate-build-out dry and peak wet weather flows that could come to it, including an expanded Sunset PS.

2.3.1 Alex Licking PS Capacity Upgrade – Current Status & Schedule

The new Alex Licking PS design has been completed and construction is currently underway. The current date for substantial completion of the new Alex Licking PS is May 2008, with final completion in July 2008 well before the Exhibit E deadline of December 31, 2010. The new PS will convey peak dry and wet weather flows under Ultimate build-out conditions through a new force main and gravity sewer conveyance system to the new ERTP.

2.3.2 Eastern Regional Collection System and WWTP Construction

As stated previously, this PS construction is part of an overall facilities plan to upgrade the Alexandria collection system and include it as a new Eastern Regional Service area. The construction of the new ERTP is almost complete and start-up is scheduled for September 2007.

2.3.3 Sewer Lining, Televising, and Maintenance

Even though the District is constructing a new PS that is designed to handle peak wet weather flows, they are committed to a long term program of aggressive collection system operation and maintenance to try to identify and remove I/I. The District will continue identifying and correcting collection system defects and I/I through its ongoing Capacity Management Operation & Maintenance (CMOM) program.

SECTION 3: RILEY RD NO. 1 PUMP STATION

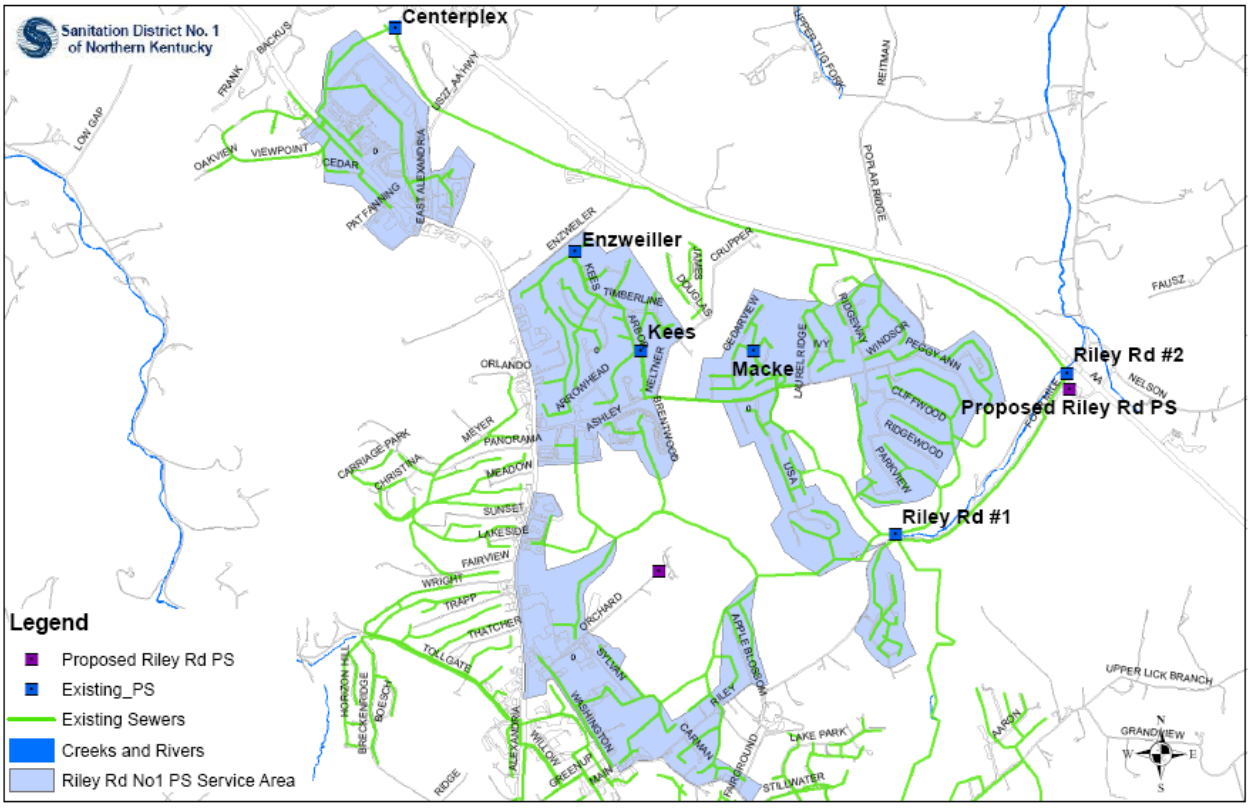
3.1 Riley Rd No. 1 Pump Station Background

Please note that there was a spelling error for the Reiley Road No. 1 PS. The correct spelling is Riley Road No. 1 PS. The Riley Rd No. 1 PS is located in Alexandria, Kentucky and was taken over by the District in 1997. The PS discharges to the Alexandria Wastewater Treatment Plant which is currently being replaced by the new ERTP. The PS utilizes two Cornell dry pit pumps. The firm capacity of the PS is 330 gpm. With two sets of pump running, the flow is 415 gpm. The PS has a constructed bypass that discharges to Four Mile Creek, which discharges to the Ohio River. Figure 3.1 shows a picture of the Riley Rd No. 1 PS

Figure 3.1 Riley Rd No. 1 PS

The Riley Rd No. 1 PS serves a large portion of the Alexandria service area and is fed by several other pump stations including Riley Rd No. 2, Kees, and Macke. Figure 3.2 shows the current Riley Rd No. 1 service area.

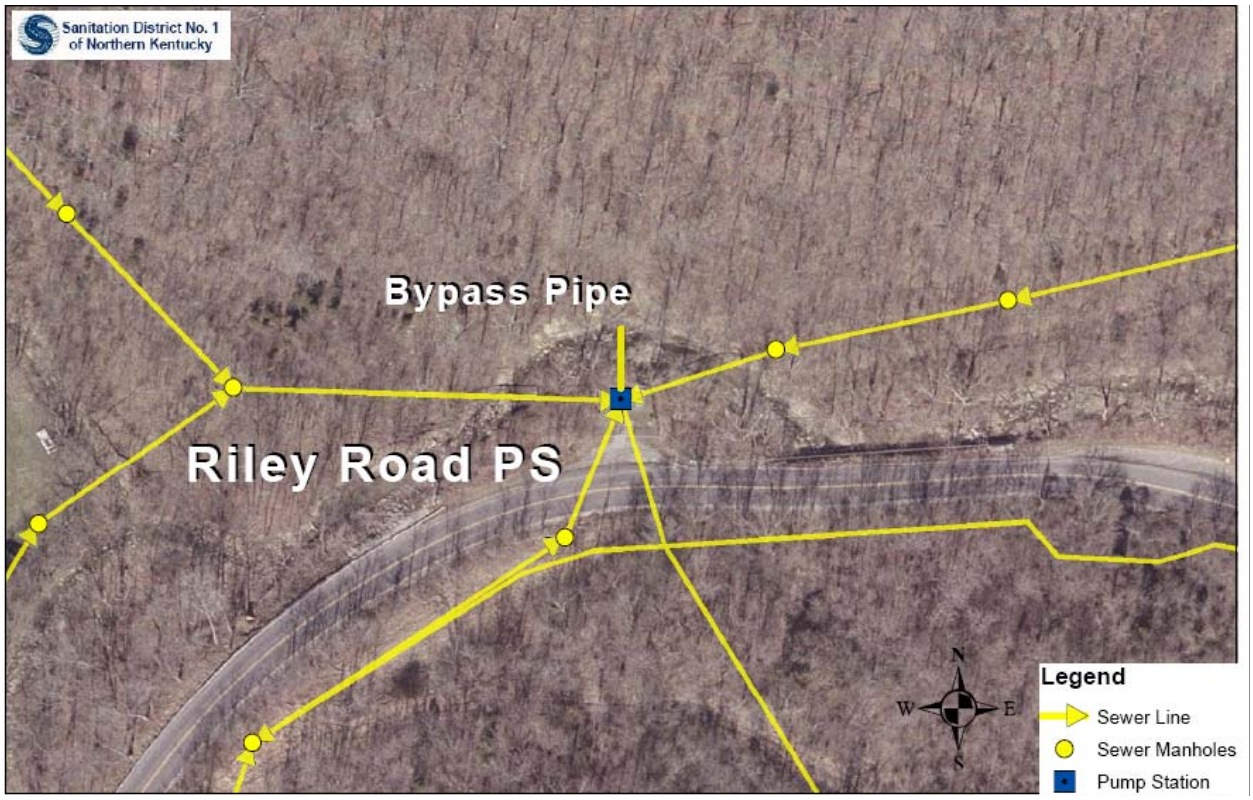
Figure 3.2 Current Riley Road No. 1 PS Service Area



Under dry weather flow, the PS has enough capacity. However, during heavy rainfall, the capacity of the PS is exceeded and flow exits the PS via a constructed bypass into Four Mile Creek. This PS is one of several in the Alexandria area susceptible to high peak wet weather flows and was part of the reason that a connection ban was placed on Alexandria in 1997 by the Kentucky Division of Water.

Figure 3.3 shows the bypass configuration at the Riley Rd No. 1 PS.

Figure 3.3 Riley Rd No. 1 PS Bypass Configuration



3.2 Known Issues and Historical Data

The overflows at the Riley Rd No. 1 PS are primarily due to excess flow during wet weather. According to available overflow reports, the overflow at the Riley Rd No. 1 PS activated approximately 18 times from August 2005 to July 2006 for a total spill volume of approximately 400,000 gallons. A complete list of the District pump station spill records for this period is available in Appendix A.

Ongoing Efforts

Before 1999, several studies were conducted in the Alexandria Service Area to try to identify I/I sources. Known direct connections were removed and sewers and manholes were repaired. However, spills in the area persisted.

In 2000, the District conducted a detailed study of the entire Alexandria Service area. The study included the development of a detailed hydraulic model and the installation of over 20 flow meters. The study evaluated various options for dealing with overflows. The resulting recommendation was to eliminate the Riley Rd No. 1 PS and bypass, and

to divert the flow via a new gravity sewer to a new Riley Rd pump station that will replace the existing Riley Rd No. 2 pump station. The replacement gravity sewer was sized to convey all peak wet weather flows to the new Riley Rd pump station. This work is part of an overall upgrade of the Alexandria system to handle peak flows into the future. The overall plan was summarized as part of the Eastern Regional portion of the District's Regional Facilities Plan that was approved in 2002.

3.2.1 Riley Rd No. 2 Upgrade & Schedule

As mentioned previously, the Riley Rd No. 2 pump station, which currently discharges to Riley Rd No. 1, is being replaced with a new PS titled Riley Rd PS which is being constructed next to the existing Riley Rd No. 2 PS that will receive all of the flow from the new gravity sewer eliminating Riley Rd No. 1 and bypass, as well as the flows from other areas of the system. The new Riley Rd PS will convey peak dry and wet weather flows under Ultimate build-out conditions through a new force main and gravity sewer conveyance system to the new ERTP. The elimination of the Riley Rd No. 1 PS and bypass is currently being performed as part of the new Riley Rd pump station and conveyance system construction which is currently underway. The current date for substantial completion of the new Riley Rd PS is December 2008, with final completion in March 2009 well ahead of the Exhibit E deadline of December 31, 2010.

3.2.2 Eastern Regional Collection System and WWTP Construction

As stated previously, this PS construction is part of an overall facilities plan to upgrade the Alexandria collection system and include it as a new Eastern Regional Service area. The construction of the new ERTP is almost complete and start-up is scheduled in September 2007.

3.2.3 Sewer Lining, Televising, and Maintenance

Even though the District is constructing a new PS that is designed to handle peak wet weather flows, they are committed to a long term program of aggressive collection system operation and maintenance to try to identify and remove I/I. Much of the Riley Rd No. 1 service area is served by older clay pipe and rates high on the list for continued I/I investigation. The District will continue identifying and correcting collection system defects and I/I through their ongoing CMOM program.

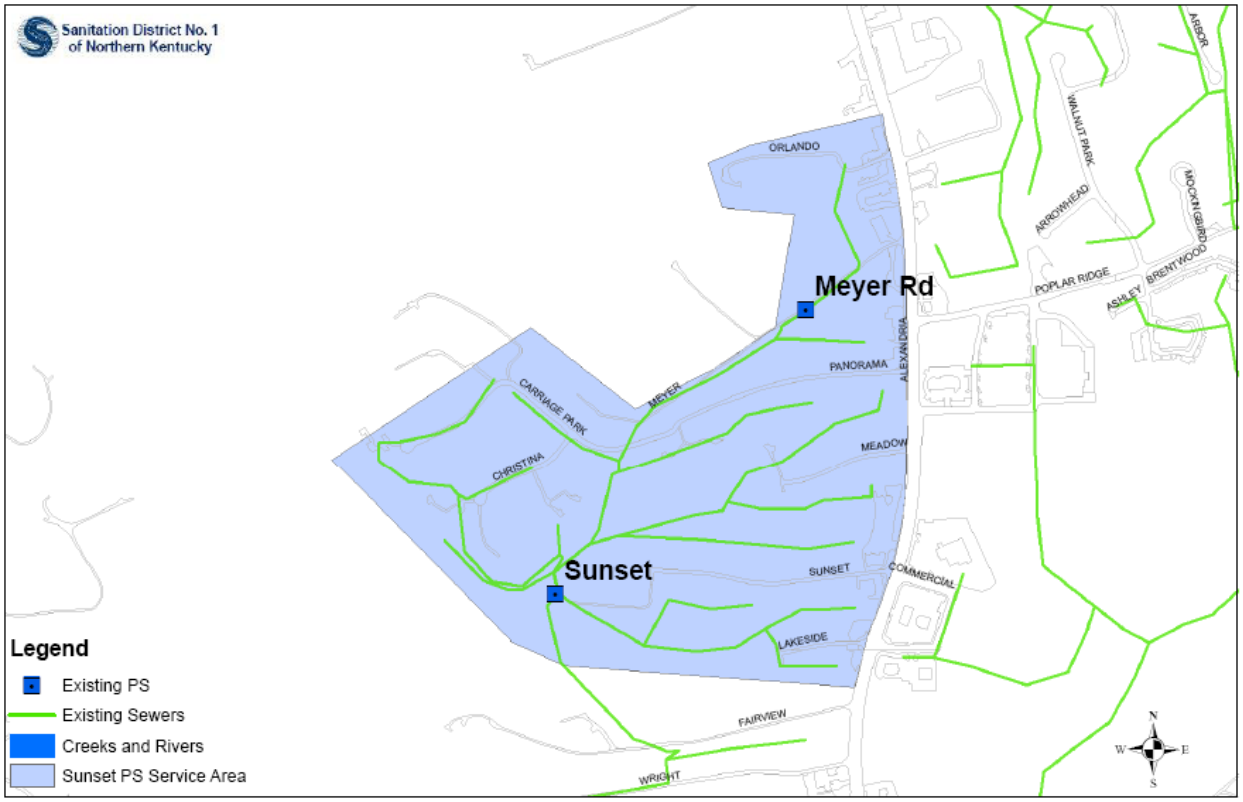
SECTION 4: SUNSET PUMP STATION

4.1 Sunset Pump Station Background

The Sunset PS is located in Alexandria, Kentucky and was taken over by the District in 1997. The PS discharges to the Alexandria Wastewater Treatment Plant which is currently being replaced by the new ERTP scheduled for startup in September 2007. The PS utilizes two Smith and Loveless vacuum prime pumps. The firm capacity of the PS is 179 gpm. With two pumps running, the flow is 213 gpm. The PS overflows during heavy rain events out of the wetwell that discharges to a lake tributary to Riffle Creek, which discharges to the Licking River.

The current service area for Sunset PS is relatively small. Figure 4.1 shows the current PS service area.

Figure 4.1 Current Sunset PS Service Area

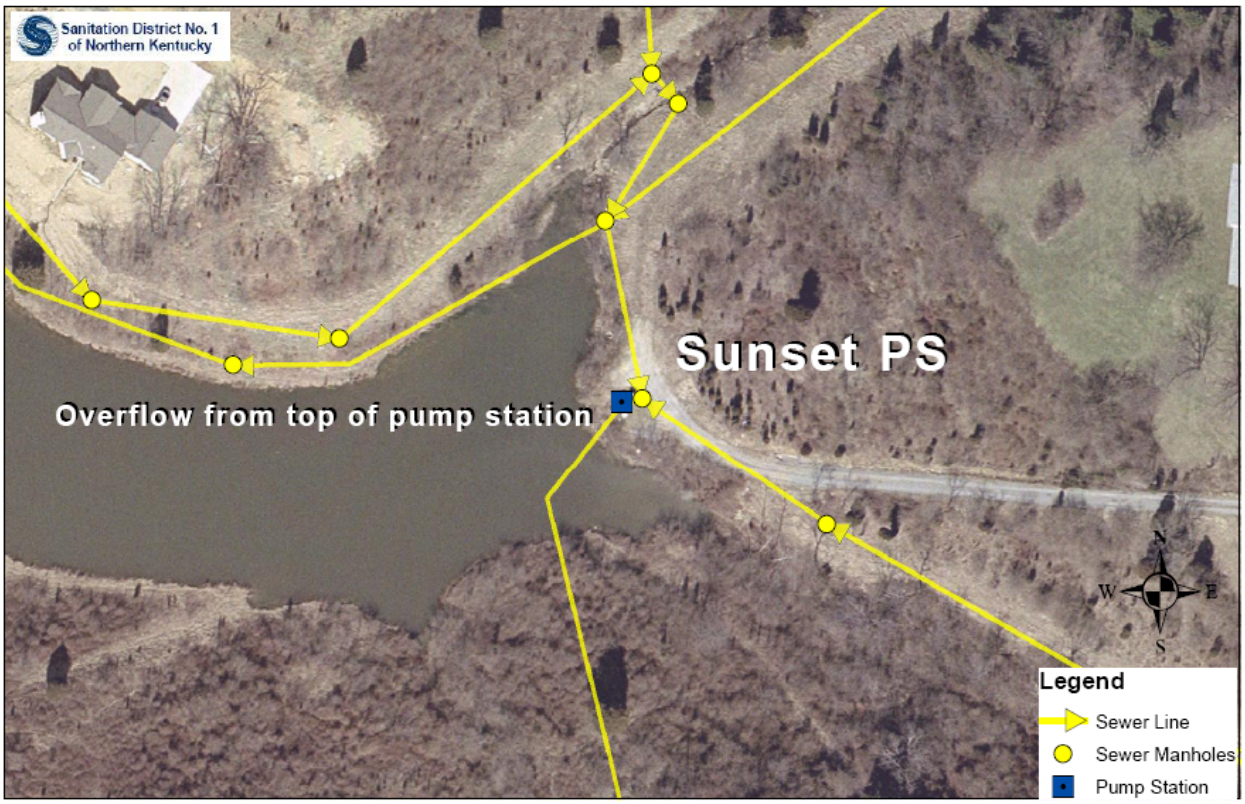


Under dry weather flow, the PS has enough capacity. However, during heavy rainfall, the capacity of the PS is exceeded and flow exits the PS via the top of the PS into a lake that drains to Riffle Creek. This PS is one of several in the Alexandria area

susceptible to high peak wet weather flows and was part of the reason that a connection ban was placed on Alexandria in 1997 by the Kentucky Division of Water.

Figure 4.2 shows the overflow location at the Sunset PS.

Figure 4.2 Sunset PS Overflow



4.2 Known Issues and Historical Data

The overflows at the Sunset PS are primarily due to excess flow during wet weather. According to available overflow reports, the overflow at the Sunset PS activated only 1 time from August 2005 to July 2006 for a total spill volume of approximately 25,000 gallons. A complete list of the District pump station spill records for this period is available in Appendix A.

4.3 Ongoing Efforts

Before 1999, several studies were conducted in the Alexandria Service Area to try to identify I/I sources. The investigations did not reveal any new direct connection I/I sources other than those that had previously been identified. The previously known direct connections were removed and sewers and manholes were repaired. However, spills in the area persisted.

In 2000, the District conducted a detailed study of the entire Alexandria Service area. The study included the development of a detailed hydraulic model and the installation of over 20 flow meters. The study evaluated various options for dealing with overflows. The resulting recommendation was to replace the Sunset PS with a new PS designed to convey peak wet weather flows under Ultimate build-out conditions and to eliminate the bypass. This replacement would be a part of an overall upgrade of the Alexandria system to handle peak dry and wet weather flows into the future. The overall plan was summarized as part of the Eastern Regional portion of the District's Facilities Plan that was approved in 2002.

During the preliminary engineering phase of the design of the new pump station, the District decided to evaluate development on a more regional basis. Therefore, the new PS was planned to convey both current and ultimate-build-out dry and peak wet weather flows that could be tributary to it.

4.3.1 Sunset PS Sewer Lining Pilot Project

In 2001, the District lined most of the sewers upstream of the Sunset PS as part of a pilot project to test the efficacy of reducing I/I into the pump station. In addition to the CIPP lining, many lateral tap connections were removed and replaced with new watertight Inserta-Tee connections. Other tap locations were grouted with acrylamide grout to remove I/I at the connection. Post rehabilitation flow monitoring showed that the peak flows did not decrease, but the overall volume did appear to drop; however overflows still occurred.

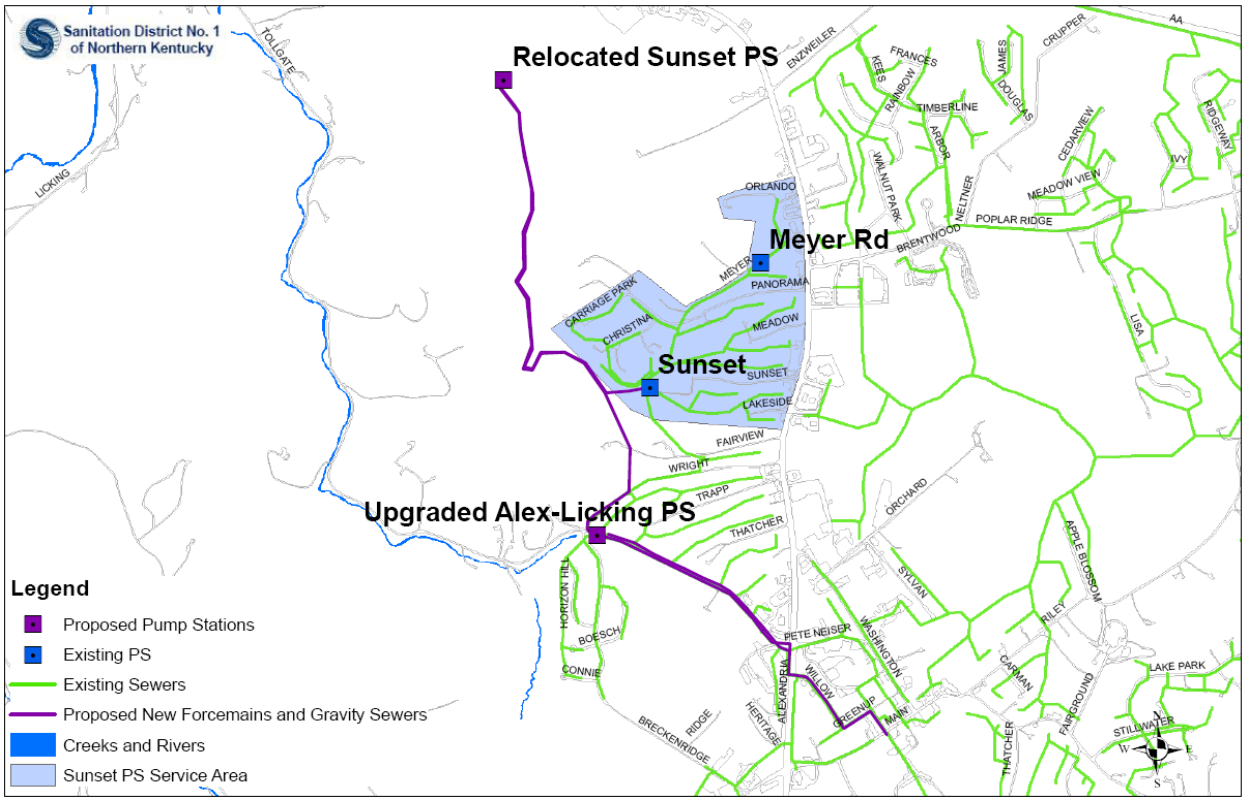
4.3.2 Sunset PS Capacity Upgrade – Current Status & Schedule

The District is currently partnering with a local developer to remove the existing Sunset PS, add a new gravity sewer, and construct a new Sunset PS farther downstream in the watershed. This new location for the new PS will allow additional future development to be served by the new Sunset PS. The new Sunset PS will discharge through a new force main and gravity sewer collection system to the new Alex Licking PS currently under construction as described in the Alex Licking PS summary above.

The new Sunset PS is currently under design with construction expected to begin in the spring of 2008. The new Sunset PS will be in-service by the spring of 2009, well ahead

of the Exhibit E deadline of December 31, 2010. The new pump station, forcemain and gravity sewers are being designed to convey peak dry and wet weather flows under Ultimate build-out conditions to the Alex Licking PS which is also designed to convey peak dry and wet weather flows to the new ERTP. Figure 4.3 shows the currently planned Sunset PS and Alex-Licking PS construction.

Figure 4.3 Proposed Sunset PS Construction



4.3.3 Eastern Regional Collection System and WWTP Construction

As stated previously, this PS construction is part of an overall facilities plan to upgrade the Alexandria collection system and include it as a new Eastern Regional Service area. The construction of the new ERTP is almost complete and start-up is scheduled in September 2007.

SECTION 5: SOUTH HAMPTON PUMP STATION

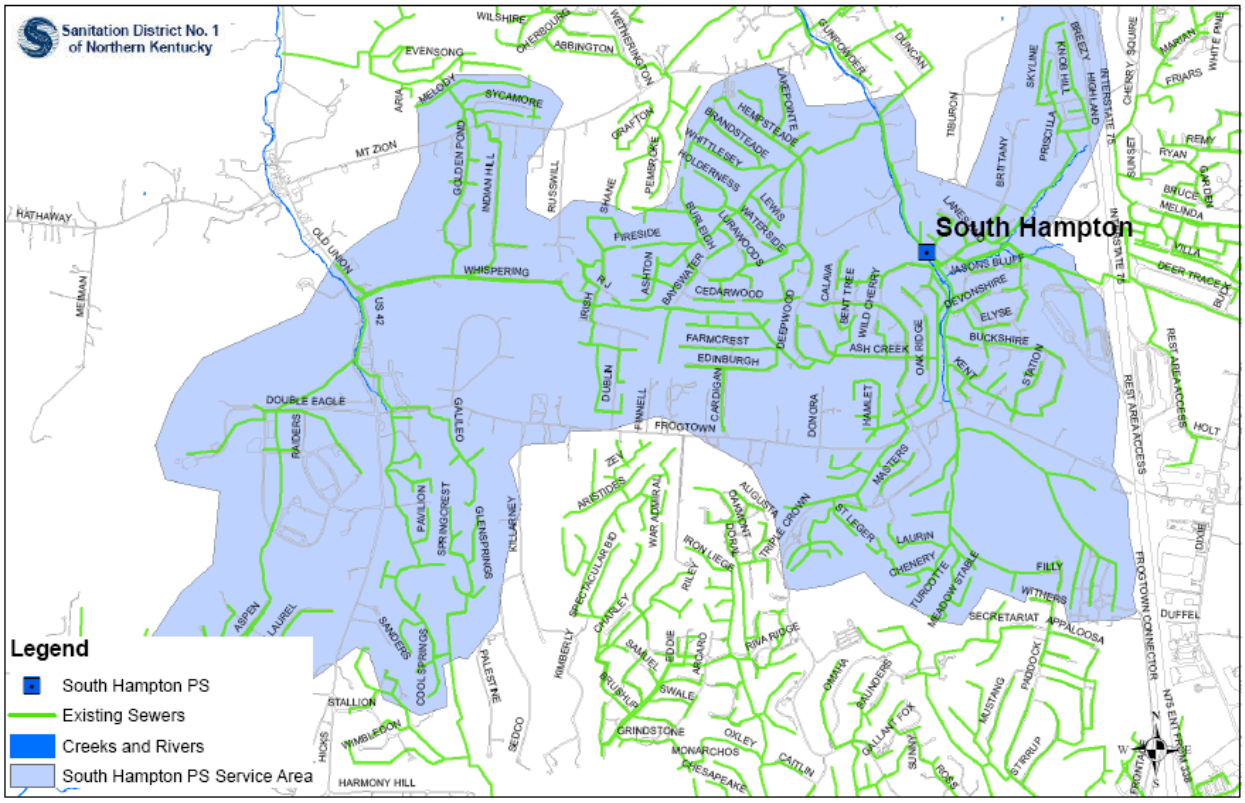
5.1 South Hampton Pump Station Background

South Hampton PS is a separate sanitary PS in the southwestern portion of the District's service area and serves a growing area in Boone County, KY. It is located on an access road at the end of Brittany Trail, south of Mt. Zion Rd and west of I-71/I-75. The South Hampton PS receives flow from the Union PS, Hempsteade PS, Dublin Green No. 1 and Dublin Green No. 2 PSs, as well as its local gravity service area. The flow from South Hampton PS is pumped through Kentucky Aire PS and then Lakeview PS until it reaches the Dry Creek Interceptor which eventually drains to the Dry Creek Wastewater Treatment Plant (WWTP). The PS contains three pumps: it currently has a firm capacity of approximately 1.4 MGD and a wet weather capacity of approximately 1.7 MGD based on field testing. A picture of South Hampton PS is shown in Figure 5.1.

Figure 5.1 South Hampton PS

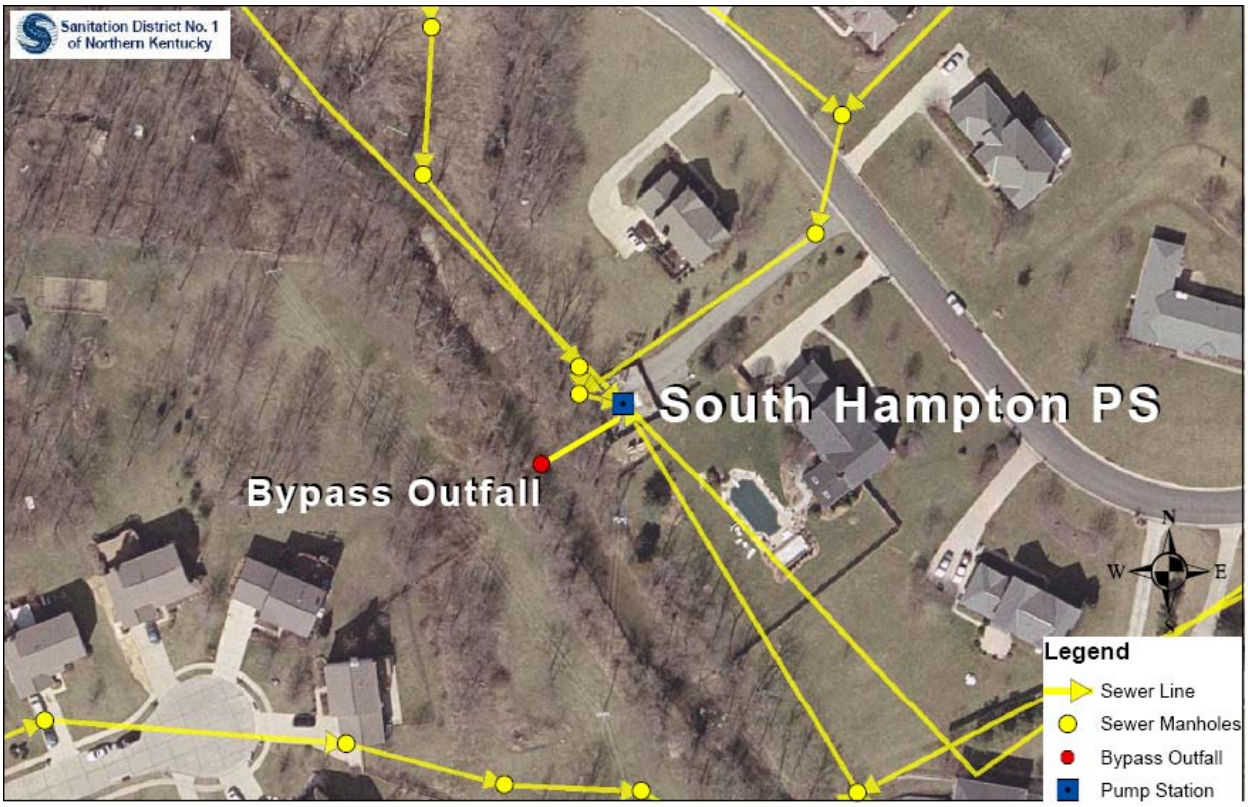
The current service area for South Hampton PS is shown in Figure 5.2.

Figure 5.2 Current South Hampton PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS overflows through an outfall into the South Fork Gunpowder Creek, which is tributary to the Gunpowder Creek, and eventually the Ohio River. Figure 5.3 shows the bypass configuration and approximate location for South Hampton PS.

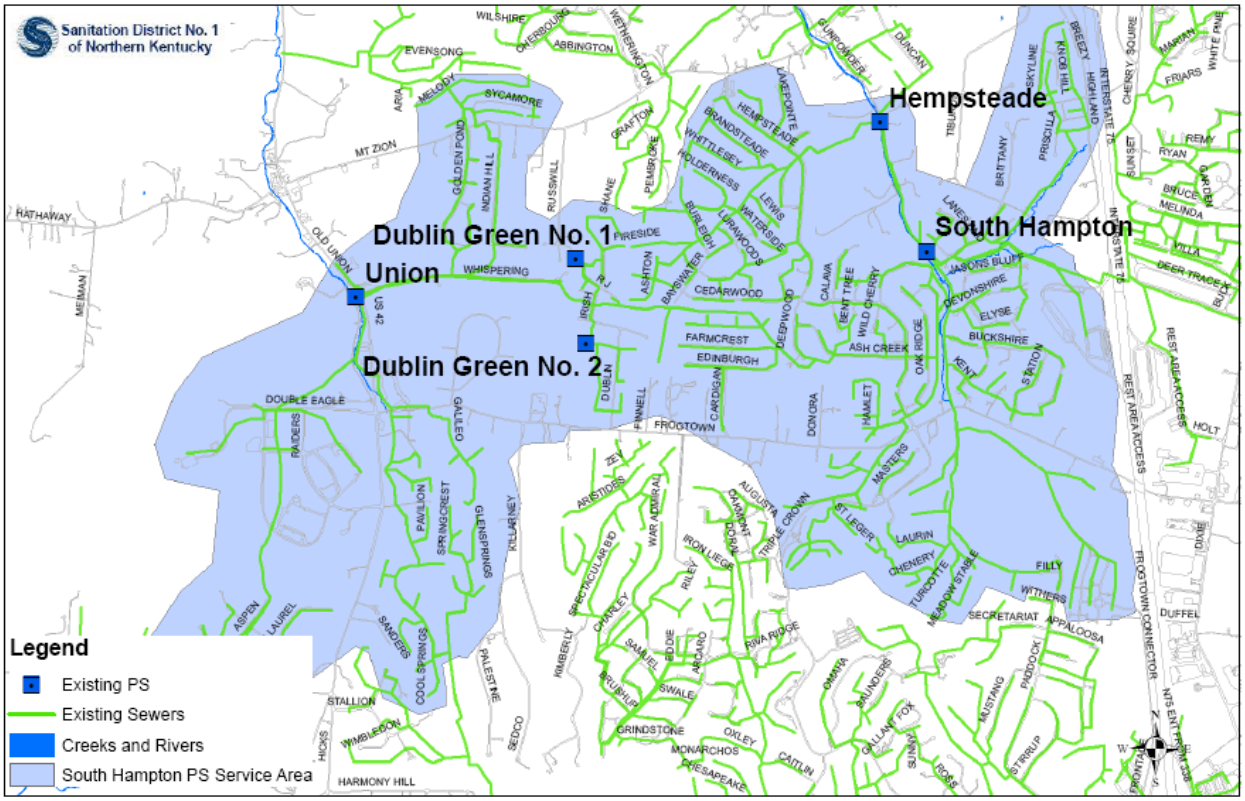
Figure 5.3 South Hampton PS Bypass Configuration



5.2 Known Issues and Historical Data

The area tributary to the South Hampton PS is one of the rapidly growing regions of the District's service area and has experienced substantial development within recent years. Though the service area does not contain a significant amount of older development, the new construction has created potential wet weather problems at South Hampton PS and its tributary pump stations such as the Union PS. Several pump stations pump to South Hampton PS and have the potential to contribute their peak capacity during a wet weather event. The pump stations upstream of South Hampton PS are shown in Figure 5.4.

Figure 5.4 South Hampton Tributary PS



With the recent growth in the area, the increased flows to the PS in recent years have increased the possibility for a wet weather overflow to occur at South Hampton PS. During the 12-month period from August 2005 to July 2006, South Hampton PS was documented to have five overflow activations based on wet weather conditions (and once for mechanical failure) according to District records for a total volume of 130,000 gallons. Future growth in this area is likely and the impacts of this future growth on station performance are being considered by the District in the plans to address the wet weather issues at South Hampton PS. A complete list of the District pump station spill records for this period is available in Appendix A.

5.3 Ongoing Efforts

With the continued growth in the locations tributary to the South Hampton PS, the District has monitored and studied the associated wet weather impacts on the pump station. With the goal to eliminate overflows at this location, the District has focused its attention on reducing wet weather flows in the interim and developing elimination strategies for the near-term. The District has previously commissioned several studies

and is currently implementing several construction projects prior to the Consent Decree deadline to eliminate the South Hampton PS and overflow.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the area tributary to South Hampton PS. The results of this monitoring program will be used to further refine the District's collection system.

The most significant of the recent projects that have contributed or will contribute to overflow reduction at the South Hampton PS are discussed below; some of the work is ongoing and will not be finalized for several years. The results of these projects will be included in the analysis of the potential solutions for the eventual elimination of the overflow.

5.3.1 Hydraulic Model Development and Southern Kenton County Study

In 2002, the District developed a series of system-wide hydraulic models to assess system performance and to utilize in the planning of major capital projects. The Dry Creek hydraulic model encompasses the Lakeview PS service area and as a result, includes the South Hampton PS service area. During 2005-2006, the District commissioned a study to examine the entire Lakeview PS drainage basin and to update the hydraulic model to reflect recent growth within the service area. Flow meters were placed in the collection system, and the hydraulic model for the Lakeview service area was updated and calibrated based on the collected data in the area around the South Hampton PS.

The tributary area to the South Hampton PS was evaluated for potential wet weather impacts based on the calibrated model. The District has utilized this information in examining the potential for short term overflow reduction and eventual overflow elimination. This hydraulic model will be verified based on data collected during the 2007-2008 flow monitoring period and will be utilized during the alternatives analysis to size potential solutions for the South Hampton PS.

5.3.2 Sewer Televising and Maintenance

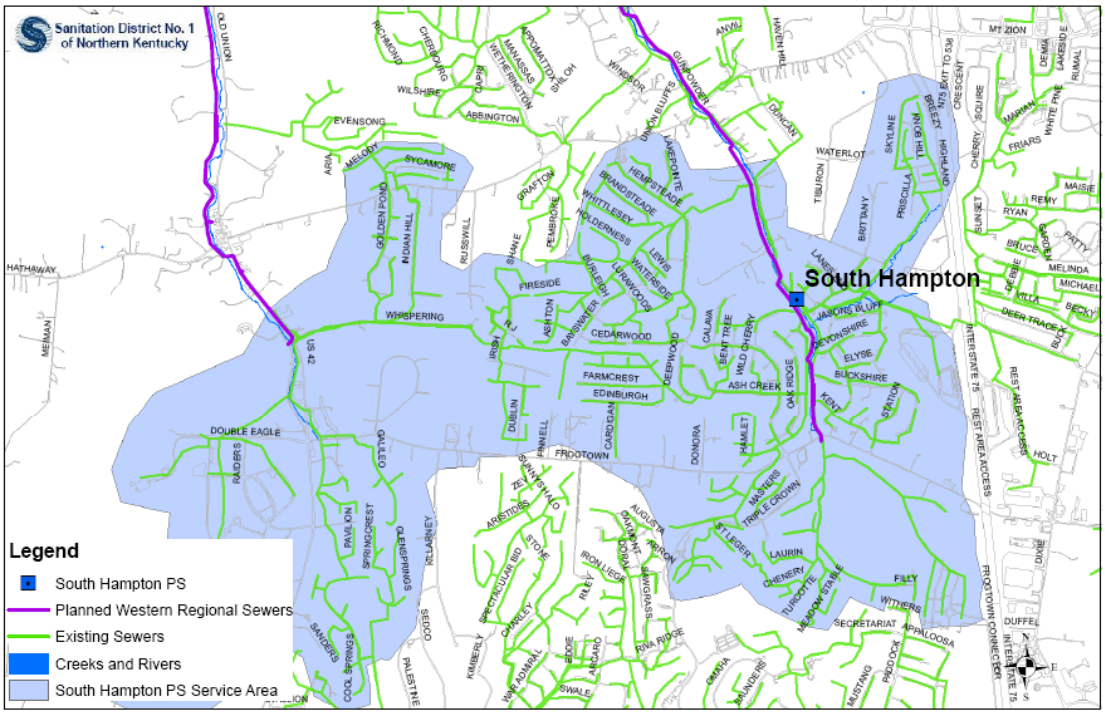
Based on the potential for wet weather bypasses to occur at South Hampton PS, the District has identified the sewers upstream of South Hampton PS (including those upstream of tributary pump stations such as Union PS) as a priority for identifying and reducing wet weather I/I. The District has also recently embarked on an aggressive televising and maintenance program in the South Hampton PS service area. To date, almost 42,000 ft out of a total of approximately 195,000 ft of tributary sewers have been televised to examine for defects and potential I/I sources. Structural and service defects (offsets, sags, debris, roots etc..) and infiltration have been observed during the

televising and have been used to designate lines for repair. Approximately 1800 ft of sewer has been replaced upstream of South Hampton PS based on the results of the televising. An additional 77 manholes have been repaired based on the results of the field investigation. All of these improvements have helped to try to reduce the wet weather I/I in the system. Future televising and field investigation will be used to help pinpoint areas where RDII reduction could take place. These efforts will be an important component of any overflow elimination plan for the South Hampton PS overflow.

5.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

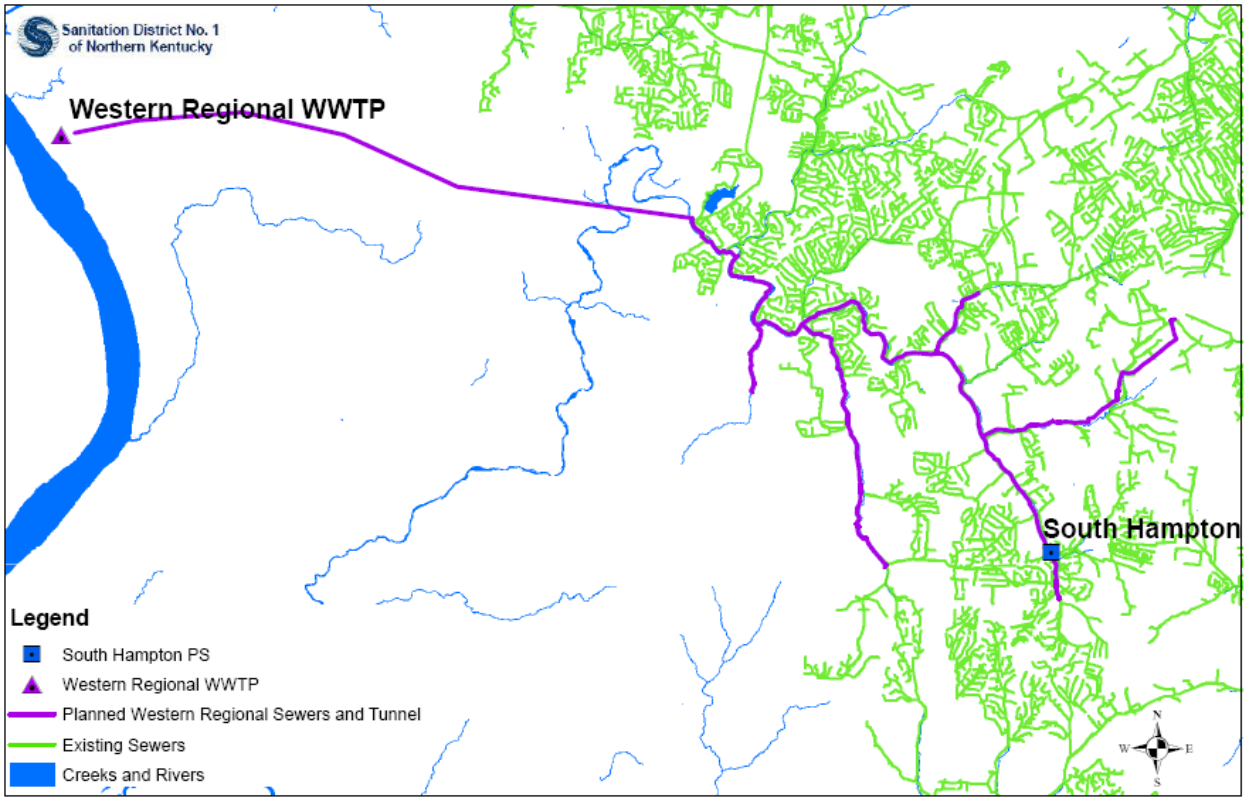
The District is currently constructing the new WRTP and collection system trunk sewers to serve the new treatment plant. As part of the new infrastructure, the new 42" Frogtown sewer is currently under preliminary design. This sewer is proposed to collect flow from the current South Hampton PS service area and convey to the WRTP. The construction of this new sewer will enable the District to eliminate the South Hampton PS and overflow and convey the peak wet weather flows by gravity to the new WRTP. The new 42" Frogtown sewer was sized to convey peak wet weather flows under Ultimate build-out conditions. Figure 5.5 shows the location of the planned Frogtown sewer and the location of the existing South Hampton PS.

Figure 5.5 Proposed Frogtown Sewer Alignment



The new Frogtown sewer will continue north to the planned Gunpowder sewer and then west to the Western Regional tunnel and to the WRTP. Figure 5.6 shows the planned path of the Frogtown sewer to the WRTP and the planned revised conveyance for the South Hampton PS service area.

Figure 5.6 Planned Western Regional Improvements



5.4 Identified Solution

The elimination of the South Hampton PS and overflow through gravity sewer construction is the planned solution for the PS. The new 42" Frogtown sewer, as noted in the previous section, will be constructed to convey peak dry and wet weather flows under Ultimate build-out conditions to the new WRTP. Following the completion of the entire Western Regional trunk sewer conveyance network and the new WRTP, the entire South Hampton PS service area will be able to drain through the new Western Regional Collection System. A small amount of additional construction will be needed to connect the existing sewers to the new Frogtown sewer upon its completion. The design and construction of the connecting sewer segment will be planned to coincide

with the construction of the WRTP. This solution will eliminate the South Hampton PS and overflow.

5.4.1 RDII Removal/Reduction

The District is committed to examining an RDII removal and reduction program within the South Hampton PS service area. By reducing wet weather RDII tributary to the PS, the potential for wet weather overflows will be reduced until the PS overflow is eliminated. The benefits of this effort will continue even after the new Frogtown sewer is operational.

5.4.2 Additional Work

Prior to the final implementation of the solution for the elimination of the South Hampton PS overflow and the sizing of any connections from the South Hampton PS site to the Frogtown sewer, the Dry Creek hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. The Frogtown sewer is already under design and has been sized to convey peak wet weather flows under Ultimate build-out conditions, but the sizing of any connections between the new sewer and the existing tributary sewers will be evaluated using the wet weather simulations within the model.

5.5 Schedule

The deadline for the elimination of the South Hampton PS overflow is December 31, 2015. The South Hampton PS is currently tributary to the Lakeview PS, and the plan is to eliminate the South Hampton PS prior to the Lakeview PS bypass elimination deadline of December 31, 2013. Given the timeframe of the currently planned District improvements for the Western Regional sewers and WRTP, the schedule is proposed in Table 5.1.

Table 5.1 South Hampton PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Existing Dry Creek and Future Dry Creek and Western Regional Models
September 1, 2011	Final Design Completed for Frogtown Sewer
January 1, 2011	Construction Begins on Frogtown Sewer
December 31, 2012	Western Regional Treatment Plant Complete
March 31, 2013	South Hampton PS connection to Frogtown Sewer completed and PS and overflow removed

SECTION 6: UNION PUMP STATION

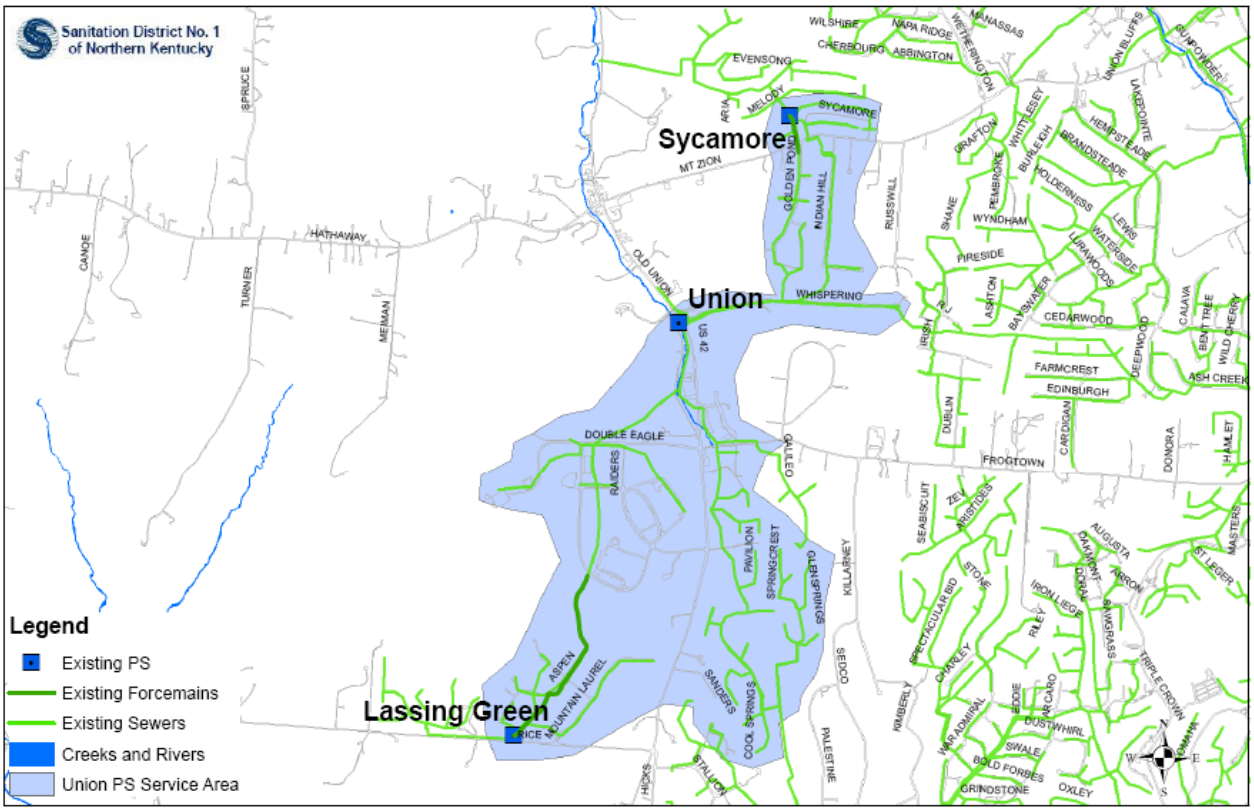
6.1 Union Pump Station Background

Union PS is a separate sanitary PS in the southwestern portion of the District's service area and serves a rapidly growing area in Union, KY. It is located on Rt 42 just south of Mt. Zion Rd in Boone County. The Union PS receives flow from its gravity service area as well as from the Sycamore and Lassing Green pump stations. The flow from Union PS is pumped through a series of additional pump stations (South Hampton PS, Kentucky Aire PS, and Lakeview PS) until it reaches the Dry Creek Interceptor which eventually drains to the Dry Creek Wastewater Treatment Plant . The PS contains 3 pumps: it currently has a firm capacity of approximately 0.9 MGD based on field testing. A picture of Union PS is shown in Figure 6.1.

Figure 6.1 Union PS

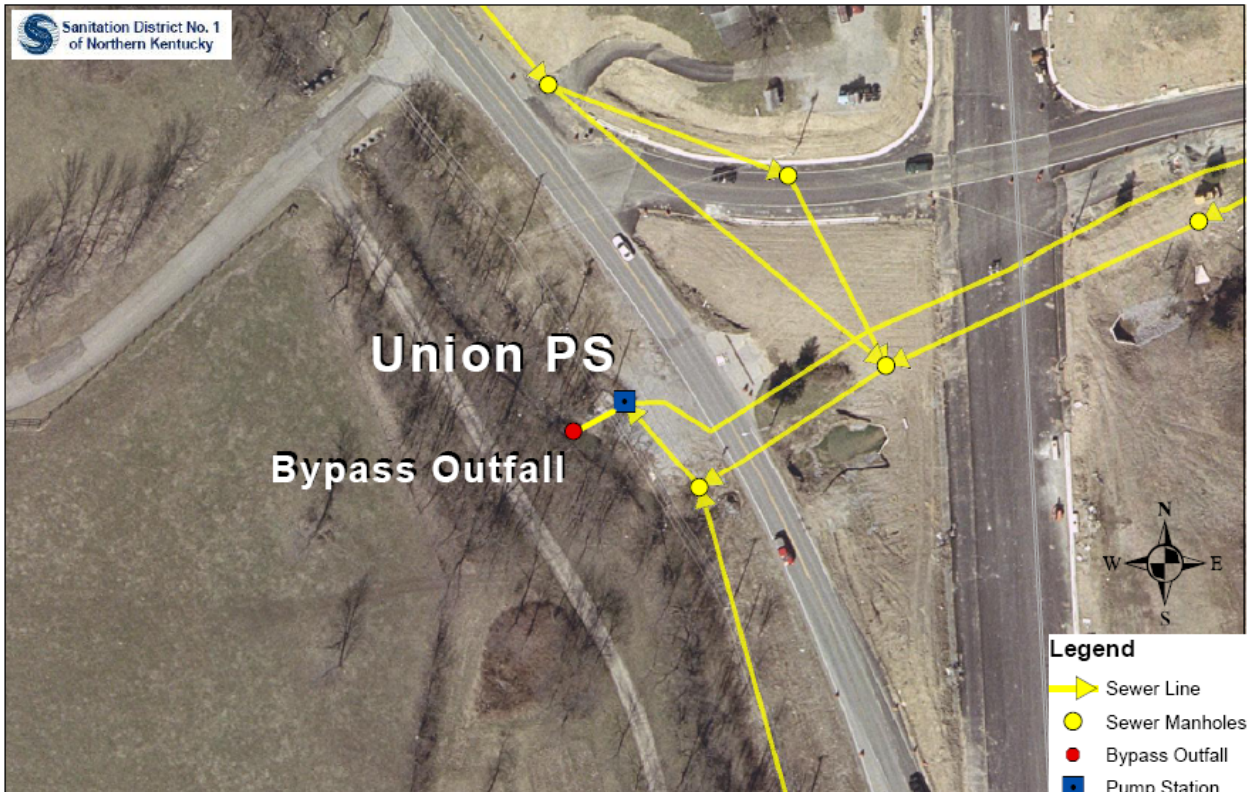
The current service area for Union PS is shown in Figure 6.2.

Figure 6.2 Current Union PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS overflows through an outfall into Fowlers Fork, which is tributary to Gunpowder Creek and eventually the Ohio River. Figure 6.3 shows the Union PS location and the bypass configuration.

Figure 6.3 Union PS Bypass Location



6.2 Known Issues and Historical Data

The area tributary to the Union PS is one of the fastest growing regions of the District's service area and has experienced substantial development within recent years. Though the service area does not contain much older development, the new construction has created potential wet weather problems at Union PS. The increased flows to the PS in recent years have increased the potential for wet weather overflows to occur at the PS. In addition, the two small pump stations, Sycamore PS and Lassing Green PS, which are tributary to Union PS, have the potential to contribute to peak wet weather flows when operating at their peak capacity during wet weather.

The District has successfully managed to reduce the frequency of overflow events at Union PS, and from July 2005 to August 2006 Union PS had no overflow activations. A complete list of the District pump station spill records for this period is available in Appendix A. However, future growth in this area is a possibility and the impacts of this future growth on station performance are being considered by the District in the plans to address the wet weather issues at Union PS.

6.3 Ongoing Efforts

Even with the continued growth in the locations tributary to Union PS, the District has managed to limit the impacts of wet weather flow on the station performance. As noted previously, zero overflows were recorded at Union PS during the 12 month period from July 2005 to August 2006. With the goal to eliminate overflows at this location, the District has focused its attention on reducing wet weather flows in the interim and developing elimination strategies for the near-term. The District has previously commissioned several studies and is currently implementing several construction projects prior to the Consent Decree deadline to eliminate the Union PS and overflow.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the area tributary to Union PS. The results of this monitoring program will be used to further refine the District's collection system and water quality models.

The most significant of the recent projects that have contributed or will contribute to overflow reduction at the Union PS are discussed below; some of the work is ongoing and will not be finalized for several years. The results of these projects will be included in the analysis of the potential solutions for the elimination of the overflow.

6.3.1 Hydraulic Model Development and Southern Kenton County Study

In 2002, the District developed a series of system-wide hydraulic models to assess system performance and to utilize in the planning of major capital projects. The Dry Creek hydraulic model encompasses the Lakeview PS service area and as a result, includes the Union PS service area. During 2005-2006, the District commissioned a study to examine the entire Lakeview PS drainage basin and to update the hydraulic model to reflect recent growth within the service area. Flow meters were placed in the collection system, and the hydraulic model for the Lakeview service area was updated and calibrated in the area around the Union PS based on the collected data.

The tributary area to the Union PS was evaluated for potential wet weather impacts based on the calibrated model. The District has utilized this information in examining the potential for short term overflow reduction and eventual bypass elimination. This hydraulic model will be verified based on data collected during the 2007-2008 flow monitoring period and will be utilized during the alternatives analysis to size potential solutions for the Union PS.

6.3.2 Sewer Televising and Maintenance

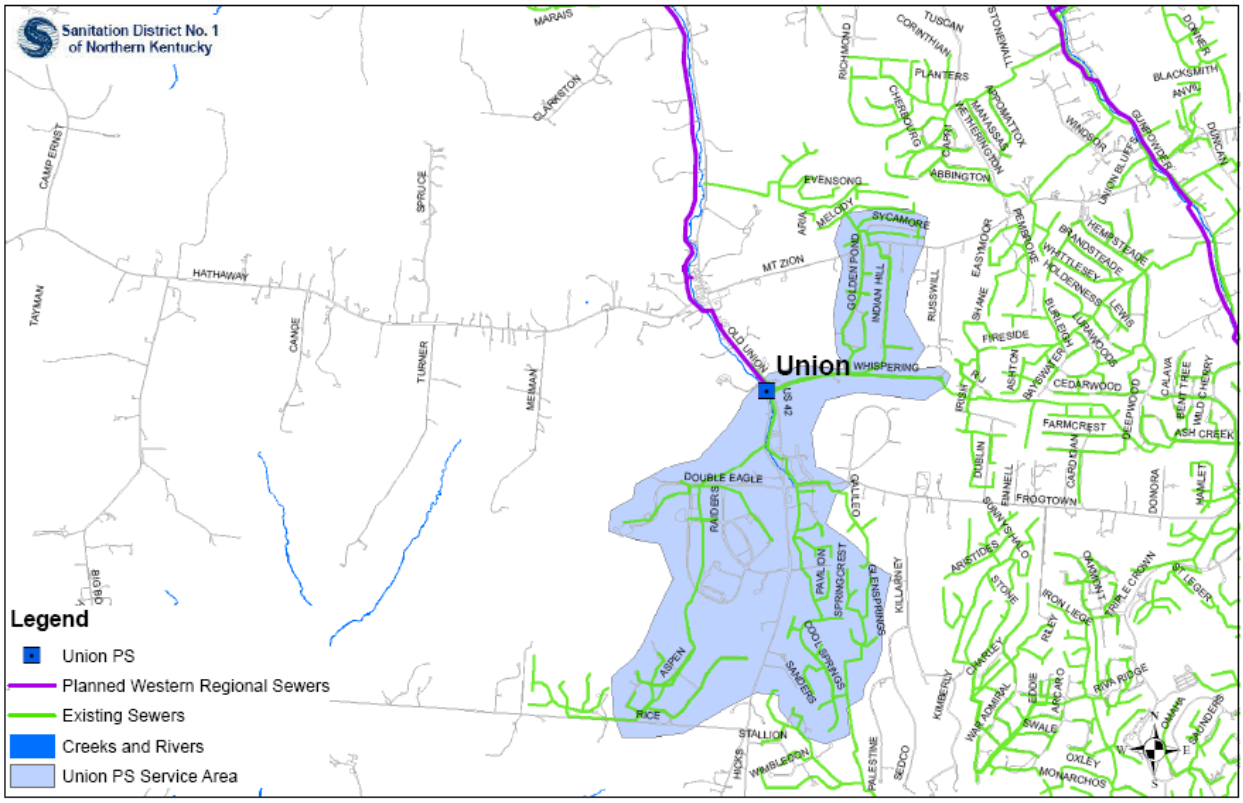
Based on the potential for wet weather bypasses to occur at Union PS, the District has identified the sewers upstream of Union PS as a priority for identifying and reducing wet weather I/I. The District has also recently embarked on an aggressive televising and maintenance program in the Union service area. The goal of the program is to televise and clean all of the tributary sewers to Union PS. To date, they have televised over 12,000 ft of tributary sewers out of a total of approximately 52,000 ft to examine for defects and potential I/I sources. Structural and service defects (offsets, sags, debris, roots etc..) have been observed during the televising and have been used to designate a small number of lines for repair. In addition to some isolated repairs, approximately 130 ft of sewer has been replaced upstream of Union PS to-date based on the results of the televising. An additional 24 manholes have been repaired based on the results of the field investigation. All of these improvements have helped to try to reduce the wet weather I/I in the system. Future televising and field investigation will be used to help pinpoint areas where further I/I reduction could take place.

6.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

The District is currently constructing the new WRTP and collection system trunk sewers to serve the new treatment plant. As part of the new infrastructure, the new 36” Union sewer is being constructed that will collect flow from the current Union PS service area and convey to the WRTP. The construction of this new sewer will enable the District to remove the Union PS and overflow and convey the flow by gravity to the new WRTP. The new 36” sewer was sized to convey peak wet weather flows under Ultimate build-out conditions, including the peak wet weather flows from the Union PS.

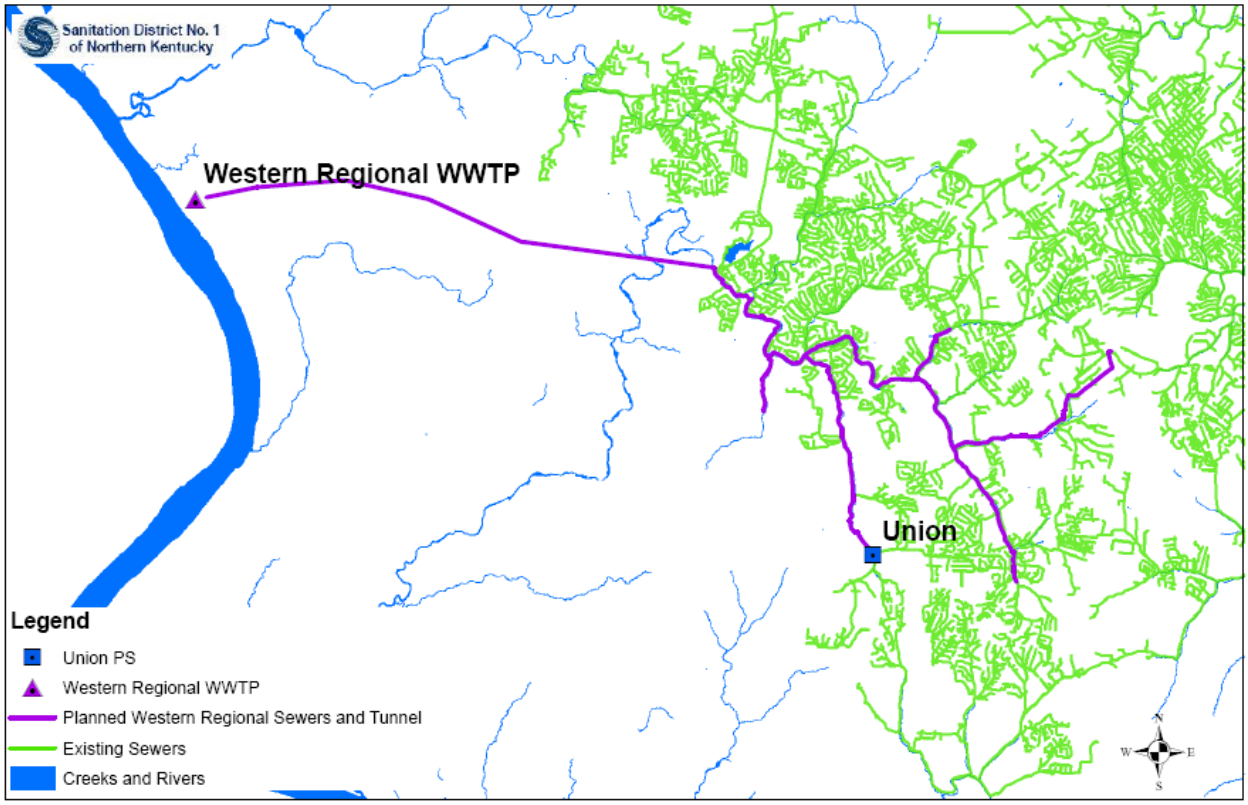
Figure 6.4 shows the location of the planned Union sewer and the location of the existing Union PS.

Figure 6.4 Proposed Union Sewer Alignment



The new Union sewer will continue north to the planned Gunpowder sewer and then west to the Western Regional tunnel and to the WRTP. Figure 6.5 shows the planned path of the Union sewer to the WRTP.

Figure 6.5 Planned Western Regional Improvements



6.4 Identified Solution

The elimination of the Union PS and overflow through gravity sewer construction is the planned solution for the Union PS. The new 36" Union sewer, as noted in the previous section, is being constructed now to convey peak dry and wet weather flows under Ultimate build-out conditions to the new WRTP. Following the completion of the entire Western Regional trunk sewer conveyance network and the new WRTP, the entire Union PS service area will be able to drain through the new Western Regional sewers. A small amount of additional construction will be needed to connect the existing sewers to the new Union sewer upon its completion. The design and construction of this additional sewer segment will be planned to coincide with the construction of the WRTP. This solution will eliminate the Union PS and overflow.

6.4.1 RDII Removal/Reduction

The District is committed to examining an RDII removal and reduction program within the Union PS service area. By reducing wet weather RDII tributary to Union PS, the risk for wet weather overflows will be reduced. The benefits of this effort will continue even after the new Union sewer is operational.

6.4.2 Additional Work

Prior to the final implementation of the solution for the elimination of the Union PS overflow and the sizing of any connections from the Union PS site to the Union sewer, the Dry Creek hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. The Union sewer is already under construction and has been sized to convey peak wet weather flows under Ultimate build-out conditions, but the sizing of any connections between the new sewer and the existing tributary sewers will be evaluated using the wet weather simulations within the model.

6.5 Schedule

The deadline for the elimination of the Union PS overflow is December 31, 2015. The Union PS is currently tributary to the Lakeview PS, and the plan is to eliminate the Union PS prior to the Lakeview PS bypass elimination deadline of December 31, 2013. Given the timeframe of the currently planned District improvements for the Western Regional sewers and WRTP, the schedule is as proposed in Table 6.1.

Table 6.1 Union PS Bypass Elimination Schedule

Date	Milestone
December 2007	Union Sewer Construction Complete
December 31, 2012	Western Regional Treatment Plant Complete
March 31, 2013	Union PS connection to Union Sewer completed and PS and overflow removed

SECTION 7: TAYLORSPORT PUMP STATION

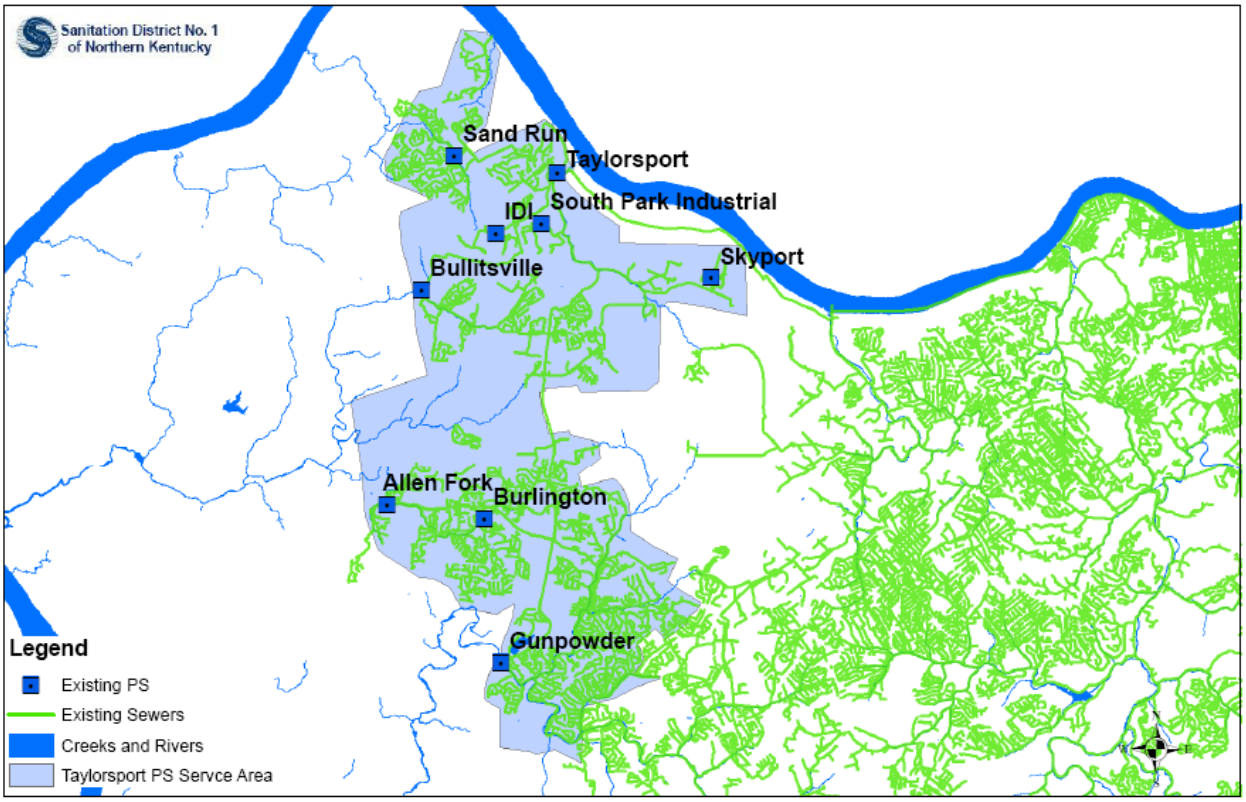
7.1 Taylorsport Pump Station Background

Taylorsport PS is the largest separate sanitary PS in the District's collection system in Boone County and is a recipient of flows from several tributary pump stations, including Allen Fork, Burlington, Gunpowder, IDI, Sand Run, Skyport, Bullittsville, and South Park. The Taylorsport PS conveys all flow from the service area through a 24-inch force main to the 48-inch diameter Bromley Force Main and ultimately to the Dry Creek Wastewater Treatment Plant. The PS was originally constructed in 1993, and in addition to regular maintenance, was upgraded in 2004 during its operation to increase the PS firm capacity to 10.2 MGD to convey peak wet weather flows and to eliminate the constructed bypass. The PS contains 3 submersible pumps (1 standby). A picture of the exterior of the Taylorsport PS is shown in Figure 7.1.

Figure 7.1 Taylorsport PS

The current service area for Taylorsport PS covers a large portion of the separate sanitary service area within northern Boone County. Figure 7.2 shows the current Taylorsport PS service area.

Figure 7.2 Current Taylorsport PS Service Area



7.2 Known Issues and Historical Data

The constructed bypass at the Taylorsport PS was eliminated in 2004 with the capacity upgrade. Figure 7.3 shows the Taylorsport PS flow configuration. The PS still receives wet weather flows, but through its capacity upgrade no longer has bypasses at the PS.

Figure 7.3 Taylorsport PS Flow Configuration

7.3 Ongoing Efforts

In addition to the PS capacity upgrade to convey peak wet weather flows and overflow elimination in 2004, the District is being proactive in its efforts to reduce wet weather flows to the Taylorsport PS. The District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the Taylorsport PS tributary area. The results of this monitoring program will be used to further refine the District's collection system and receiving water quality models. These refined models will be used in confirming planned alternatives for the continued reduction in wet weather flows to Taylorsport.

The most significant of the recent construction and rehabilitation projects that have contributed or will contribute to wet weather flow reduction at the Taylorsport PS are discussed below.

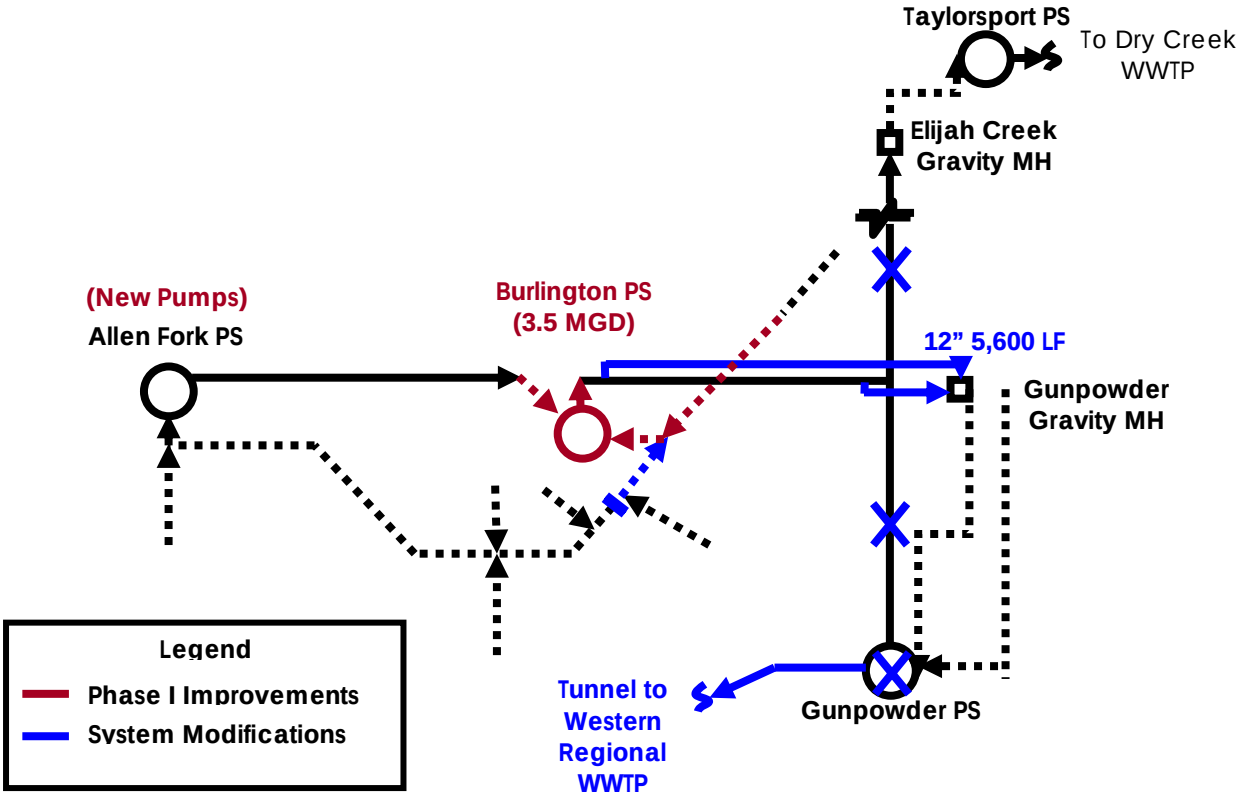
7.3.1 Allen Fork Collection System – Phase I Improvements

The Allen Fork Collection System Phase I Improvements completed in January 2007 increased the dry and wet weather capacity of the Allen Fork service area. The first phase included the construction of the new Burlington PS and modifications to the existing Allen Fork PS as well as installation of approximately 2,700 LF of new 24-inch gravity sewer to replace existing deteriorated 8-inch and 12-inch gravity sewers The overall intent was to maximize the hydraulic capacity of the existing collection system. The installation of the new sewer to replace the existing failing sewer directly reduced wet weather flows at the Taylorsport PS because some I/I was eliminated from the system.

7.3.2 Western Regional Collection System and Western Regional Treatment Plant Construction

The District's primary alternative to further reduce wet weather flows to the Taylorsport PS is the construction of the new WRTP and new collection system, including a gravity tunnel to convey flows to the new treatment plant. The new WRTP and collection system is scheduled to be online by 2013. As part of the new infrastructure, flow from the Gunpowder, Burlington, and Allen Fork pump stations will be diverted from the Taylorsport PS service area and be redirected to the new gravity tunnel and WRTP. When the WRTP is constructed and brought online, the current planning-level hydraulic model predicts a reduction in annual peak wet weather flow and total annual volumes to Taylorsport PS in a typical year of 2.1 MGD and 1,171 MG, respectively. These values are based on projected system flows through 2013, and are subject to change if development patterns vary from current projections. Figure 7.4 shows the re-configuration of flows (including improvements in the Allen Fork service area) after the WRTP is on-line.

Figure 7.4 Taylorsport PS Flow Re-configuration



7.4 Solution & Schedule

As stated above, the constructed overflow at the Taylorsport PS was eliminated with the PS capacity upgrade in 2004 to convey peak wet weather flows. Therefore the work to eliminate the SSO at this PS has been completed well in advance of the December 31, 2010 Exhibit E deadline.

SECTION 8: LAKEVIEW PUMP STATION

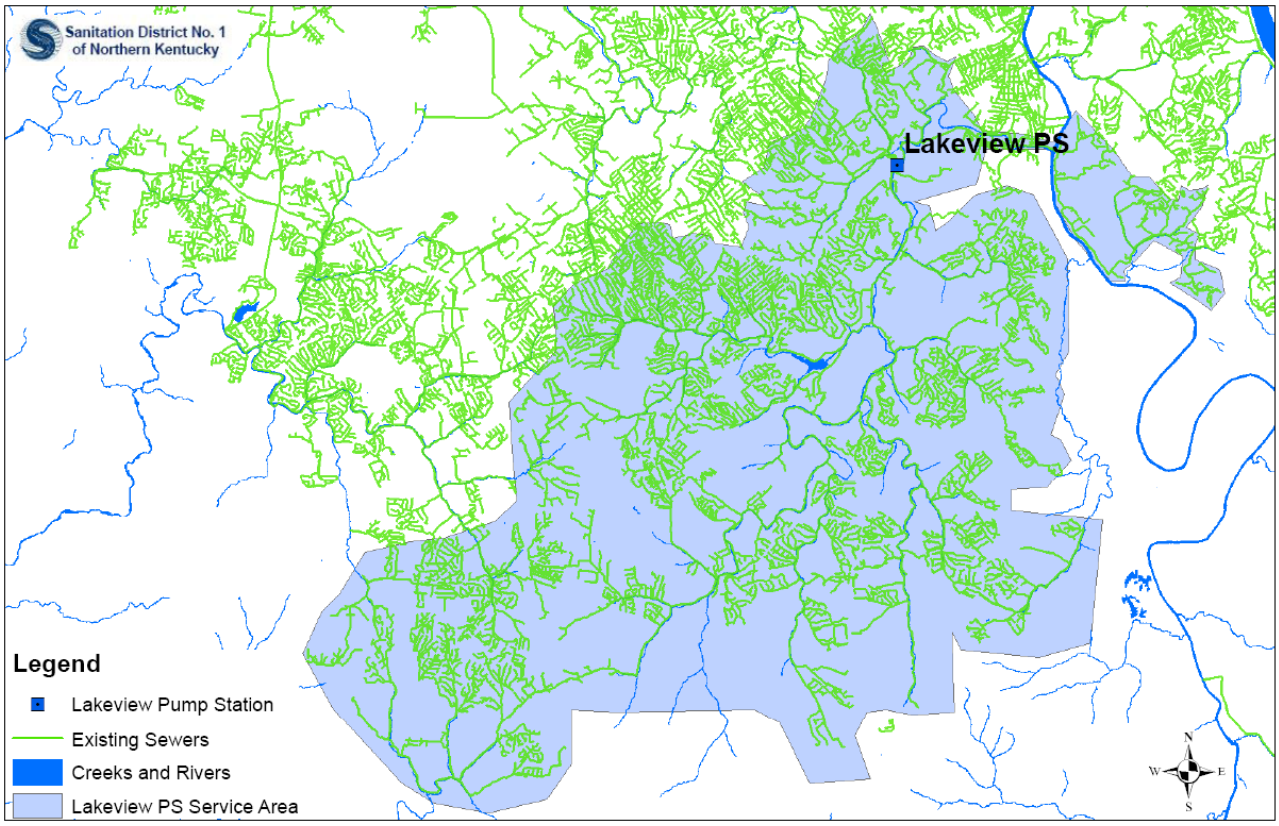
8.1 Lakeview Pump Station Background

Lakeview PS is the largest separate sanitary PS in the District's system and serves an extensive portion of the District's separate sanitary system. The PS pumps to the Dry Creek Interceptor which eventually drains to the Dry Creek Wastewater Treatment Plant. The PS contains 4 sets of series pumps: it currently has a firm capacity of approximately 17 million gallons per day (MGD) and a peak wet weather capacity of approximately 22 MGD. It was originally constructed in 1973, and in addition to regular maintenance, has been upgraded several times during its operation. A picture of the exterior of Lakeview PS is shown in Figure 8.1.

Figure 8.1 Lakeview PS

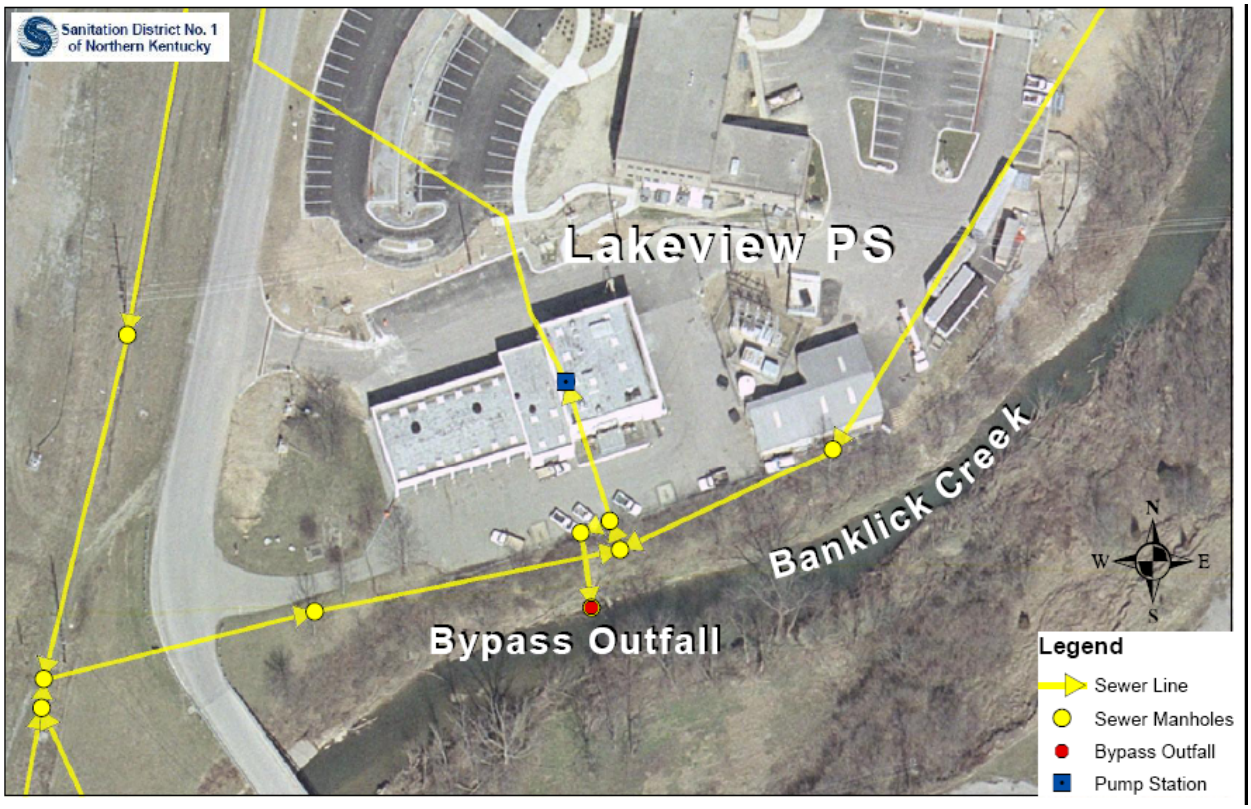
The current service area for Lakeview PS covers the majority of the separate sanitary service area within Kenton County as well as additional acreage within Boone and Campbell counties. Figure 8.2 shows the current Lakeview PS service area.

Figure 8.2 Current Lakeview PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS bypasses through an outfall into Banklick Creek. The bypass is located on the main sewer that leads to the pump station. Figure 8.3 shows the bypass configuration at Lakeview PS.

Figure 8.3 Lakeview PS Bypass Configuration



8.2 Known Issues and Historical Data

Due to the presence of both older and new development within Kenton County, Lakeview PS has become a capacity limitation within the collection system during severe wet weather events. The older areas, with sewers constructed in the 1940s, which are tributary to Lakeview PS have some of the highest rainfall-derived inflow/infiltration (RDII) rates within the District system. These areas are typified by clay sewers and private source I/I. In addition to these older areas, there has been significant growth in the areas tributary to the pump station. The combination of these two factors has caused Lakeview PS to become susceptible to bypassing during large wet weather events.

The District is well aware of the wet weather issues that are contributing to overflow volumes at Lakeview PS. The District has made, and is planning to make, significant efforts to reduce the wet weather overflow volumes from Lakeview PS. These efforts will be detailed in Section 3 of this report. To monitor the activation frequency and overflow volume in the bypass from Lakeview PS, the District maintains a flow meter on the bypass line. This is a traditional area-velocity flow meter that calculates flow and

creates a log of the recorded flow data. The overflow frequency and volume are monitored and documented by District personnel following every rain event. A review of the previous 3 years of overflow data for Lakeview PS is presented in Table 8.1.

Table 8.1 Lakeview Release Report Summary

Year	Total Approx. Recorded Volume (MG)
2004	26.2
2005	29.8
2006	7.1

The reduction in overflow volume shown in 2006 was due to upgrades and increases in the pumping capacity of the PS completed in 2005. These upgrades are further detailed in Section 8.3.2.

8.3 Ongoing Efforts

As evidenced by the recorded reduction in overflow volume based on the data collected at the Lakeview PS bypass, the District is continuing to make strides to reduce the magnitude of overflows into Banklick Creek. With the goal to eliminate overflows at this location, the District has focused its attention on reducing wet weather flows and providing increased PS capacity. The District has commissioned several studies and construction projects that have been implemented or will be implemented prior to the Consent Decree deadline. The District has taken a proactive approach to addressing this overflow through a combination of infrastructure rehabilitation and new construction. Additional work required to eliminate the Lakeview PS bypass will build on the District's projects that have previously been implemented.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the Lakeview tributary area. The results of this monitoring program will be used to further refine and calibrate the District's collection system and receiving water quality models, respectively. These refined models will then be used in identifying and evaluating alternatives for the elimination of the Lakeview PS bypass.

The most significant of the recent construction and rehabilitation projects that have contributed or will contribute to overflow reduction at the Lakeview PS are discussed below; some of the work is ongoing and will not be finalized for several years. The results of these projects will be included in the analysis of the potential solutions for the eventual elimination of the bypass.

8.3.1 Hydraulic Model Development and Southern Kenton County Study

In 2002, the District developed a series of system-wide hydraulic models to assess system performance and to utilize in the planning of major capital projects. The Dry Creek hydraulic model encompasses the Lakeview PS service area. During 2005-2006, the District commissioned a study to examine the entire Lakeview PS drainage basin and to update the hydraulic model to reflect recent growth within the service area as well as the rebuilt pump station. As part of this study, several locations were also investigated upstream for potential RDII contributions. The areas that were targeted were those areas that showed the most RDII during the monitored storm events.

Flow meters were placed in the collection system from February 2004 to May 2005, and the hydraulic model for the Lakeview service area was updated and calibration was attempted based on this collected data. In addition to the current model, future model projections were developed for Southern Kenton County for the years 2010 and 2030 and provided best estimates of future growth scenarios based on available planning information and historical District data. The end result of this study showed that the flows in the District's system are highly influenced by variations in groundwater levels and antecedent moisture conditions (i.e. back to back storm events) and calibration of the Model proved to be very difficult for the storm events collected during the flow monitoring program. Partial calibration of the Model was obtained for certain storm events but it was found that a winter and summer model was required in order to properly represent the dry and wet weather flows in the collection system. This partially calibrated hydraulic model will be further refined, calibrated and verified based on data collected during the year long 2007-2008 flow monitoring period for the Watershed Plans to more accurately reflect the variations in groundwater levels and antecedent moisture conditions and will be utilized during the alternatives analysis to size potential solutions for elimination of the Lakeview bypass.

8.3.2 Lakeview PS Capacity Upgrade

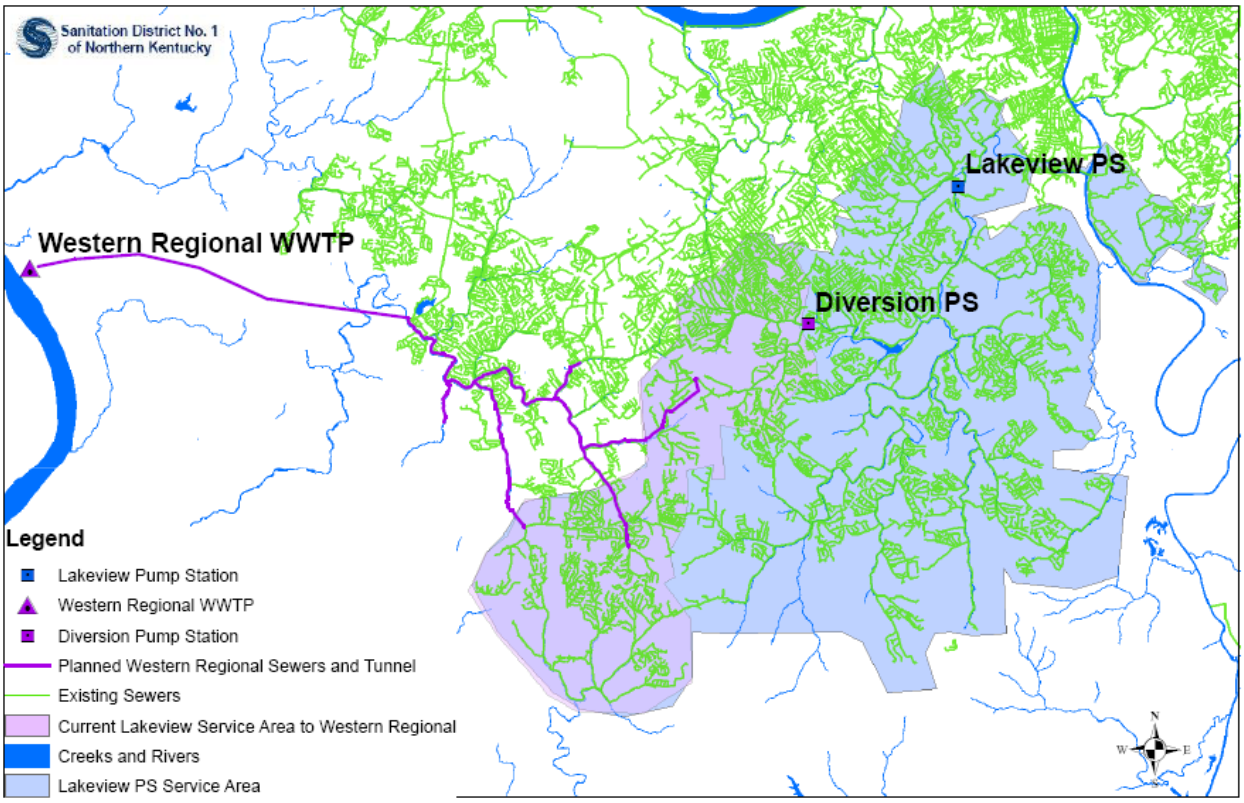
During 2004, the District commissioned a study to examine the potential for increasing the capacity of Lakeview PS; this study resulted in a significant capacity upgrade through a complete rehabilitation of the pumps. Peak wet weather capacity increased from 14 -15 MGD to approximately 22 MGD following the 2005 rehabilitation. Based on the collected data, the increased PS capacity was one of the main factors contributing to the reduction in wet weather overflow volume that occurred from 2005 to 2006. The reduction of almost 22 MG of overflow volume from 2005 to 2006 demonstrates that the increased PS capacity had a significant impact on reducing overflow volume to Banklick Creek.

8.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

The District is currently designing the new WRTP, Western Regional conveyance and storage tunnel, and collection system trunk sewers to serve the new treatment plant. These projects are Initial Watershed Projects listed in Exhibit D of the Consent Decree and are currently on schedule to exceed the construction completion date of 2013. As part of the new infrastructure, flow will be diverted from the Lakeview PS service area and redirected to the new Western Regional Collection System via the proposed Diversion PS. The Diversion PS is scheduled to be constructed and online prior to the Exhibit D Consent Decree deadline and is projected to provide a significant reduction in overflow volume at the Lakeview PS. In addition, several other areas are planned to be rerouted to the WRTP, relieving Lakeview PS during large wet weather events.

Figure 8.4 shows the service area now tributary to Lakeview PS that will ultimately be tributary to the WRTP.

Figure 8.4 Proposed Western Regional Tributary Area



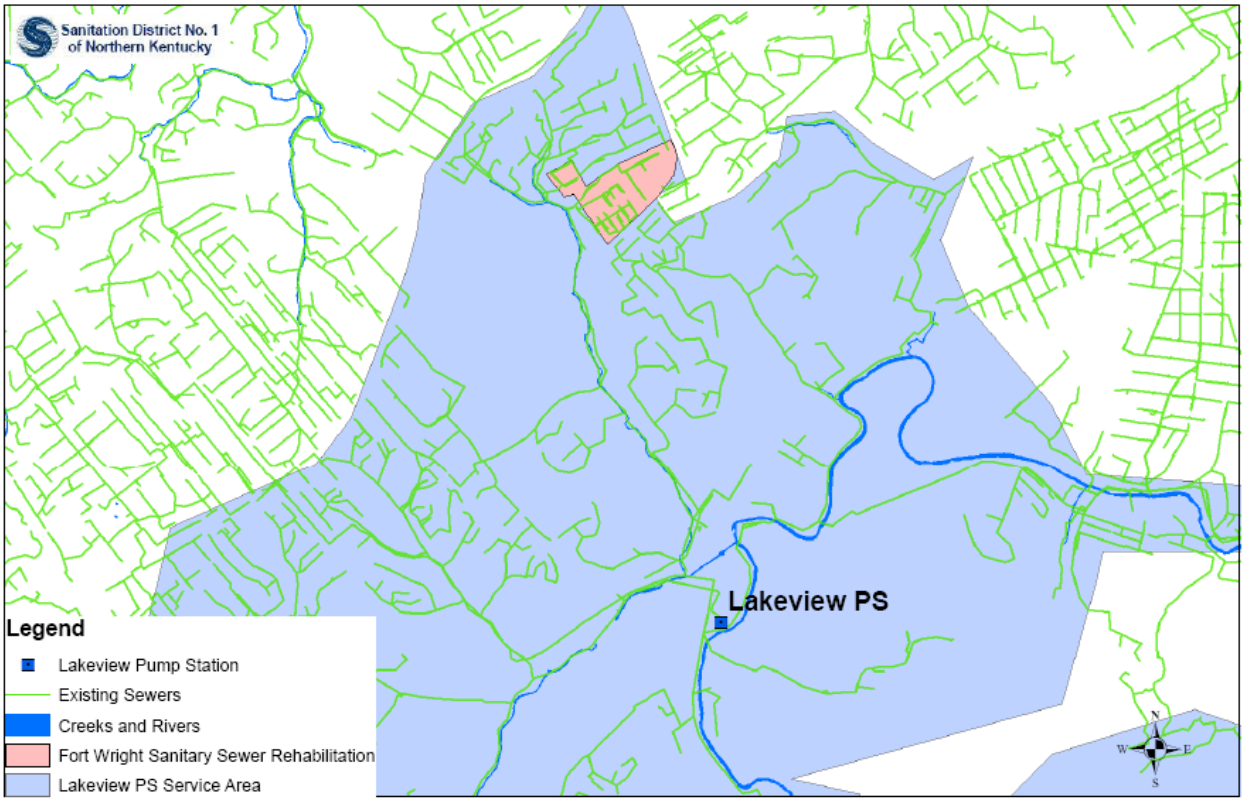
The District has evaluated the impacts of the Western Regional Collection System construction on the Lakeview overflow bypass volume based on the recently updated Dry Creek hydraulic model. Based on future model projections and factoring in the continued growth of the Southern Kenton County area as the Western Regional Collection System is constructed and completed, the typical year overflow volume for the Lakeview PS bypass was predicted by the hydraulic model to drop from a current modeled 7.7 MG/typical year to 1.7 MG/typical year following the completion of the Western Regional Collection System. This reduction is due to a significant amount of wet weather flow being diverted once the collection system is complete, greatly reducing the flow that is tributary to Lakeview PS.

The results of this analysis are based on the typical year simulated within the hydraulic model and are dependent on the future projections that were assumed during the Southern Kenton County study. These projections and reduction in overflow volume will be evaluated in more detail as more information becomes available and also following the model update and recalibration based on the year-long flow monitoring study that is currently being conducted.

8.3.4 Fort Wright Sanitary Sewer Rehabilitation

Within the City of Fort Wright, the District performed a series of sewer improvements designed to reduce the wet weather impact for the areas tributary to the Lakeview PS. This area had been identified by the District as a source of substantial RDII during wet weather events and was a good candidate for source removal. From 2002-2005, several stretches of aging storm and sanitary sewer were replaced and direct private source storm connections to the sanitary sewer were removed. In addition, several connections from the public storm sewer to the sanitary were removed with the construction of the new sewers. Figure 8.5 shows the Fort Wright rehabilitation area.

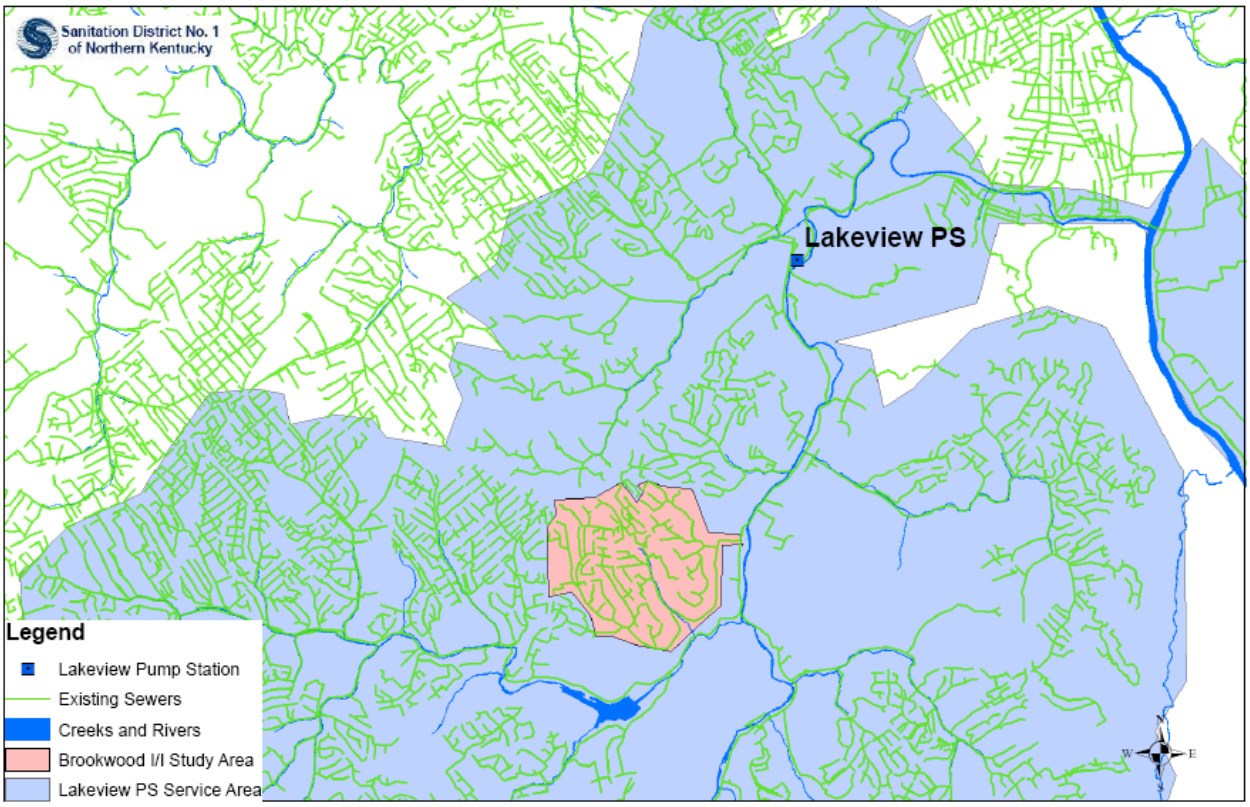
Figure 8.5 Fort Wright Sanitary Sewer Rehabilitation Study Area



8.3.5 Brookwood I/I Study

As part of the ongoing effort to investigate locations within the District's system that had been identified as wet weather contributors, the District conducted a 2005 study in the Brookwood subdivision to examine the wet weather RDII from this area. This area is tributary to Lakeview PS and was selected by the District based on historically high observed RDII rates. Flow monitoring was conducted to characterize the area and the wet weather response to help determine the extent and locations of potential problems. This study resulted in identifying several thousand feet of sewer and associated manholes that needed to be replaced. This work is currently ongoing. The study results are also being used to develop a long-term approach to private source RDII removal in the Brookwood area as well as District-wide. Figure 8.6 shows the location of the Brookwood subdivision relative to Lakeview PS.

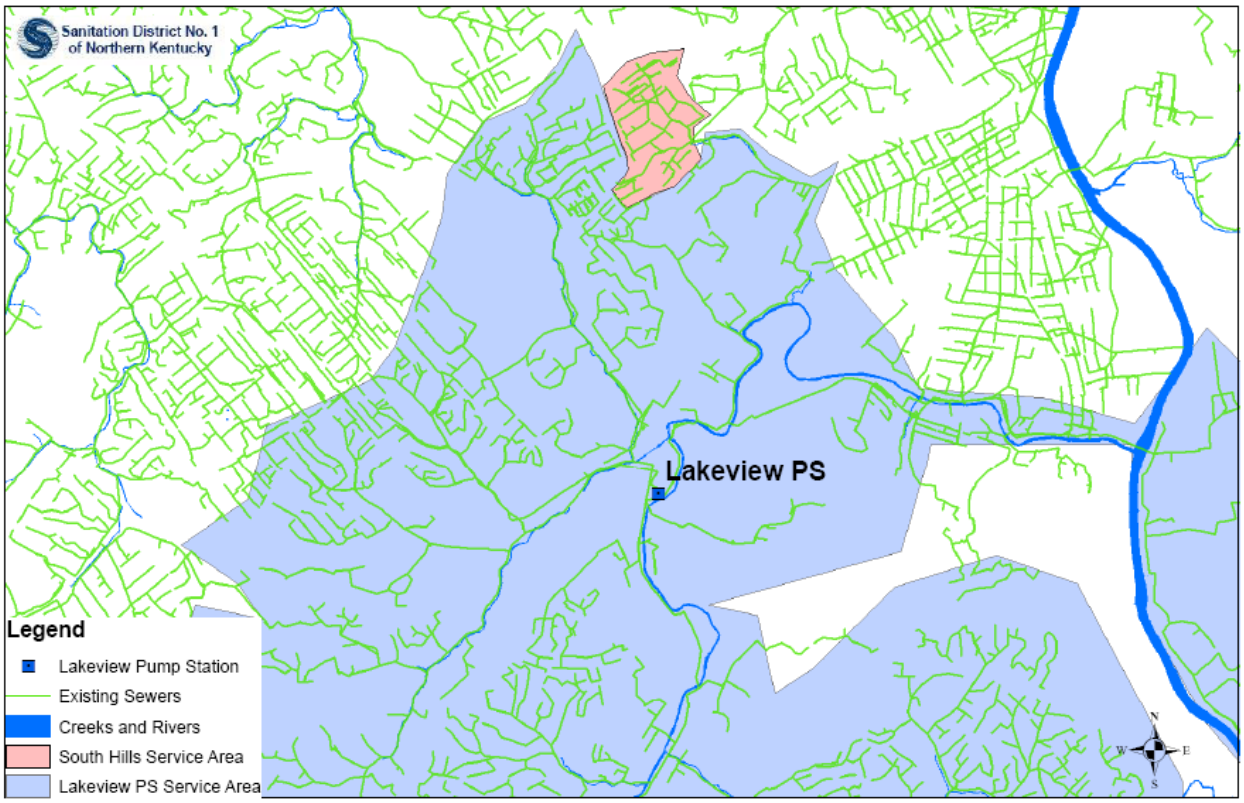
Figure 8.6 Brookwood I/I Study Area



8.3.6 South Hills Outfall Sewer

An additional area that was identified as a significant contributor to the wet weather problems at Lakeview PS was the South Hills area within Fort Wright. This neighborhood was the only combined sewer area that was tributary to Lakeview PS, and as a result, contributed high wet weather flows during large storm events. The District developed and designed a sewer that would provide an alternative flow pattern for this area; this sewer was designed to redirect and convey combined sewage that was tributary to Lakeview PS to the existing combined sewer system and to the Bromley PS. The District recently completed construction in April 2007 on the South Hill Outfall Sewer and is continuing to monitor the impacts of this new sewer on overflow reduction at Lakeview PS. Figure 8.7 shows the South Hills area in relation to Lakeview PS.

Figure 8.7 South Hills Service Area



8.3.7 Sewer Lining, Televising, and Maintenance

The District has identified the sewers upstream of Lakeview PS as a high priority for identifying and reducing wet weather I/I. Some of the oldest and most vulnerable sewers within the District's system are within this basin. To address many of these older sewers, the District has installed cured-in-place lining for almost 7,100 ft. of sewers within the Lakeview service area. The District has also recently embarked on an aggressive televising and maintenance program in the Lakeview service area. The goal of the program is to televise and clean all of the tributary sewers to Lakeview PS. To date, the District has televised almost 660,000 ft of sewer tributary to Lakeview PS, over 20% of the tributary sewers. Structural defects and infiltration observed during the televising will be used to help pinpoint areas where RDII reduction could take place. These ongoing efforts will be an important component of the overflow elimination plan for the Lakeview bypass.

8.4 Potential Solutions

Several solutions will be examined during the detailed alternatives analysis that will be conducted for the Lakeview PS. The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Lakeview PS bypass. The applicability of each of the listed solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the listed solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not consider the combination of solutions, but will outline the process to identify the alternatives.

8.4.1 Service Area Reduction/PS Elimination

The elimination of the bypass through gravity sewer construction at the PS would require conveyance of peak flows to an alternate point within the system. There currently is not a viable option for conveyance of flows from Lakeview PS by gravity to a wastewater treatment plant.

Construction of gravity sewers and pump stations within the upstream system (such as those planned as part of the Western Regional Collection System) that would direct flow out of the Lakeview service area could provide a substantial reduction in peak flows to the PS and result in the bypass elimination. Options for rerouting flows from the Lakeview service area in addition to the already planned Western Regional Collection System will be examined during the alternatives analysis and the full impact of the removal of these areas will be addressed during the design sizing.

8.4.2 Pump Station Capacity Upgrade

The recent upgrade to Lakeview PS provided the maximum capacity of 22 MGD given the existing configuration of the PS and the forcemain. This is accomplished through the operation of all 4 sets of series pumps which are available. A potential alternative that will be examined is the addition of a 5^{th} set of pumps to increase the firm capacity of the PS to 22 MGD. Increasing capacity beyond the existing wet weather capacity of 22 MGD would require significant new infrastructure both on site and along the forcemain length; this option will be explored in detail as a potential alternative. Construction of a new PS at the same location is impractical given the site constraints and is likely not a feasible option given the 2013 deadline for bypass elimination.

8.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage is a feasible solution for the elimination of the Lakeview PS bypass. As part of the alternatives analysis, the sizing and the site location(s) for the storage will be examined in detail. Given the large service area for the Lakeview PS, there are several locations where equalization storage may prove to be feasible and/or cost-effective. The use of satellite storage within the system will be examined as well as local storage near to the pump station.

8.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive RDII removal and reduction program within the Lakeview service area. This will involve continued CCTV and I/I investigation in the service area. Identification of potential I/I sources within the Lakeview service area is a priority within the District and as such, has already yielded several areas that were found to be contributing at high RDII rates. This option will likely not be used as a stand-alone solution but is likely to be included as a supplemental solution that will be used in conjunction with other alternatives. By reducing wet weather RDII tributary to Lakeview PS over time, the overall magnitude and cost of the solution to be implemented may be able to be reduced.

8.4.5 Additional Work

Prior to the evaluation and selection of a solution for the Lakeview PS bypass elimination, the Dry Creek hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program as part of the Watershed Plans. In addition to the refinement of the existing hydraulic model, future condition models will be updated to simulate the impacts of future growth on the District's collection system at various time horizons. Future condition models will be used to ensure that any potential solution will be valid not only for current conditions, but also for future conditions.

The calibrated hydraulic models resulting from the 2007-2008 flow monitoring program will be used by the District to evaluate the potential solutions outlined above and help develop the solution sizing requirements for the elimination of the Lakeview PS bypass. District receiving water quality models will also be used to assess the implications of decreased bypass activities and assess the improvement in water quality due to the implementation of the potential alternatives. Planning level costs will be developed for each of the selected solutions and will be used to generate a cost-benefit comparison among the potential solutions. Based on the available hydraulic, water quality, and financial data and results, the most effective alternative will be selected for implementation.

8.5 Schedule

The deadline for the elimination of the Lakeview PS bypass is December 31, 2013. Given this timeframe and the required time to select, design, and implement a solution, the schedule is as proposed in Table 8.2.

Table 8.2 Lakeview PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Existing Dry Creek Hydraulic Model and Future Condition Dry Creek Models
June 1, 2009	Alternative Selected for Design
January 1, 2011	Final Design Submitted
April 1, 2011	Construction Begins on Selected Alternative
December 31, 2013	Construction Completion Date

This schedule includes the conclusion of the updated calibration for the Dry Creek hydraulic model and the updating of the future condition Dry Creek models. These models will serve as the cornerstone for the alternatives analysis in the evaluation of the potential solutions outlined in Section 8.4.

SECTION 9: HIGHLAND ACRES PUMP STATION

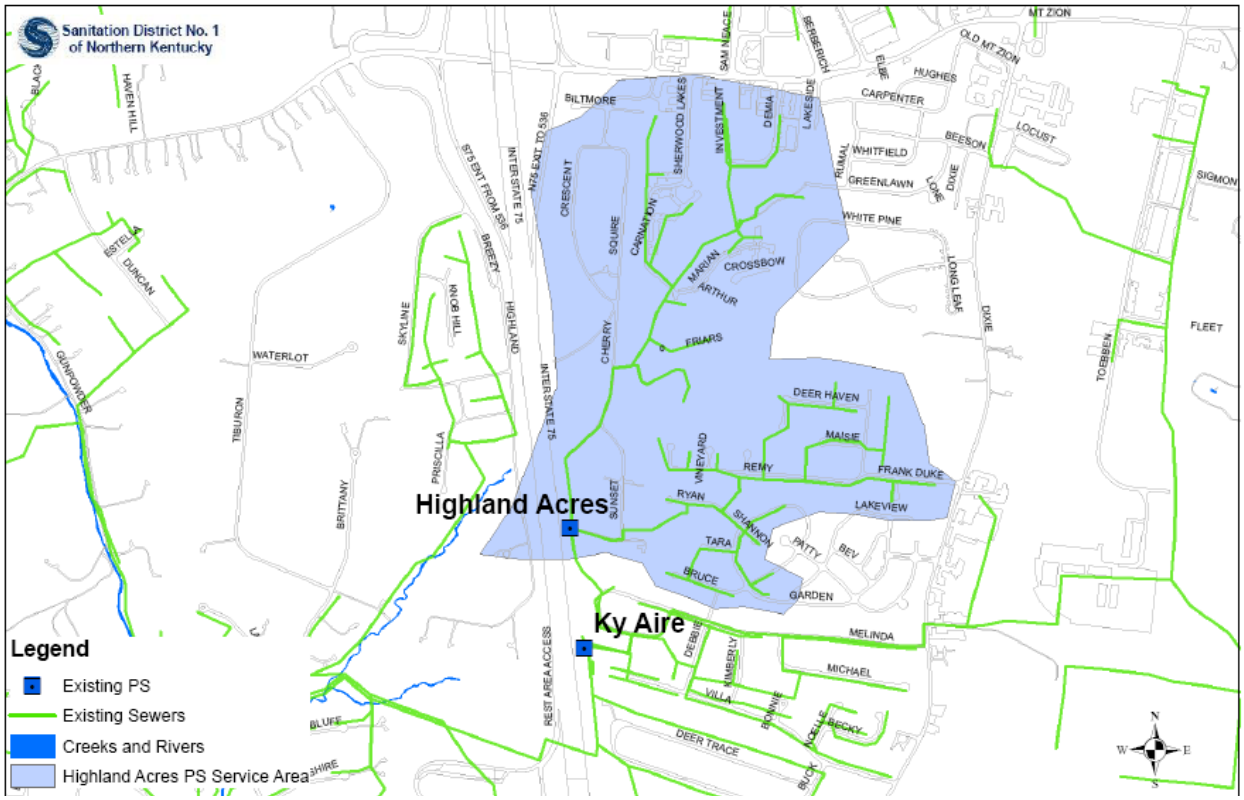
9.1 Highland Acres Pump Station Background

Highland Acres PS is a separate sanitary PS in the southwestern portion of the District's service area and is located within Boone County. It is located on an access road at the end of Sunset Drive, south of Mt. Zion Rd and just east of I-71/I-75. The flow from Highland Acres PS is pumped through Kentucky Aire PS and then Lakeview PS until it reaches the Dry Creek Interceptor which eventually drains to the Dry Creek Wastewater Treatment Plant. The PS contains 3 pumps: it currently has a firm capacity of approximately 1.2 MGD and a wet weather peak capacity of approximately 1.4 MGD based on the results of field testing. A picture of Highland Acres PS is shown in Figure 9.1.

Figure 9.1 Highland Acres PS

The current service area for Highland Acres PS is shown in Figure 9.2.

Figure 9.2 Current Highland Acres PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS overflows into a small creek which is tributary to the South Fork Gunpowder Creek and eventually the Ohio River. Figure 9.3 shows the bypass configuration at Highland Acres PS.

Figure 9.3 Highland Acres PS Bypass Configuration

9.2 Known Issues and Historical Data

The area tributary to the Highland Acres PS has experienced some recent growth and is a mixture of newer construction and older neighborhoods. The recent growth coupled with the existing wet weather issues generated by the older sections of the sewer system help to contribute to the potential for wet weather problems at the PS. The District has managed to limit the potential for wet weather issues to occur at the PS as a result of proactive measures to reduce wet weather I/I. From August 2005 to July 2006, Highland Acres PS had two overflow activations; one in November 2005 and one in March 2006. The total estimated volume was not available for the overflow in November 2005. The March 2006 overflow volume was estimated at 1200 gallons. A complete list of the District pump station spill records for this period is available in Appendix A. The District has investigated this area thoroughly and has televised all of the sewers upstream of this PS as part of a long-term I/I investigation of the tributary service area. As part of this program, any I/I sources that were discovered were investigated and removed.

9.3 Ongoing Efforts

With the continued wet weather issues associated with Highland Acres PS, the District has monitored and studied the potential causes for the overflows at this pump station. With the goal to eliminate overflows at this location, the District has focused its attention on reducing wet weather flows in the interim and developing overflow elimination strategies for the near-term.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the area tributary to Highland Acres PS. Both influent lines are in the process of being monitored in 2007-2008 in addition to tracking the PS data telemetry. The results of this monitoring program will be used to further refine the District's collection system. These refined models will be used in identifying and evaluating alternatives for the Highland Acres PS bypass elimination.

The most significant of the recent projects that have contributed or will contribute to overflow reduction at the Highland Acres PS are discussed below. The results of these projects will be included in the analysis of the potential solutions for the eventual elimination of the bypass.

9.3.1 Hydraulic Model Development and Southern Kenton County Study

In 2002, the District developed a series of system-wide hydraulic models to assess system performance and to utilize in the planning of major capital projects. The Dry Creek hydraulic model encompasses the Lakeview PS service area and as a result, includes the Highland Acres PS service area. During 2005-2006, the District commissioned a study to examine the entire Lakeview PS drainage basin and to update the hydraulic model to reflect recent growth within the service area. Flow meters were placed in the collection system, and the hydraulic model for the Lakeview service area was updated and calibrated in the area tributary to the Highland Acres PS based on the collected data.

The tributary area to the Highland Acres PS was evaluated for potential wet weather impacts based on the calibrated model. The District has utilized this information in examining the potential for short-term overflow reduction and eventual elimination. This hydraulic model will be verified based on data collected during the 2007-2008 flow monitoring period and will be utilized during the alternatives analysis to size potential solutions for the Highland Acres PS.

9.3.2 Sewer Televising and Maintenance

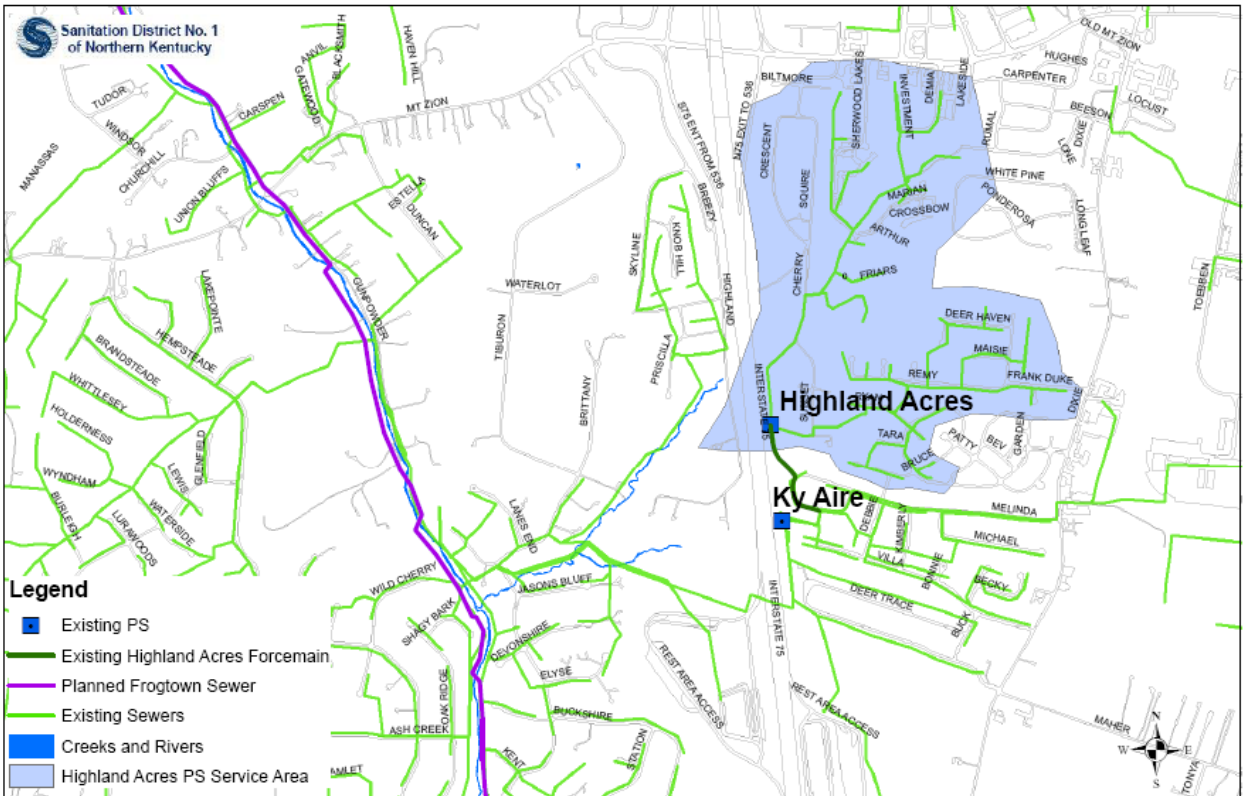
Based on the potential for wet weather overflows to occur at Highland Acres PS, the District has identified the sewers upstream of Highland Acres PS as a priority for identifying and reducing wet weather I/I. The District historically has worked to address the wet weather issues associated with this PS. The goal of the program was to televise and clean all of the tributary sewers to Highland Acres PS to examine for defects and potential I/I sources. This work has been completed. No major defects were found in the District owned sewers. It was discovered during this work that privately owned sewers from a mobile home park tie into the District owned sewers. These privately owned sewers were found to be causing the majority of the I/I tributary to the Highland Acres pump station. The District will be developing a program over the next 12 to 18 months to force the owner of the private system to address the discovered I/I issues. These ongoing efforts are an important component of any overflow elimination plan for the Highland Acres PS oveflow.

9.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

The District is currently constructing the new WRTP and collection system trunk sewers to serve the new treatment plant. As part of the new infrastructure, the Frogtown sewer is currently under preliminary design. Pursuant to an analysis of future capacity, this sewer was sized to be a 42” sewer to convey peak wet weather flows under Ultimate build-out conditions. This sewer is proposed to collect flow beginning near the current South Hampton PS service area and convey to the WRTP. The location of the Highland Acres PS in relation to this proposed sewer is shown in Figure 9.4. The construction of this new sewer provides a potential solution to eliminate the Highland Acres PS and convey peak wet weather flows from the PS service area to the new WRTP. Additional sewer construction is required to tie in the PS service area to the Frogtown sewer, but the 42” sewer was sized to convey peak wet weather flows from this area should that construction be determined to be the most cost-effective solution to eliminate the overflow at the Highland Acres PS.

Figure 9.4 shows the location of the planned Frogtown sewer and the location of the existing Highland Acres PS.

Figure 9.4 Proposed Frogtown Sewer Alignment



The new Frogtown sewer will continue north to the new Gunpowder sewer, then west to the Western Regional tunnel and then to the WRTP. A new sewer constructed to tie in the Highland Acres service area to the new Frogtown sewer would be sized to provide adequate peak wet weather capacity to eliminate the existing Highland Acres PS and overflow.

9.4 Potential Solutions

The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Highland Acres PS overflow. The applicability of each of the listed solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the listed solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not

consider the combination of solutions, but will outline the process to identify the alternatives.

9.4.1 Service Area Reduction/PS Elimination

The new 42" Frogtown sewer, as noted in the previous section, is currently being planned as an Initial Watershed Project in the CD as part of the Western Regional Collection System and the new WRTP. This sewer is planned to be constructed beginning near the current South Hampton PS location and eventually conveying flow to the Western Regional tunnel and the WRTP. Following the completion of the entire Western Regional trunk sewer conveyance network and the new WRTP, there will be the potential for an alternate peak wet weather flow conveyance to treatment to eliminate the Highland Acres PS and overflow. To access the Frogtown sewer for the Highland Acres service area, a new sewer or sewers would be required to be constructed that would connect from the location of the current PS to the Frogtown sewer.

There are several potential alignments that would be considered in eliminating the PS and overflow through the construction of a gravity sewer. The District has investigated the potential for the construction of a sewer that would convey flow by gravity from the site of the Highland Acres PS to the Kentucky Aire PS and eliminate the need for the Highland Acres PS. Replacement of Kentucky Aire PS with a gravity sewer connection has also been explored; this would connect both Kentucky Aire and Highland Acres to the Frogtown sewer and the Western Regional Collection System. To be applicable, the design and construction of these additional sewers have to be planned to coincide with the construction of the Western Regional sewers. This solution of the gravity sewer connection would be designed to convey peak wet weather flows under Ultimate build-out conditions to eliminate the PS and the overflow.

9.4.2 Pump Station Capacity Upgrade

As currently constructed, Highland Acres PS pumps to the Kentucky Aire PS; a potential solution would be to increase the current capacity of the PS if the downstream capacity is available, either at Kentucky Aire PS or through a new gravity sewer connection to the new Frogtown sewer. This solution will be explored as part of the alternatives analysis.

9.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage at the Highland Acres PS site is a possibility given the deadline for the elimination of the PS overflow. The potential locations of the equalization storage would be reviewed as part of the alternatives analysis screening.

9.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive RDII removal and reduction program within the Highland Acres PS service area. The District has committed in the past to examining this area in great detail and will continue to do so both to reduce ongoing overflows and as part of a long-term solution. As discussed above the CCTV work that was performed recently identified privately owned sewers as a cause for the majority of the I/I tributary to the Highland Acres pump station. The District will be developing a program over the next 12 to 18 months to force the owner of the private system to address the discovered I/I issues. This solution will not be used as a stand-alone solution, but is to be included as a supplemental solution that will be used in conjunction with other alternatives. By reducing wet weather RDII tributary to Highland Acres PS, the risk for wet weather overflows will be reduced.

9.4.5 Additional Work

Prior to the final implementation of the solution for the elimination of the Highland Acres PS overflow, the Dry Creek hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. In addition to the development of an existing hydraulic model, future condition models will be created to simulate the impacts of future growth on the District's collection system at various time horizons for the WRTP system. Future condition models will be used to ensure that any potential solution will be not only be valid for current conditions, but also for future conditions.

The calibrated hydraulic models will be used by the District to evaluate and finalize the details for the elimination solution outlined above and help develop the sizing requirements for the elimination of the Highland Acres PS overflow. The Frogtown sewer is already planned for construction and has been sized, but the sizing of any connections between the Highland Acres PS and the new sewer will be evaluated using the wet weather simulations within the model.

9.5 Schedule

The deadline for the elimination of the Highland Acres PS bypass is December 31, 2010. Given this timeframe and the required time to design and implement a solution, the schedule is proposed in Table 9.1.

Table 9.1 Highland Acres PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Existing Dry Creek and Future Dry Creek and Western Regional Models
December 1, 2008	Alternative Selected for Design
September 30, 2009	Design Completed for Selected Alternative
December 1, 2009	Construction Begins for Selected Alternative
December 31, 2010	Construction Complete for Selected Alternative

This schedule includes the conclusion of the updated calibration for the Dry Creek hydraulic model and the creation of the future condition Dry Creek and Western Regional models. These models will serve as the cornerstone for the alternatives analysis in the evaluation of the potential solutions outlined in Section 9.4.

SECTION 10: KENTUCKY AIRE PUMP STATION

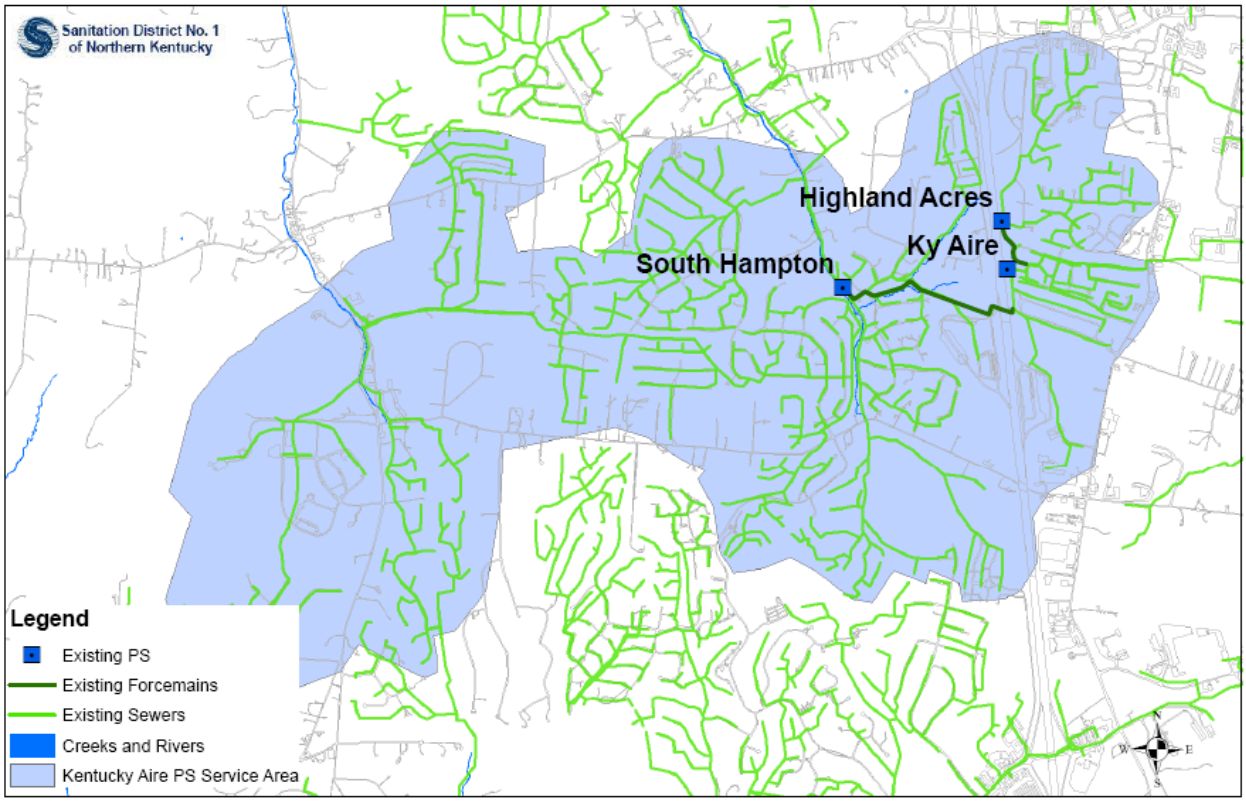
10.1 Kentucky Aire Pump Station Background

Kentucky Aire PS is a separate sanitary PS in the southwestern portion of the District's service area and is located within Boone County. It is located at the end of Villa Drive, south of Mt. Zion Rd and just east of I-71/I-75. Kentucky Aire PS receives flow from the Highland Acres and South Hampton PSs in addition to its gravity service area and conveys the flow to the Lakeview PS where it is pumped to the Dry Creek Interceptor which eventually drains to the Dry Creek Wastewater Treatment Plant. The PS contains three pumps: it currently has a firm capacity of approximately 2.4 MGD and a wet weather peak capacity of approximately 3.0 MGD based on the results of field testing. A picture of Kentucky Aire PS is shown in Figure 10.1.

Figure 10.1 Kentucky Aire PS

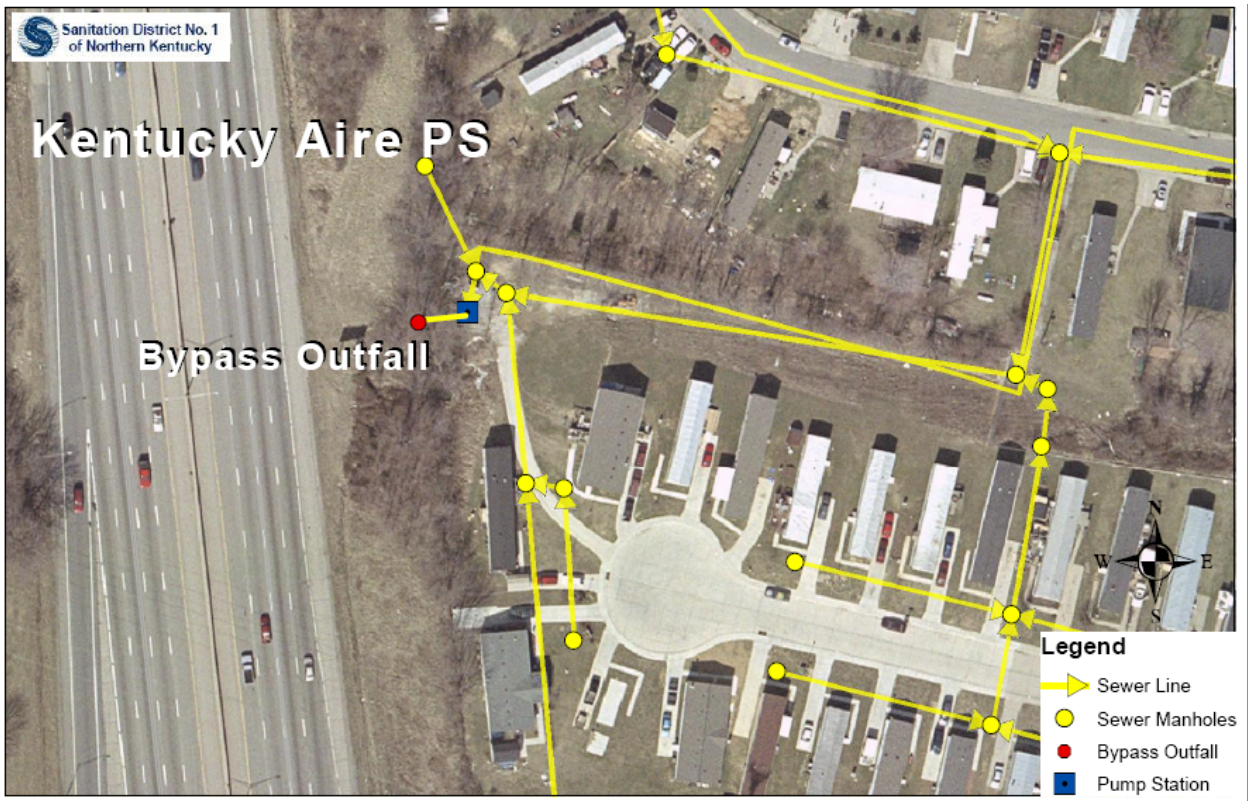
The current service area for Kentucky Aire PS is shown in Figure 10.2.

Figure 10.2 Current Kentucky Aire PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS overflows through an outfall into a small creek which is tributary to the South Fork Gunpowder Creek, Gunpowder Creek, and eventually the Ohio River. Figure 10.3 shows the bypass configuration and location for the Kentucky Aire PS.

Figure 10.3 Kentucky Aire PS Bypass Configuration



10.2 Known Issues and Historical Data

The area that is tributary by gravity connection to the Kentucky Aire PS is an older residential area and a small contributor to the flow for the pump station. The existing wet weather issues generated by the older sections of the sewer system help to contribute to the potential for wet weather problems at the PS. Some of the older sections of the service area have been identified by the District as being large potential sources of RDII based on previous studies, but the gravity connections to the pump stations are not the main contributors to the wet weather overflows that occur at the pump station.

Contributing to a greater extent to the wet weather issues associated with Kentucky Aire PS are the two main tributary pump stations, Highland Acres and South Hampton. These two pump stations contribute high peak flows during wet weather and are a main contributor to wet weather overflows that occur at the Kentucky Aire PS. Their force mains both discharge very close to the pump stations and when both Highland Acres and South Hampton are operating at maximum capacity, it exacerbates the capacity limitations at Kentucky Aire.

During the 12-month period from August 2005 to July 2006, Kentucky Aire PS had eight overflow activations due to capacity limitations (and five activations due to power failure) for a total overflow volume of 135,000 gallons according to District records. A complete list of the District pump station spill records for this period is available in Appendix A.

10.3 Ongoing Efforts

With the continued wet weather issues associated with Kentucky Aire PS, the District has monitored and studied the potential causes for the PS overflows that are occurring. With the goal to eliminate overflows at this location, the District has focused its attention on reducing wet weather flows in the interim and developing elimination strategies for the near-term.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the area tributary to Kentucky Aire PS. The two incoming tributary lines are both being monitored throughout 2007-2008. Both the tributary areas for South Hampton and Highland Acres PSs are also being flow monitored as the effects of the wet weather issues at those pump stations help to exacerbate problems at Kentucky Aire PS. The results of this monitoring program will be used to further refine the District's collection system and receiving water quality models, respectively.

The most significant of the recent projects that have contributed or will contribute to overflow reduction at the Kentucky Aire PS are discussed below; some of the work is ongoing and will not be finalized for several years. The results of these projects will be included in the analysis of the potential solutions for the eventual elimination of the overflow.

10.3.1 Hydraulic Model Development and Southern Kenton County Study

In 2002, the District developed a series of system-wide hydraulic models to assess system performance and to utilize in the planning of major capital projects. The Dry Creek hydraulic model encompasses the Lakeview PS service area and as a result, includes the Kentucky Aire PS service area. During 2005-2006, the District commissioned a study to examine the entire Lakeview PS drainage basin and to update the hydraulic model to reflect recent growth within the service area. Flow meters were placed in the collection system, and the hydraulic model for the Lakeview service area was updated and calibrated based on the collected data in the areas tributary to the Kentucky Aire PS.

The tributary area to the Kentucky Aire PS was evaluated for potential wet weather impacts based on the calibrated model. The District has utilized this information in

examining the potential for short term overflow reduction through repair of existing sewers and eventual bypass elimination. This hydraulic model will be verified based on data collected during the 2007-2008 flow monitoring period and will be utilized during the alternatives analysis to size potential solutions.

10.3.2 Sewer Televising and Maintenance

Based on the potential for wet weather overflows to occur at Kentucky Aire PS, the District has identified the upstream sewers as a priority for identifying and reducing wet weather I/I. As noted, the gravity sewers directly tributary to Kentucky Aire are only a piece of the wet weather picture. The sewers which are tributary to upstream pump stations such as South Hampton, and Highland Acres are also being included in this inspection. Decreasing flows to those pump stations would help to eliminate some of their wet weather influence on the Kentucky Aire PS performance.

To date, the District has televised and cleaned approximately 70,000 ft of the total of 235,000 ft of tributary sewers to examine for defects and potential I/I sources. Additional televising of the upstream sewers will be conducted in the future to complete the total length. Structural and service defects (offsets, sags, cracks, debris, roots etc.) and infiltration have been observed during the televising and have been used to designate lines for repair. Approximately 2,000 ft of sewer has been replaced upstream of Kentucky Aire PS based on the results of the televising. An additional 94 manholes have been repaired based on the results of the field investigation. All of these improvements have helped to try to reduce the wet weather I/I in the system. Future televising and field investigation will be used to help pinpoint areas where further I/I reduction could take place. These efforts are an important component of any overflow elimination plan for the Kentucky Aire PS overflow.

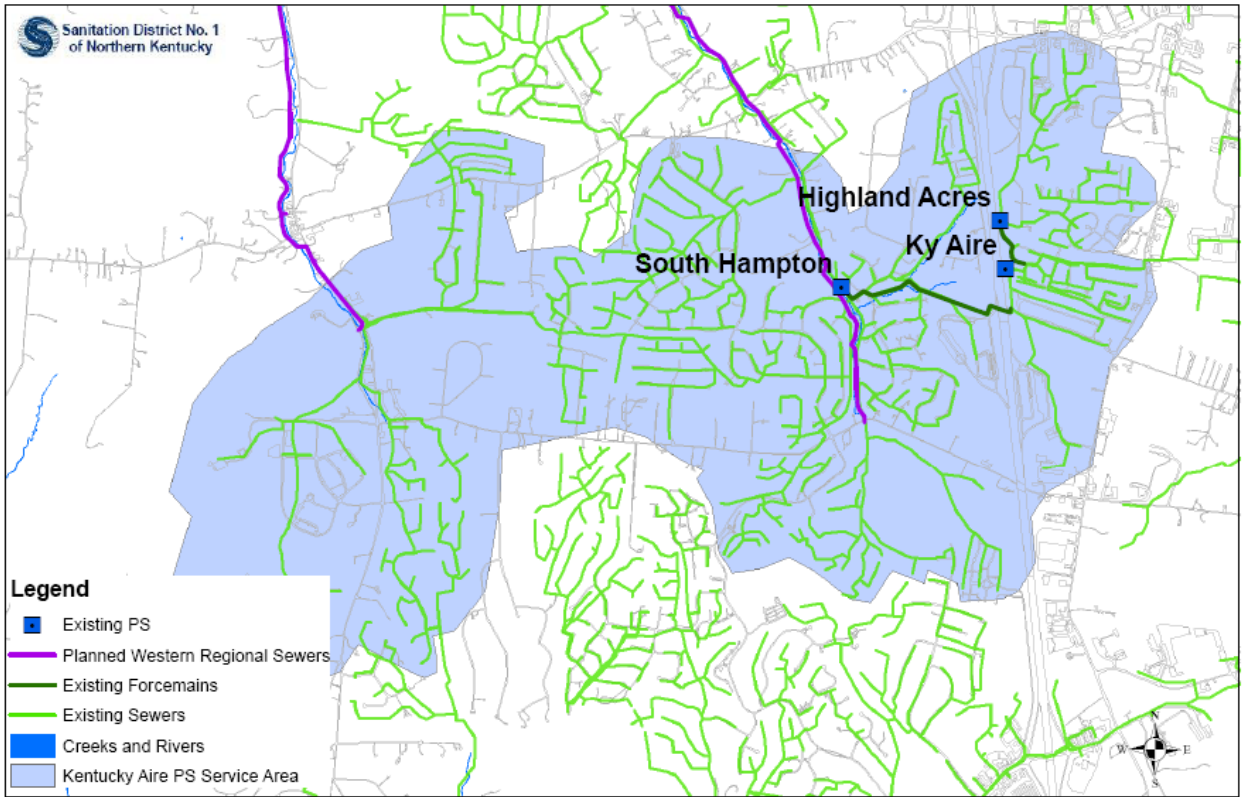
10.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

The District is currently constructing the new WRTP and collection system trunk sewers to serve the new treatment plant. The new Western Regional 42” Frogtown sewer is proposed to collect flow beginning at Frogtown Rd and flow north to the WRTP. This sewer will help to reduce the tributary area for Kentucky Aire upon its completion by picking up flows from the South Hampton PS and eliminating it from service. The location of the Kentucky Aire PS in relation to the new Frogtown sewer is shown in Figure 10.4. The construction of the new Frogtown sewer provides a potential for removal of the Kentucky Aire PS by gravity conveyance to the new WRTP. Additional sewer construction would be required to tie the Kentucky Aire gravity service area into the new Frogtown sewer.

The 42” Frogtown sewer was sized to convey peak wet weather flows under ultimate build-out conditions; including peak wet weather flows from the entire Kentucky Aire PS service area should that construction be determined to be the most cost-effective solution. Potential sizing for the sewer that would connect Kentucky Aire to the Frogtown sewer has not been finalized.

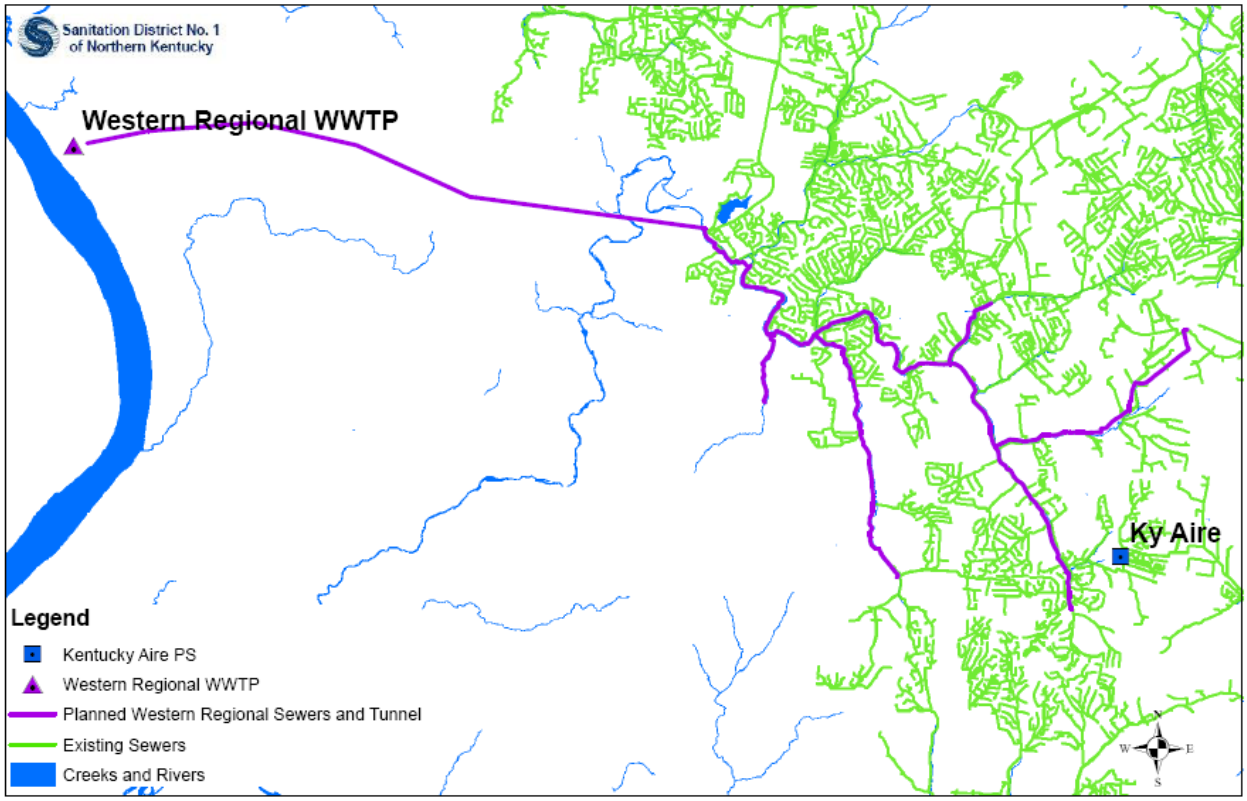
This solution of the gravity sewer connection would be designed to convey peak wet weather flows under Ultimate build-out conditions to eliminate the PS and the overflow.

Figure 10.4 Proposed Frogtown Sewer Alignment



The new Frogtown sewer will continue north to the planned Gunpowder sewer and then west to the Western Regional tunnel and to the WRTP. The connection of the Kentucky Aire PS by gravity service into the Frogtown sewer would eliminate the PS and overflow. The planned Western Regional Collection System is shown in Figure 10.5.

Figure 10.5 Planned Western Regional Collection System



In addition to the removal of the PS itself, removal of tributary flow is also scheduled through the elimination of the Union and South Hampton PSs through both the new Western Regional 36" Union and 42" Frogtown sewers, respectively. By providing an alternate conveyance for these two pump stations, the wet weather burden for Kentucky Aire PS will be greatly reduced.

10.4 Potential Solutions

The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Kentucky Aire PS overflow. The applicability of each of the listed solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the listed solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not

consider the combination of solutions but will outline the process to identify the alternatives.

10.4.1 Service Area Reduction/PS Elimination

The Frogtown sewer, as noted in the previous section, is currently being planned for eventual construction to provide an alternate conveyance to the new WRTP. To access the Frogtown sewer for the Kentucky Aire service area, a new sewer or sewers would be required that would connect from the location of the current PS to the planned sewer alignments. There are several potential routes that could be considered in eliminating the PS through the construction of a gravity sewer. The District has investigated the possibility of utilizing the existing South Hampton forcemain which runs continuously uphill under I-75/I-71 from South Hampton to Kentucky Aire as a gravity sewer to convey flow the opposite direction towards the Frogtown sewer in the future. A detailed sizing and feasibility analysis would have to be done prior to any further design for this option to be selected. With a gravity sewer connection to the Frogtown sewer, the design and construction of this additional sewer would have to be planned to coincide with the construction of the Western Regional sewers. This solution of the gravity sewer connection would be designed to convey peak wet weather flows under Ultimate build-out conditions and would eliminate the PS and the overflow.

Both South Hampton and Highland Acres PSs are tributary to Kentucky Aire PS; the elimination of one or both of these pump stations will reduce the wet weather flows to the pump station. The option of eliminating the South Hampton PS as currently planned with the new Frogtown sewer and reducing the wet weather flow from the Highland Acres PS will be examined as part of the alternatives analysis. We will also examine the alternative of eliminating the Highland Acres PS by a gravity sewer to the Kentucky Aire PS and then eliminating the Kentucky Aire PS by a new gravity sewer connecting to the Frogtown sewer. The new sewers would be designed to convey peak wet weather flows under Ultimate build-out conditions.

10.4.2 Pump Station Capacity Upgrade

As currently constructed, Kentucky Aire PS pumps to the gravity sewers that lead to Lakeview PS; a potential solution would be to increase the current capacity of the PS given that the downstream capacity is available within the Southern Kenton County gravity sewers. The viability of this option would depend on the eventual solution for the Lakeview drainage basin and the conveyance capacity of this system.

10.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage at the Kentucky Aire PS site is a possibility given the deadline for the elimination of the PS overflow. The potential locations of the

equalization storage would be reviewed as part of the alternatives analysis screening. Construction of storage would be a feasible solution given the location of the station and the size of the tributary service area. Due to the interconnected nature of the pump stations within this area, several options for storage exist that would reduce the wet weather impacts at Kentucky Aire.

10.4.4 RDII Removal/Reduction

The District is committed to examining the potential benefits of an RDII removal and reduction program within the Kentucky Aire PS service area (including all sewers tributary to upstream pump stations). This option will not be used as a stand-alone solution but is to be included as a supplemental solution that will be used in conjunction with other solutions. Through potential wet weather flow reduction, planned solutions may be able to be reduced in size to account for the predicted reduction in wet weather flows.

10.4.5 Additional Work

Prior to the final implementation of the solution for the elimination of the Kentucky Aire PS overflow, the Dry Creek hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. In addition to the development of an existing hydraulic model, future condition models will be created to simulate the impacts of future growth on the District's collection system at various time horizons. Future condition models will be used to ensure that any potential solution will not only be valid for current conditions, but also for future conditions.

The calibrated hydraulic models will be used by the District to evaluate and finalize the details for the elimination solution outlined above and help develop the sizing requirements for the elimination of the Kentucky Aire PS overflow. The Frogtown sewer is already planned for construction and has been sized, but the sizing of any connections between the Frogtown sewer and the current PS will be evaluated using the wet weather simulations within the updated model.

10.5 Schedule

The deadline for the elimination of the Kentucky Aire PS overflow is December 31, 2015. There are several additional considerations in the development of the schedule, but the biggest consideration is the deadline for the elimination of the Lakeview PS overflow by December 31, 2013. The removal of Kentucky Aire PS from the Lakeview service area may provide a reduction in wet weather burden at Lakeview and may provide additional wet weather capacity at Lakeview PS, potentially reducing any proposed solution for that station. The effects of removing the Kentucky Aire PS from the Lakeview service area by December 31, 2013 will be analyzed with the updated

model to determine if a cost-effective benefit will be provided to elimination of the Lakeview PS overflow. If a cost-effective benefit is shown then the District will consider addressing the Kentucky Aire PS flows to coincide with the deadline for elimination of the Lakeview PS overflow. Otherwise, the deadline of December 31, 2015 will be met per the schedule below. Given this timeframe and the required time to design and implement a solution, the schedule is as proposed in Table 10.1.

Table 10.1 Kentucky Aire PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Existing Dry Creek Hydraulic Model and Future Condition Dry Creek and Western Regional Models
March 1, 2013	Alternative Selected for Design
June 1, 2014	Final Design Submitted
September 1, 2014	Construction Begins on Selected Alternative
December 31, 2015	Construction Completion Date

This schedule includes the conclusion of the updated calibration for the Dry Creek hydraulic model and the creation of the future condition Dry Creek and Western Regional models. These models will serve as the cornerstone for the alternatives analysis in the evaluation of the potential solutions outlined in Section 10.4.

SECTION 11: ALLEN FORK PUMP STATION

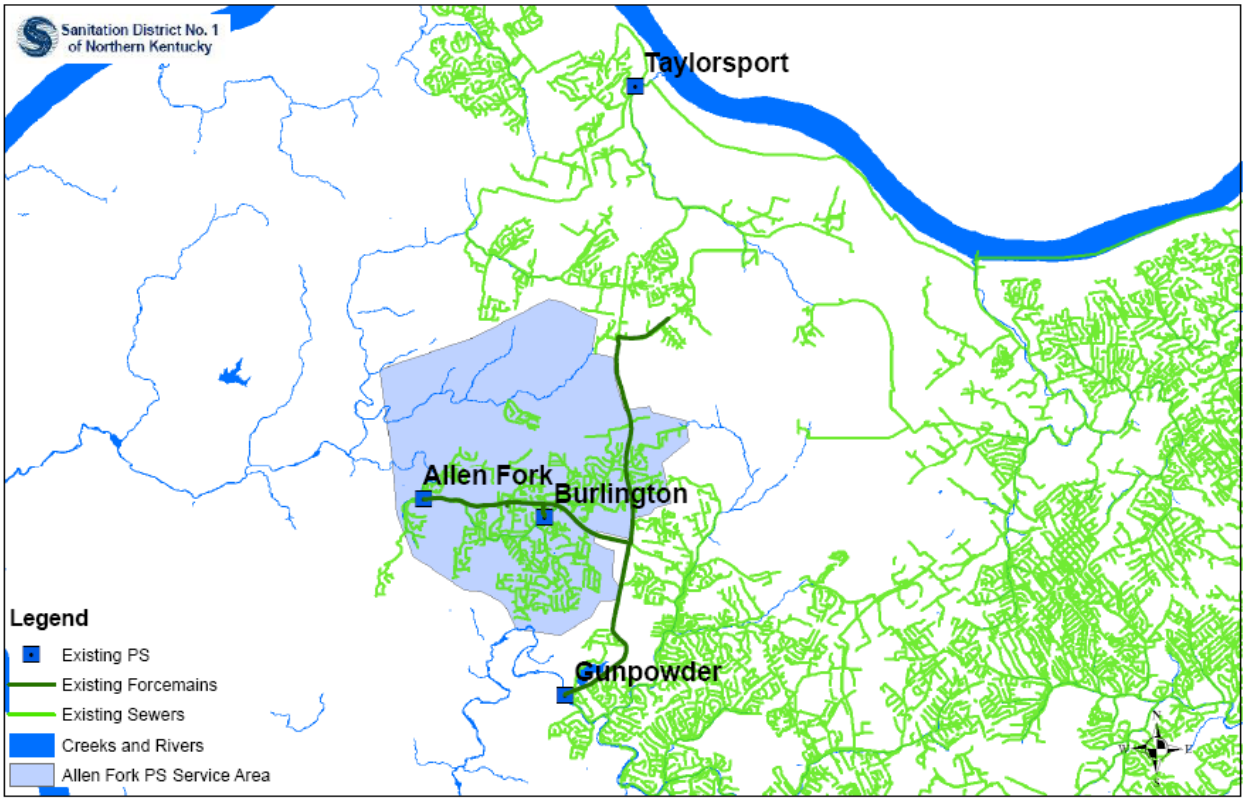
11.1 Allen Fork Pump Station Background

Allen Fork PS is one of the many tributary pump stations to the Taylorsport PS. The Allen Fork PS pumps to the new Burlington PS and Burlington PS pumps to a 24-inch force main (merging with flows from the Gunpowder PS) to Taylorsport PS. Taylorsport PS conveys all flow from the service area through a 24-inch force main, which manifolds with the 48-inch diameter Bromley Force Main and conveys flows to the Dry Creek Wastewater Treatment Plant. The PS was originally constructed in 1993, and in addition to regular maintenance, was upgraded in 2004 during its operation. The PS currently contains three submersible pumps (one standby) and has a firm capacity of approximately 2.3 MGD and a total rated capacity of 2.6 MGD. A picture of the exterior of Allen Fork PS is shown in Figure 11.1.

Figure 11.1 Allen Fork PS

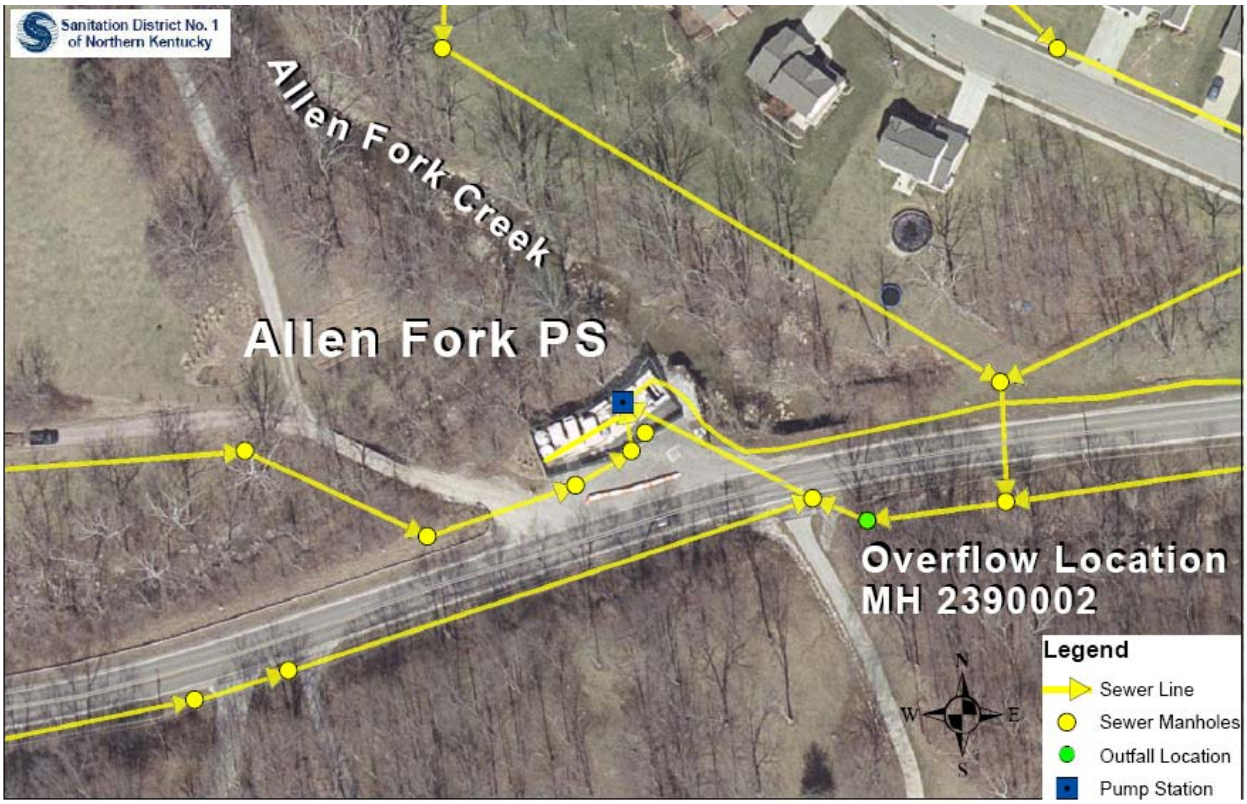
The current service area for Allen Fork PS includes the Burlington PS as a major component in conveying the Allen Fork PS flows to the Taylorsport PS. Figure 11.2 shows the current Allen Fork PS service area.

Figure 11.2 Current Allen Fork PS Service Area



This PS does not have a constructed bypass, but MH 2390002 (SSO) immediately upstream overflows during large wet weather events. Figure 11.3 shows the Allen Fork PS flow configuration.

Figure 11.3 Allen Fork PS Flow Configuration



11.2 Known Issues and Historical Data

Continued population growth and development in the service area has resulted in capacity issues at the Allen Fork PS.

Table 11.1 Allen Fork PS Release Report Summary

Year	Total Recorded Volume (Gal)
2004	0
2005	7,300
2006	0

Prior to the PS upgrade in 2004, the PS overflowed frequently during wet weather events. Since the upgrade, the total annual estimated overflow volume has been reduced. Records show that two electrical failures during December 2005 resulted in overflows totaling 7,300 gallons. There were no known overflows at the PS during

2004 or 2006. The District spill records for the 12 month period between August 2005 and July 2006 are located in Appendix A.

The new Burlington PS is expected to increase the capacity of the collection system during wet weather events, but its long-term impact has not been confirmed to-date due to a lack of significant precipitation since the PS was brought into service in January 2007.

SSO 2390002 is a manhole just upstream of the PS that overflows to prevent sewage from backing up into basements upstream of the PS. The SSO was in existence prior to the PS upgrades in 2004. It is estimated that the improvements in 2004 and the addition of the Burlington PS in 2007 have resulted in the decrease in overflow frequency and duration at SSO 2390002. The decrease in overflow volume will be confirmed with the current flow monitoring program being conducted.

11.3 Ongoing Efforts

The District is being proactive in its efforts to eliminate overflows at this PS by its current investigations in the behavior of the system's flows, water quality, rehabilitation of its infrastructure, and through current and future construction projects.

In addition to ongoing efforts to reduce wet weather overflows, the District is currently conducting a system-wide flow monitoring and sampling program to further characterize their collection system, including the Allen Fork PS tributary area. The results of this monitoring program will be used to further refine the District's collection system and receiving water quality models. These refined models will be used in determining the optimum solution for the elimination of the overflow at the Allen Fork PS.

The most significant of the recent construction and rehabilitation projects that have contributed or will contribute to overflow reduction at the Allen Fork PS are discussed below; some of the work has been completed and some is ongoing and will be finalized in the future.

11.3.1 Allen Fork Collection System Improvements – Phase I

The Allen Fork Collection System Phase I Improvements completed in January 2007 increased the dry and wet weather capacity within the Allen Fork service area. This project included the construction of the new Burlington PS and modifications to the existing Allen Fork PS as well as installation of approximately 2,700 LF of new 24-inch gravity sewer to replace existing deteriorated 8-inch and 12-inch gravity sewers. The overall intent was to maximize the hydraulic capacity of the existing collection system. The Allen Fork PS discharge was changed from pumping to the Taylorsport PS and routed to the new Burlington PS thereby reducing the discharge head requirements for

the Allen Fork PS. The pump impellers were changed to accommodate the reduction in discharge head while maintaining the current increased flow rate to pump wet weather flows.

The installation of the new Burlington PS and replacement sewers directly reduced wet weather flows at the Allen Fork PS. With the completion of the Allen Fork Phase I improvements, the current planning-level hydraulic model predicts a reduction in total annual volume of over 50% to the Allen Fork PS in a typical year. These values are based on projected flows in the current existing system model. The existing system model is being updated and refined (based on flow data currently being collected). Figure 11.4 presents a simplified schematic of the proposed Allen Fork Collection System Improvements – Phase I.

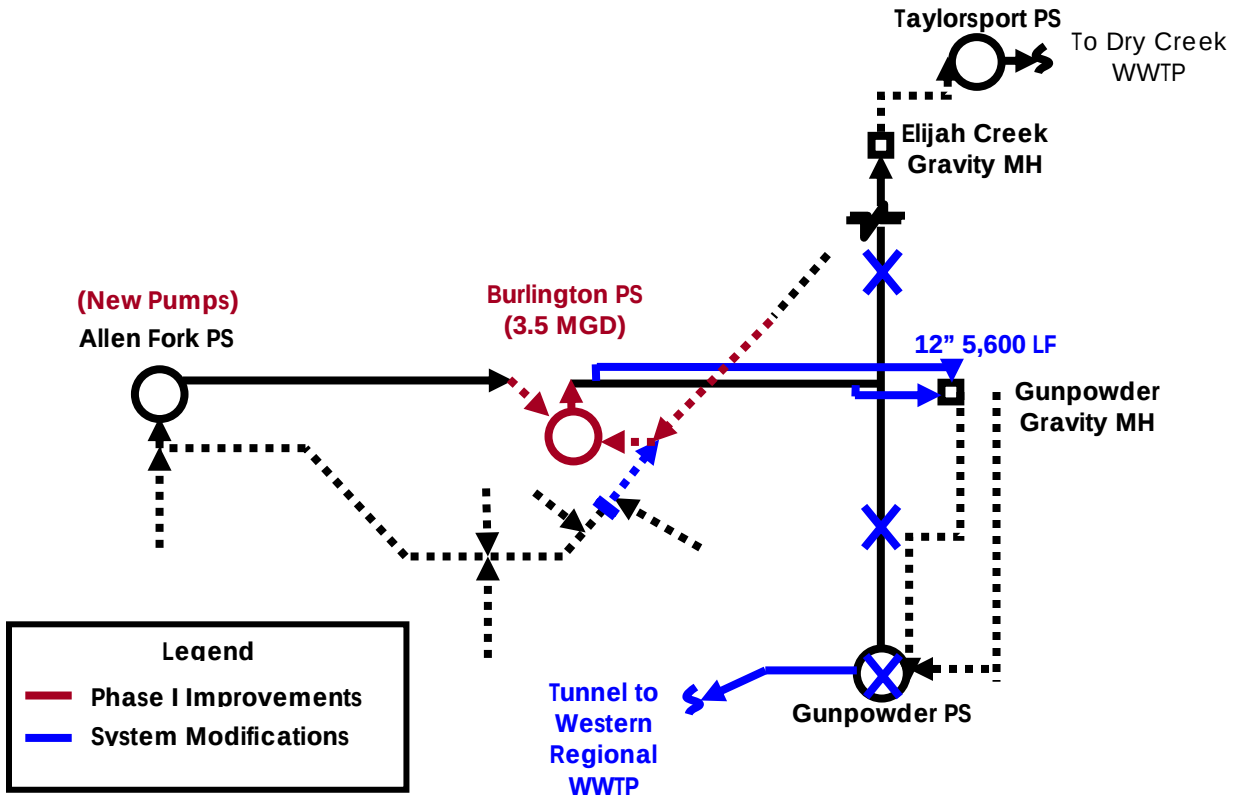
11.3.2 Allen Fork Collection System Improvements – Phase II

The Allen Fork Collection System Phase II Improvements is the second phase of improvements that are intended to increase the capacity of the Allen Fork service area and address peak wet weather flows at the PS. The second phase is currently underway and consists of flow monitoring upstream of the Allen Fork and Burlington PSs as part of the 2007 – 2008 system-wide flow monitoring program to identify additional I/I sources and develop a plan to remove the I/I. Problem areas identified will be televised and investigated further to locate pipe defects and I/I sources. The results of this work will then be used to correct the defects and remove the I/I sources identified.

11.3.3 Western Regional Collection System and Western Regional Treatment Plant Construction

The District's primary alternative to eliminate overflows at the Allen Fork PS is the construction of the new WRTP and new collection system, including a gravity tunnel to convey flows to serve the new treatment plant. The new WRTP and collection system is scheduled to be online by 2013. As part of the new infrastructure, flow from the Gunpowder, Burlington, and Allen Fork pump stations will be diverted from the Taylorsport PS service area and redirected to the new gravity tunnel and WRTP. Following the system-wide flow monitoring and Phase II work described above, the hydraulic Model will be updated and calibrated and used to evaluate and confirm how this redirection of flows will reduce the overflow volume at the Allen Fork PS. Potential solutions, as needed, to eliminate the overflow at the Allen Fork PS will then be developed as described below to address the remaining wet weather flows.

Figure 11.4 Allen Fork PS Flow Re-configuration



11.4 Potential Solutions

Several solutions will be examined during the detailed alternatives analysis that will be conducted for the Allen Fork PS. The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Allen Fork PS overflow. The applicability of each of the potential solutions outlined within the introduction will be assessed for this pump station and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the potential solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not consider the combination of solutions, but will outline the process to identify the alternatives.

11.4.1 Service Area Reduction/PS Elimination

The elimination of the overflow through gravity sewer construction at the pump station would require conveyance of peak flows to an alternate point within the system. Given its current location and elevation, there currently is not a viable solution for conveyance of flows from Allen Fork PS by gravity. Therefore, this solution is not a likely candidate for overflow elimination.

11.4.2 Pump Station Capacity Upgrade

Upgrading PS capacity is a viable solution that will be evaluated in great detail. The main concern about this solution is the impact that increasing the Allen Fork PS capacity will have on the Burlington PS. It is likely that if this solution is selected that the capacity will be increased for both the Allen Fork and Burlington PSs to convey peak wet weather flows to the Western Regional tunnel and WRTP. The District's hydraulic model as described above will be a critical tool that will be used to evaluate the impacts of increasing flow.

11.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage is a feasible solution for the elimination of the Allen Fork PS overflow. As part of the alternatives analysis, the sizing and the site location for the storage will be examined in detail.

11.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive RDII removal and reduction program, as described above, within the Allen Fork service area. This solution will be used in conjunction with the other potential solutions to eliminate the overflow at the Allen Fork PS.

11.4.5 Additional Work

Prior to the evaluation and selection of a solution for the Allen Fork PS overflow elimination, the District's hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. In addition to the development of an existing hydraulic model, future condition models will be created to simulate the impacts of future growth on the District's collection system at various time horizons. Future condition models will be used to ensure that any potential solution will not only be valid for current conditions, but also for future conditions.

The calibrated hydraulic models will be used by the District to evaluate the potential solutions outlined above and help develop the solution sizing requirements for the

elimination of the Allen Fork PS overflow. District receiving water quality models will also be used where applicable to assess the implications of decreased overflow activities and assess the improvement in water quality due to the implementation of the potential solutions. Planning level costs will be developed for each of the selected solutions and will be used to generate a cost-benefit comparison among the potential solutions. Based on the available hydraulic, water quality, and financial data and results, the most effective alternative will be selected for implementation.

11.5 Schedule

The deadline for the elimination of the Allen Fork PS overflow is December 31, 2015. Given this timeframe and the required time to select, design, and implement a solution, the schedule is as proposed in Table 11.2.

Table 11.2 Allen Fork PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Hydraulic Model and Develop Future Condition Models
January 1, 2012	Alternative Selected for Design
June 1, 2013	Final Design Submitted
September 1, 2013	Construction Begins on Selected Alternative
December 31, 2015	Construction Completion Date

SECTION 12: HARRISON HARBOR PUMP STATION

12.1 Harrison Harbor Pump Station Background

Harrison Harbor PS is a very small PS located along the Ohio River just south of Silver Grove. The PS serves only a few houses and contains two pumps with a firm capacity of approximately 45 GPM. A picture of the exterior of Harrison Harbor PS is shown in Figure 12.1.

Figure 12.1 Harrison Harbor PS

Figure 12.2 shows the current Harrison Harbor PS service area.

Figure 12.2 Current Harrison Harbor PS Service Area

12.2 Known Issues and Historical Data

A detailed review of all overflow records shows an overflow occurring from January 9 through January 13, 2005. The reason stated on the record was a high Ohio River Level. A review of the Ohio River Level data shows that during this time period the Ohio River was 4 feet above flood stage but was still 6 feet below the top pf the pump station. There is some evidence that the pump station may have been turned off under the high flood conditions in order to protect the pumps from severe damage. If this was the case, the total overflow volume would have been approximately 4,500 gallons. Recent SCADA data indicate that the pump at Harrison Harbor operates an average of 20 minutes per day. At a rated capacity of 45 gpm, the total daily volume would be approximately 900 gallons.

Recent field investigations have confirmed that there is not a constructed bypass located at the pump station. It turns out that the District's GIS erroneously shows a pipe leaving the pump station towards the old WWTP that was eliminated by the Harrison Harbor PS. This pipe was, in fact, an older abandoned line that used to flow

into the WWTP. Further, there is a 4-inch PVC vent line that has been mistaken in the past for an overflow pipe.

While there is no constructed bypass at the station, the District has conducted detailed smoke testing and other field investigations to try to identify any potential I/I sources into the station. The smoke testing revealed two sections of pipe that used to serve a trailer park that was abandoned during the flood of 1997. These sections of pipe are being removed. In addition, the District has installed flow meters in the gravity sewers tributary to the pump station and is tracking via SCADA, pump run times and high level alarm data to confirm that there are no capacity issues at the pump station. In addition, SD1 no longer turns off the pump station at elevated Ohio River levels.

12.3 Identified Solution

Given the history of the PS and the lack of recorded overflow activity, the District is currently monitoring Harrison Harbor PS closely, as described above, to identify if there is any potential for wet weather overflow activations. The monitoring for this PS will continue and will be documented in the periodic updates of this report. Telemetry data will be used to identify if the PS experiences any wet weather conditions. The District plans to monitor the PS and to document the lack of a wet weather problem. By documenting the lack of overflows occurring, the District proposes that this will address the requirements of the Consent Decree in eliminating the overflow at the Harrison Harbor PS.

SECTION 13: RIPPLE CREEK PUMP STATION

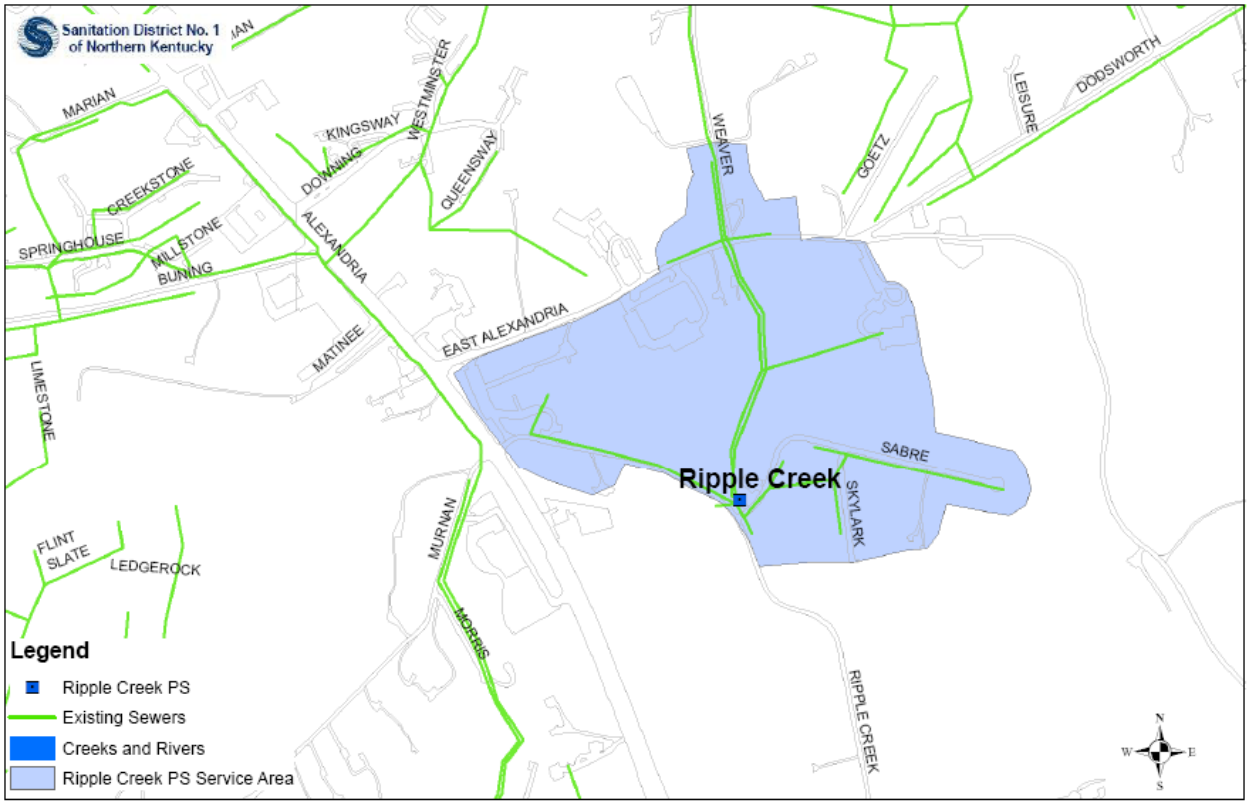
13.1 Ripple Creek Pump Station Background

Ripple Creek PS is a very small PS located near Silver Grove, Kentucky. The PS discharges to the Silver Grove PS which is at the very upstream end of the Dry Creek WWTP service area. The PS contains 2 dry pit pumps; it currently has a firm capacity of approximately 97 gpm. A picture of the exterior of Ripple Creek PS is shown in Figure 13.1. As the picture shows, the PS is located along a public road.

Figure 13.1 Ripple Creek PS

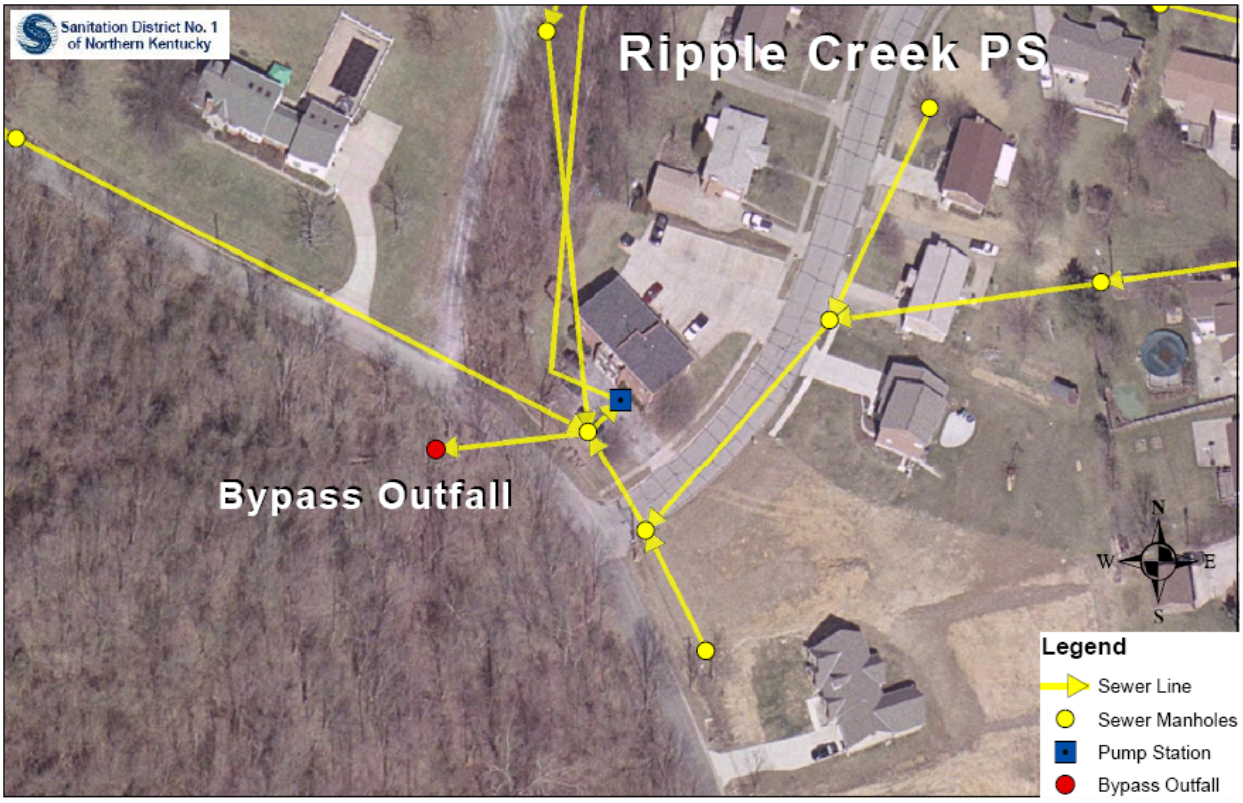
The current service area for Ripple Creek PS is quite small. Figure 13.2 shows the current Ripple Creek PS service area.

Figure 13.2 Current Ripple Creek PS Service Area



During large wet weather events when the capacity of the PS is exceeded, the PS overflows through a 6-inch constructed bypass to a tributary of Riffle Creek which discharges to the Licking River.

Figure 13.3 Ripple Creek PS Bypass Configuration



13.2 Known Issues and Historical Data

Based on available information, the Ripple Creek PS has spilled six times between August 2005 and July 2006 for a total estimated volume of 61,000 gallons. One spill was due to a mechanical failure at the PS. A complete list of the District pump station spill records for this period is available in Appendix A.

13.3 Ongoing Efforts

13.3.1 Current Efforts

The District is currently making significant efforts to evaluate the collection system upstream of the Ripple Creek PS as part of the overall Infrastructure Characterization effort as part of the Watershed Plans for the CD. These include:

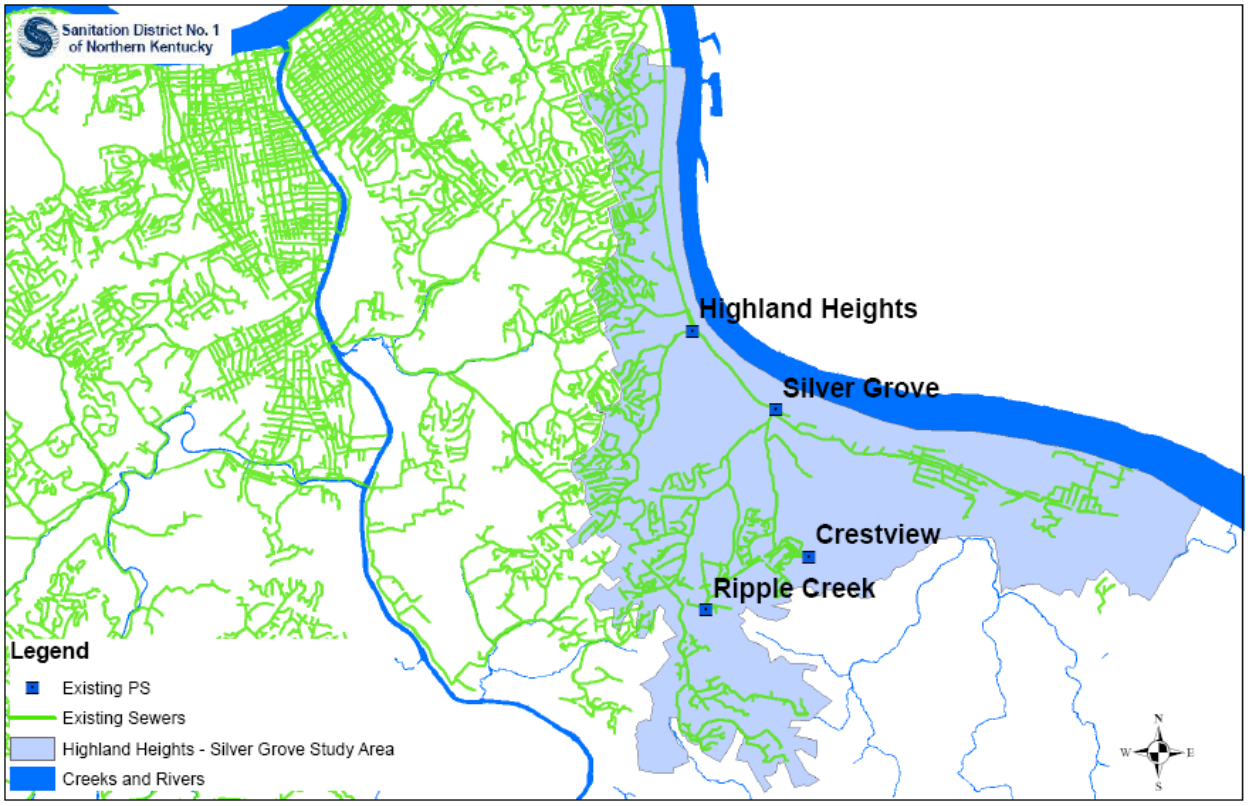
- **Flow monitoring**: As part of the overall system-wide flow monitoring effort, the District has placed a flow meter upstream of the PS to evaluate the system's reaction during wet weather.

- **CCTV**: All sewers upstream of the PS are currently being televised to look for potential sources of I/I and to evaluate the overall condition of the pipes upstream of the PS.
- **Smoke Testing**: The entire system upstream of the PS has been smoke tested to look for public and private sources of I/I upstream of the PS.
- **Pump Testing**: The actual PS capacity will be calculated using drawdown testing.
- **Hydraulic Modeling**: The Ripple Creek PS will be added to the District's collection system hydraulic model, calibrated and verified. This model will then be used to evaluate numerous conditions and impacts at the PS and to evaluate various alternatives to eliminate the overflow.

13.3.2 Highland Heights Silver Grove Study

A study was recently conducted to address CSOs and SSOs in the area tributary to the Highland Heights PS., which includes the area served by Ripple Creek PS. Figure 13.4 shows the extents of the study area.

Figure 13.4 Highland Heights Silver Grove Study Area



The study focused on options to convey dry and wet weather flows from the area. Because this area is at the very top of the system, there are great challenges to face when conveying higher flows to the WWTP. Therefore equalization storage was a key component to the study. The results of the study will be refined as part of the ongoing Infrastructure Characterization efforts for the development of the Watershed Plans to address overflows system-wide.

13.3.3 Silver Grove Sewer Separation

The City of Silver Grove sewer system has a blend of combined and separate sewers. The combined flow during wet weather puts a significant stress on the Silver Grove PS, which receives the flow from Ripple Creek PS. Since the City already has a storm sewer system, the District is currently removing all known direct source storm sewer connections, such as catch basins. This effort is approximately 50% complete and will be done by the end of 2008.

13.4 Potential Solutions

Several solutions will be examined during the detailed alternatives analysis that will be conducted for the Ripple Creek PS. The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Ripple Creek PS overflow. The applicability of each of the listed solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the listed solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not consider the combination of solutions, but will outline the process to identify the alternatives.

13.4.1 Service Area Reduction/PS Elimination

The elimination of the overflow through gravity sewer construction at the PS would require conveyance of peak flows to an alternate point within the system. Given its current location and elevation, there currently is not a viable solution for conveyance of flows from Ripple Creek PS by gravity. Therefore, this solution is not a likely candidate for overflow elimination.

13.4.2 Pump Station Capacity Upgrade

Upgrading PS capacity is a potentially viable solution that will be evaluated in detail, but the challenge is that the current PS is located on a public right-of-way. Therefore, replacement in its current location is not a solution. Another concern about this solution is the impact of increased capacity on the downstream system. The Ripple Creek PS is located very high in the District's service area and is tributary to the Silver Grove PS, which already receives significant flow. The District's hydraulic model will be a critical tool that will be used to evaluate the impacts of increasing flow downstream from this pump station.

There may be an opportunity to replace the Ripple Creek PS as part of a potential development in the area. If this is the case, then this may be an opportunity to eliminate the overflow by providing a larger capacity pump station. However, impacts of increasing flow downstream from this PS will need to be examined closely.

13.4.3 Wet Weather Equalization Storage

The use of off-line wet weather equalization storage is not a feasible solution for the elimination of the Ripple Creek PS overflow due to the lack of available space. However, depending on the size of storage that is needed, in-line pipe storage may be feasible. As part of the alternatives analysis, the sizing and the site location for the storage will be examined in detail.

13.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive RDII removal and reduction program within the Ripple Creek service area. This solution will likely not be used as a stand-alone solution but is likely to be included as a supplemental solution that will be used in conjunction with other alternatives. By reducing wet weather RDII tributary to Ripple Creek PS over time, the overall magnitude and cost of the alternative to be implemented may be able to be reduced.

13.4.5 Additional Work

Prior to the evaluation and selection of a solution for the Ripple Creek PS overflow elimination, the District's hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program as part of the Watershed Plans. In addition to the development of an existing hydraulic model, future condition models will be created to simulate the impacts of future growth on the District's collection system at various time horizons. Future condition models will be used to ensure that any potential solution will be valid not only for current conditions, but also under future growth conditions.

The calibrated hydraulic models will be used by the District to evaluate the potential solutions outlined above and help develop the solution sizing requirements for the elimination of the Ripple Creek PS bypass. Water quality models where applicable will also be used to assess the implications of decreased bypass activities and assess the improvement in water quality as a result of the implementation of the potential alternatives. Planning level costs will be developed for each of the selected solutions and will be used to generate a cost-benefit comparison among the potential solutions. Based on the available hydraulic, water quality, financial data and results, the most effective alternative will be selected for implementation.

13.5 Schedule

The deadline for the elimination of the Ripple Creek PS bypass is December 31, 2010. Given this timeframe and the required time to select, design, and implement a solution, the schedule is as proposed in Table 13.1.

Table 13.1 Ripple Creek PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Hydraulic Model and Develop Future Condition Models
July 31, 2008	Alternative Selected for Design
March 1, 2009	Final Design Submitted
June 1, 2009	Construction Begins on Selected Alternative
December 31, 2010	Construction Completion Date

SECTION 14: SOUTH PARK PUMP STATION

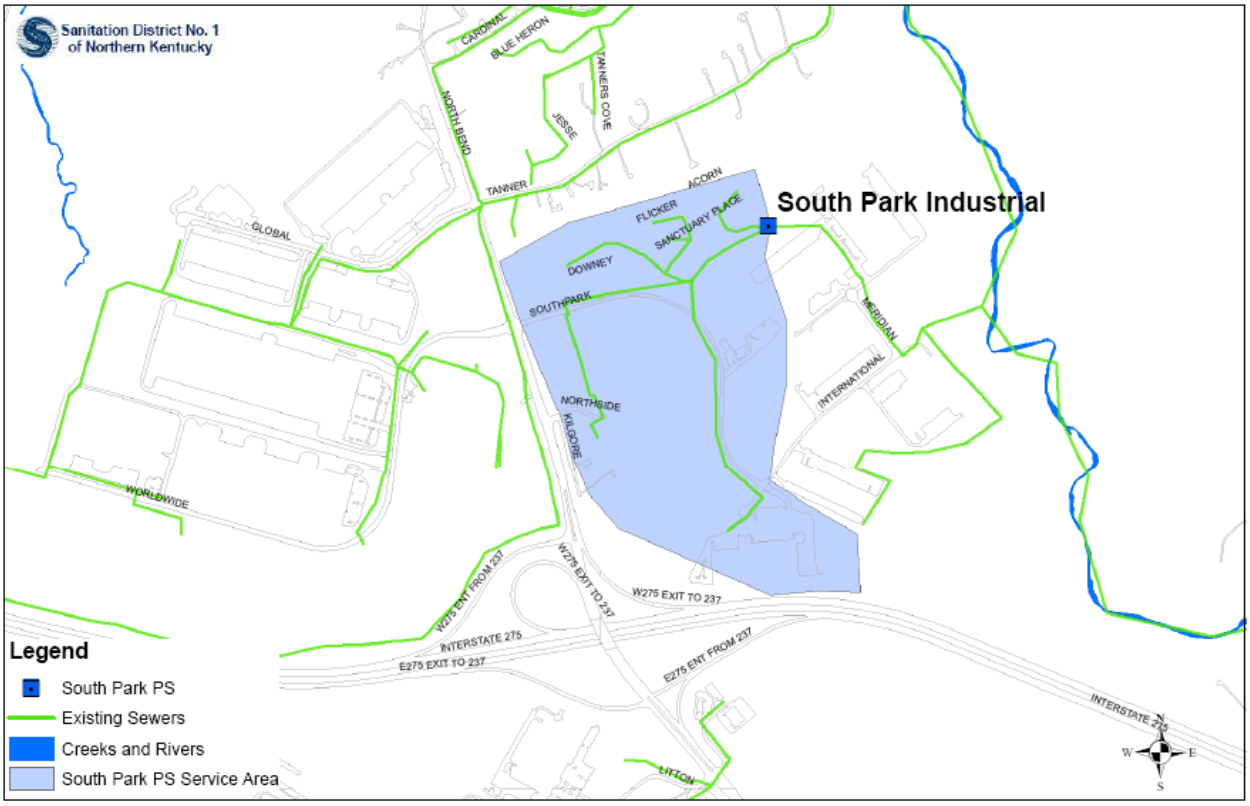
14.1 South Park Pump Station Background

The South Park Industrial PS is located in Boone County and is one of the many tributary pump stations to the Taylorsport PS. The PS was originally constructed in 1986 and it operates with 2 submersible pumps (1 standby). The firm capacity and peak wet weather inflow are currently unknown. Flow monitoring is currently underway and drawdown tests are scheduled to be conducted to determine flows to the PS and PS capacity. A picture of the exterior of South Park PS is shown in Figure 148.1.

Figure 14.1 South Park PS

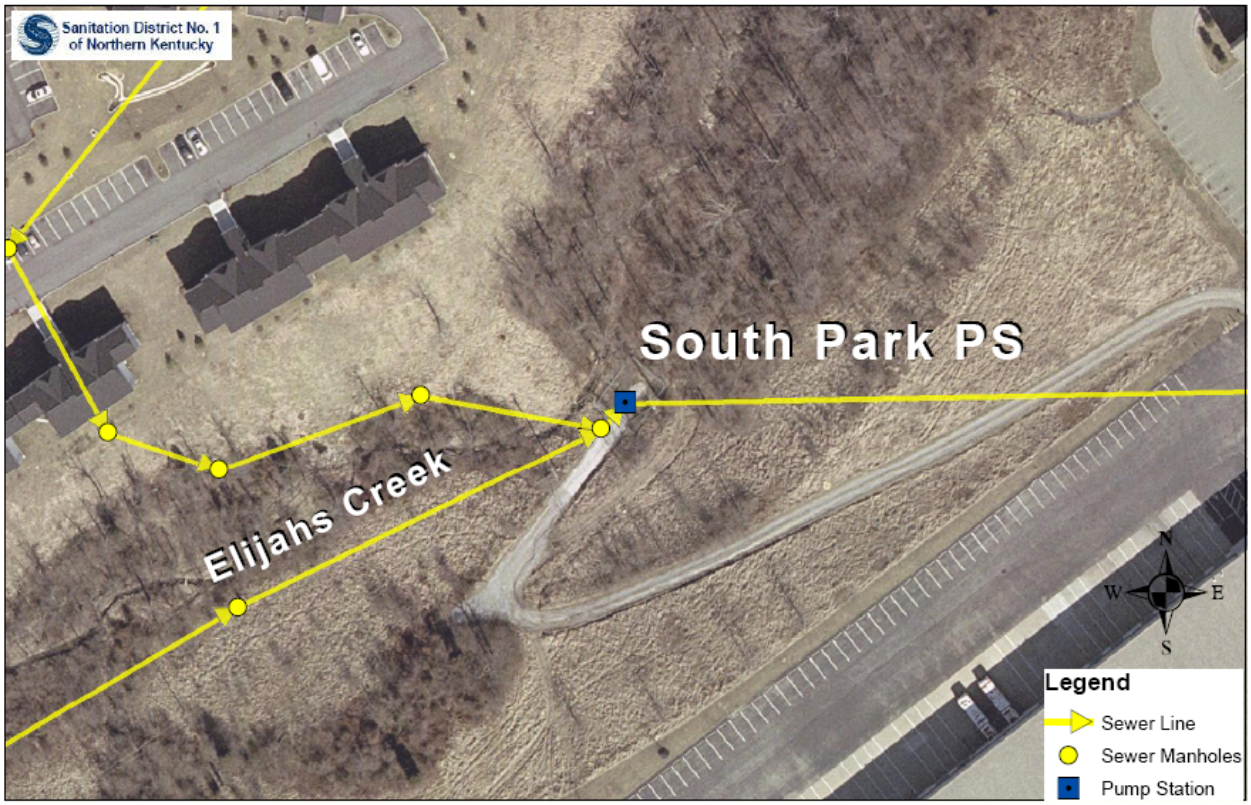
Figure 14.2 shows the current South Park PS service area.

Figure 14.2 Current South Park PS Service Area



There is no constructed overflow structure at the pump station; however, during heavy rain events overflows occur through the hatch of the wet well and a manhole immediately upstream of the pump station. Figure 14.3 shows the South Park PS flow configuration.

Figure 14.3 South Park PS Flow Configuration



14.2 Known Issues and Historical Data

There has been physical evidence that an overflow has occurred in the past at this location, but no spillage data has been recorded. The only known overflow at this PS occurred in 2001 due to a power failure. The overflow began on July 11th and ended on July 13th spilling an unknown volume into Elijahs Creek. There were no recorded overflows during the 12 month period from August 2005 – July 2006. A complete list of the pump station overflow records for this period is available in Appendix A.

14.3 Ongoing Efforts

The District is currently making significant efforts to evaluate the collection system upstream of the South Park PS as part of the overall Infrastructure Characterization effort as part of the Watershed Plans for the CD. These include:

- **Flow monitoring**: As part of the overall system-wide flow monitoring effort, the District has placed a flow meter upstream of the PS to evaluate the system's reaction during wet weather.

- **CCTV**: All sewers upstream of the PS are currently being televised to look for potential sources of I/I and to evaluate the overall condition of the pipes upstream of the PS.
- **Smoke Testing**: The entire system upstream of the PS is being smoke tested to look for public and private sources of I/I upstream of the PS.
- **Pump Testing**: The actual PS capacity will be calculated using drawdown testing.
- **Hydraulic Modeling**: The South Park PS will be added to the District's collection system hydraulic model, calibrated and verified. This model will then be used to evaluate numerous conditions and impacts at the PS and to evaluate various alternatives to eliminate the overflow.

The results of this monitoring program will be used to further refine the District's collection system and receiving water quality models. These refined models will be used in identifying and evaluating alternatives for the elimination of overflows at the South Park PS.

The District will be reviewing PS telemetry data to assess pump run times and wet well levels during wet weather events. The District will also be conducting a draw-down test at the South Park PS to determine its firm capacity during the fall of 2007.

14.4 Potential Solutions

Several solutions will be examined during the detailed alternatives analysis that will be conducted for the South Park PS. The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the overflow at South Park PS. The applicability of each of the listed solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the listed solutions to be implemented simultaneously or in phases. For example, I/I reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not consider the combination of solutions, but will outline the process to identify the alternatives.

14.4.1 Service Area Reduction/PS Elimination

Elimination of the PS and subsequent overflow through the construction of a gravity sewer would require conveyance of peak flows to an alternate point within the system.

The feasibility of this solution will be evaluated based on the anticipated downstream impacts from the increased dry and wet weather flows.

14.4.2 Pump Station Capacity Upgrade

Elimination of the overflow by increasing the capacity of the PS either by replacing the existing pumps and forcemain with larger ones or adding an additional pump will be evaluated. Potential impacts on the downstream system will be included in the evaluation.

14.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage might be a feasible solution for the elimination of the South Park service area wet weather issues and overflow. As part of the alternatives analysis, the sizing and the site location for the storage will be examined in detail.

14.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive I/I removal and reduction program within the South Park service area. This solution will likely not be used as a stand-alone solution but is likely to be included as a supplemental solution that will be used in conjunction with other alternatives. By reducing wet weather RDII tributary to South Park PS over time, the overall magnitude and cost of the selected alternative to be implemented may be able to be reduced.

14.5 Schedule

The deadline for the elimination of the South Park PS overflow is December 31, 2010. Given this timeframe and the required time to select, design, and implement a solution, the schedule is proposed in Table 14.1.

Table 14.1 South Park PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Alternative Selected for Design
June 1, 2009	Final Design Submitted
August 31, 2009	Construction Begins on Selected Alternative
December 31, 2010	Construction Completion Date

This schedule includes the conclusion of the updated calibration for the Taylorsport hydraulic model and the creation of the future condition Taylorsport models. These models will serve as the cornerstone for the alternatives analysis in the evaluation of the potential solutions outlined in Section 14.4.

SECTION 15: CRESTVIEW PUMP STATION

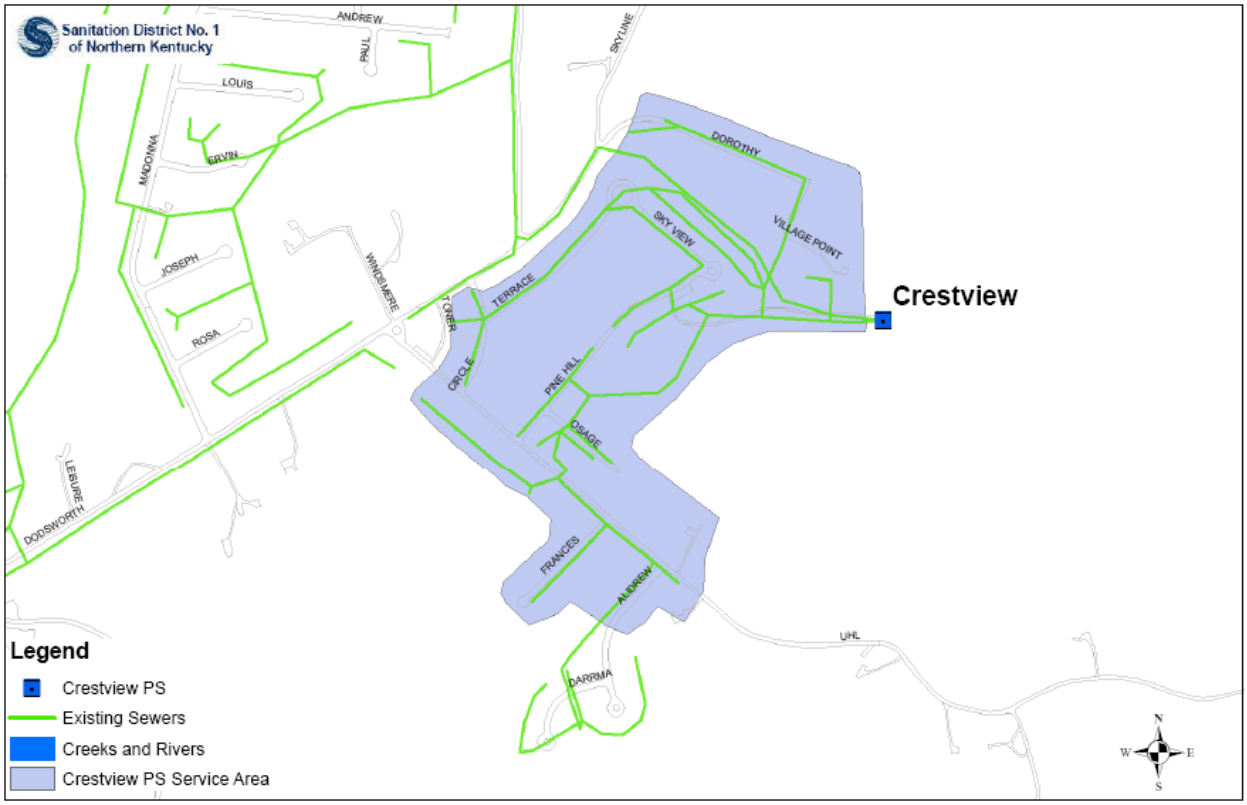
15.1 Crestview Pump Station Background

The Crestview PS is located near Silver Grove and pumps to a gravity line tributary to the Silver Grove PS. The PS contains 2 pumps and has a firm capacity of approximately 0.36 MGD. A picture of the exterior of Crestview PS is shown in Figure 15.1.

Figure 15.1 Crestview PS

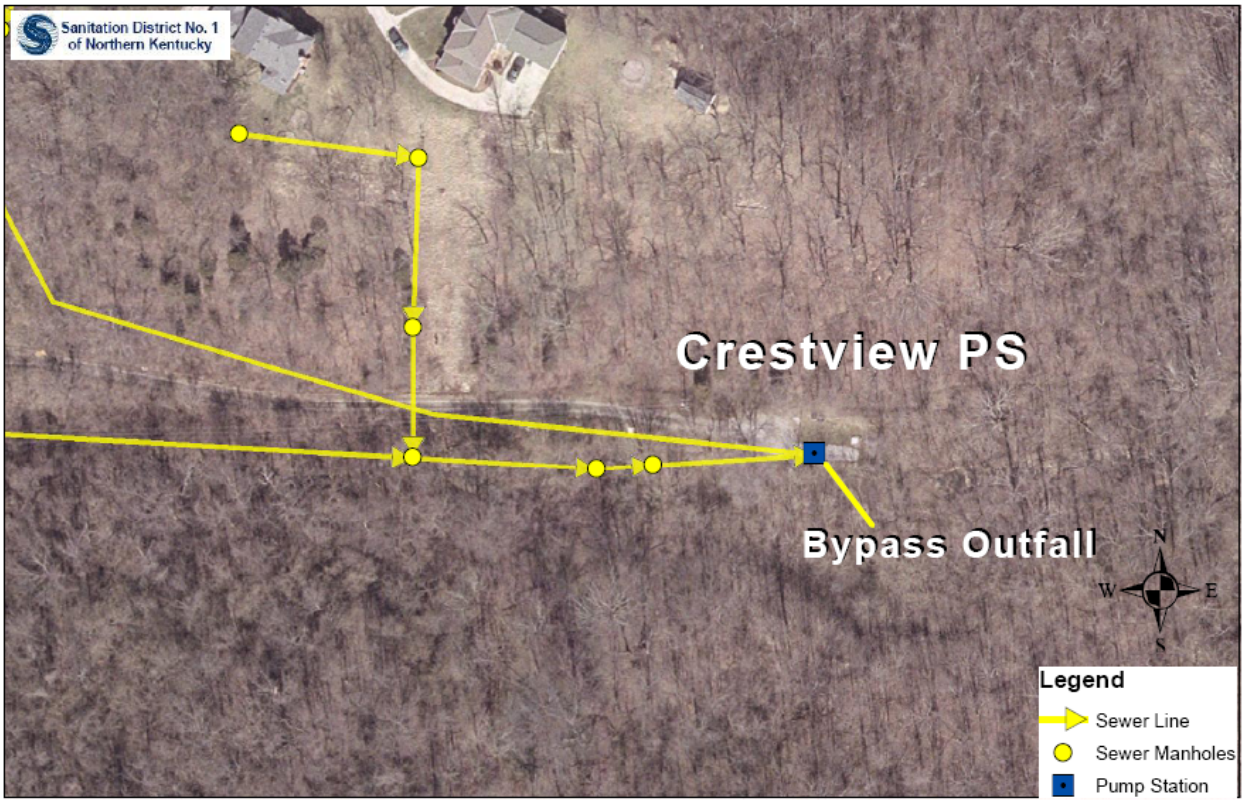
The current service area for Crestview PS can be seen in Figure 15.2.

Figure 15.2 Current Crestview PS Service Area



During large wet weather events when the capacity of the PS has been exceeded and during power outages the PS overflows through a constructed 8-inch outfall into a tributary of Uhl Creek which discharges to Four Mile Creek. Figure 15.3 shows the bypass configuration at Crestview PS.

Figure 15.3 Crestview PS Bypass Configuration



15.2 Known Issues and Historical Data

Based on available information, the Crestview PS has spilled two times between August 2005 and July 2006 for a total estimated volume of 24,500 gallons. One spill was due to a power failure and another was due to mechanical failure at the PS. Therefore, no spills were caused by excessive wet weather flows during this time period. Based on field investigation, there is evidence that shows the PS has experienced overflows due to wet weather in the past.

15.3 Ongoing Efforts

15.3.1 Current Efforts

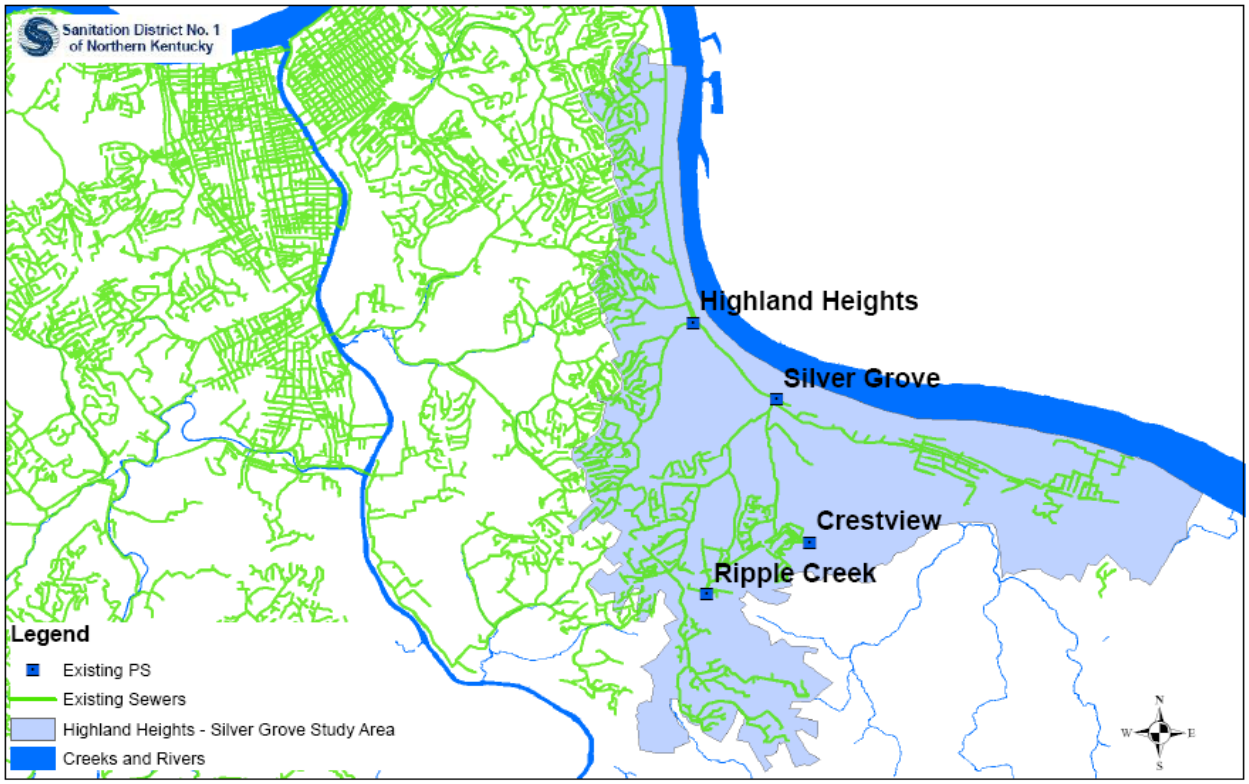
The District is currently making significant efforts to evaluate the current collection system upstream of the Crestview PS as part of the overall Infrastructure Characterization effort as part of the Watershed Plans for the CD. These efforts include:

- **Flow monitoring**: As part of the overall system-wide flow monitoring effort, the District has placed a flow meter upstream of the PS to evaluate the system's dry and wet weather flows.
- **CCTV**: All sewers upstream of the PS have been televised to look for potential sources of I/I and to evaluate the overall condition of the pipes upstream of the PS. The District is currently reviewing the results of these inspections to determine potential rehabilitation locations.
- **Smoke Testing**: The entire system upstream of the PS has been smoke tested to look for public and private sources of I/I upstream of the PS. The District is currently reviewing the results of these inspections to determine locations for future I/I inspections.
- **Pump Testing**: The actual PS capacity will be calculated using drawdown testing.
- **Hydraulic Modeling**: The Crestview PS will be added to the District's collection system hydraulic model, calibrated and verified. This model will then be used to evaluate numerous conditions and impacts at the PS and to evaluate various alternatives to eliminate the overflow.

15.3.2 Highland Heights Silver Grove Study

A study was recently conducted to address CSOs and SSOs in the area tributary to the Highland Heights PS, which includes the area served by Crestview PS. Figure 15.4 shows the extents of the study area.

Figure 15.4 Highland Heights Silver Grove Study Area



The study focused on options to convey dry and wet weather flows from the area. Because this area is at the very top of the system, there are great challenges to face when conveying higher flows to the WWTP. Therefore, equalization storage was a key component to the study. The results of the study will be refined as part of the ongoing Infrastructure Characterization efforts for the development of the Watershed Plans to address overflows system-wide.

15.3.3 Silver Grove Sewer Separation

The City of Silver Grove sewer system has a blend of combined and separate sewers. The combined flow during wet weather puts a significant stress on the Silver Grove PS, which receives the flow from Crestview PS. Since the City already has a storm sewer system, the District is currently removing all known direct source storm sewer connections, such as catch basins. This effort is approximately 50% complete and will be done by the end of 2008.

15.4 Potential Solutions

Several solutions will be examined during the detailed alternatives analysis that will be conducted for the Crestview PS. The purpose of this section is to define the potential solutions that will be analyzed in determining the best alternative for the elimination of the Crestview PS overflow. The applicability of each of the potential solutions outlined within the introduction will be assessed for this PS and the feasibility of that solution will be discussed.

In some cases, the eventual selected alternative may include one or more of the potential solutions to be implemented simultaneously or in phases. For example, RDII reduction in addition to the construction of an equalization basin may be proposed as the recommended alternative following the detailed alternatives analysis. This plan will not consider the combination of solutions, but will outline the process to identify the alternatives.

15.4.1 Service Area Reduction/PS Elimination

The elimination of the overflow through gravity sewer construction at the PS would require conveyance of peak flows to an alternate point within the system. Given its current location and elevation, there currently is not a viable solution for conveyance of flows from Crestview PS by gravity. Therefore, this solution is not a likely candidate for bypass elimination.

15.4.2 Pump Station Capacity Upgrade

Upgrading PS capacity is a viable solution that will be evaluated in great detail. The main concern about this solution is the impact that increasing the PS capacity will have in the downstream system. The Crestview PS is located very high in the District's service area and is tributary to the Silver Grove PS which already receives significant flow. The District's hydraulic model, described above, will be a critical tool that will be used to evaluate the impacts of increasing flow.

15.4.3 Wet Weather Equalization Storage

The use of wet weather equalization storage is a feasible solution for the elimination of the Crestview PS bypass. As part of the alternatives analysis, the sizing and the site location for the storage will be examined in detail.

15.4.4 RDII Removal/Reduction

The District is committed to implementing an aggressive RDII removal and reduction program, described above, within the Crestview service area. Since there has not been

any recent overflow activity, it is reasonable to include this option as the stand-alone solution. The overflow activity can be tracked over time and overflow elimination can be confirmed if there is not activity.

15.4.5 Additional Work

Prior to the evaluation and selection of a solution for the Crestview PS overflow elimination, the District's hydraulic model will be updated and calibrated based on data collected by the District during the 2007-2008 flow monitoring program. In addition to the development of an existing hydraulic model, future condition models will be created to simulate the impacts of future growth on the District's collection system at various time horizons. Future condition models will be used to ensure that any potential solution will not only be valid for current conditions, but also for future conditions.

The calibrated hydraulic models will be used by the District to evaluate the potential solutions outlined above and help develop the solution sizing requirements for the elimination of the Crestview PS overflow. Water quality models where applicable will also be used to assess the implications of decreased bypass activities and assess the improvement in water quality due to the implementation of the potential alternatives. Planning level costs will be developed for each of the selected solutions and will be used to generate a cost-benefit comparison among the potential solutions. Based on the available hydraulic, water quality, and financial data and results, the most effective alternative will be selected for implementation.

15.5 Schedule

The deadline for the elimination of the Crestview PS bypass is December 31, 2015. Given this timeframe and the required time to select, design, and implement a solution, the schedule is proposed in Table 15.1.

Table 15.1 Crestview PS Bypass Elimination Schedule

Date	Milestone
June 12, 2008	Calibrated Hydraulic Model and Develop Future Condition Models
March 1, 2013	Alternative Selected for Design
June 1, 2014	Final Design Submitted
September 1, 2014	Construction Begins on Selected Alternative
December 31, 2015	Construction Completion Date

APPENDIX A:

Pump Station Spill Records – August 2005 – July 2006

Pump Station Releases Reported for approximately one year						
Overflow Number	**Date**	**Pump Station**	**County**	**Primary Cause**	**Est. Gallons Spilled**	**Comments**
2553	8/30/2005	Riley Road #1	Campbell	Heavy Rain	59400	
2563	9/11/2005	Riley Road #2	Campbell	Mechanical Failure	375	
2573	9/23/2005	Riley Road #1	Campbell	Unknown	3900	
2599	11/15/2005	Riley Road #1	Campbell	Heavy Rain	No Est.	
2632	11/28/2005	Riley Road #1	Campbell	Heavy Rain	13920	
2645	12/15/2005	Riley Road #1	Campbell	Heavy Rain	1900	
2655	1/2/2006	Riley Road #1	Campbell	Heavy Rain	32160	
2669	1/17/2006	Riley Road #1	Campbell	Heavy Rain	15400	
2676	1/22/2006	Riley Road #1	Campbell	Heavy Rain	38291	
2685	2/4/2006	Riley Road #1	Campbell	Heavy Rain	177	
2694	2/9/2006	Riley Road #2	Campbell	Mechanical Failure	48675	Also Electrical problem
2710	3/11/2006	Riley Road #1	Campbell	Heavy Rain	34200	
2731	3/12/2006	Riley Road #1	Campbell	Heavy Rain	191750	
2753	3/31/2006	Riley Road #1	Campbell	Heavy Rain	5280	
2754	4/2/2006	Riley Road #1	Campbell	Heavy Rain	4260	
2762	4/15/2006	Riley Road #1	Campbell	Heavy Rain	3360	
2771	4/21/2006	Riley Road #1	Campbell	Heavy Rain	1020	
2795	6/2/2006	Riley Road #1	Campbell	Heavy Rain	420	
2818	7/4/2006	Riley Road #1	Campbell	Heavy Rain	2160	
2852	7/21/2006	Riley Road #1	Campbell	Heavy Rain	5340	
20 Reports				**Total Spilled**	**461988**	
2554	8/30/2005	Ripple Creek	Campbell	Heavy Rain	28500	
2602	11/15/2005	Ripple Creek	Campbell	Heavy Rain	No Est.	
2657	1/2/2006	Ripple Creek	Campbell	Heavy Rain	3600	
2668	1/17/2006	Ripple Creek	Campbell	Heavy Rain	21600	
2671	1/23/2006	Ripple Creek	Campbell	Heavy Rain	6800	
2693	2/19/2006	Ripple Creek	Campbell	Mechanical Failure	400	
2732	3/12/2006	Ripple Creek	Campbell	Heavy Rain	75840	
2763	4/15/2006	Ripple Creek	Campbell	Heavy Rain	15680	Also Electrical failure
2789	5/25/2006	Ripple Creek	Campbell	Heavy Rain	1000	
2815	7/4/2006	Ripple Creek	Campbell	Heavy Rain	1000	
2854	7/21/2006	Ripple Creek	Campbell	Heavy Rain	4400	
11 Reports				**Total Spilled**	**158820**	
2557	8/30/2005	South Hampton	Boone	Heavy Rain	45980	
2566	10/9/2005	South Hampton	Boone	Power Failure	2200	
2607	11/15/2005	South Hampton	Boone	Heavy Rain	No Est.	
2719	3/11/2006	South Hampton	Boone	Heavy Rain	15000	
2726	3/12/2006	South Hampton	Boone	Heavy Rain	50160	
2856	7/21/2006	South Hampton	Boone	Heavy Rain	17270	

Overflow Number	Date	Pump Station	County	Primary Cause	Est. Gallons Spilled	Comments
2641	12/12/2005	Allen Fork PS	Boone	Electrical Failure	5000	
2652	12/26/2005	Allen Fork PS	Boone	Electrical Failure	2300	
2 Reports				**Total Spilled**	**7300**	
2591	10/31/2005	Crestview PS	Campbell	Mechanical Failure	20000	
2621	11/22/2005	Crestview PS	Campbell	Power Failure	4500	
2 Reports				**Total Spilled**	**24500**	
2616	11/15/2005	Sunset PS	Campbell	Heavy Rain	25000	
1 Report				**Total Spilled**	**25000**	
2610	11/15/2005	Highland Acres PS	Boone	Heavy Rain	Unknown	
2734	3/12/2006	Highland Acres PS	Boone	Heavy Rain	1200	
2 Reports				**Total Spilled**	**1200**	
2593	11/2/2005	Ky Aire PS	Boone	Power Failure	No Est.	
2600	11/15/2005	Ky Aire PS	Boone	Heavy Rain	No Est.	
2654	1/2/2006	Ky Aire PS	Boone	Heavy Rain	No Est.	
2666	1/19/2006	Ky Aire PS	Boone	Power Failure	1648	
2678	1/29/2006	Ky Aire PS	Boone	Power Failure	8680	
2679	1/29/2006	Ky Aire PS	Boone	Power Failure	13160	
2718	3/9/2006	Ky Aire PS	Boone	Heavy Rain	900	
2717	3/11/2006	Ky Aire PS	Boone	Heavy Rain	35870	
2738	3/12/2006	Ky Aire PS	Boone	Heavy Rain	35870	
2755	4/2/2006	Ky Aire PS	Boone	Power Failure	850	
2770	4/21/2006	Ky Aire PS	Boone	Heavy Rain	13680	
2816	7/4/2006	Ky Aire PS	Boone	Heavy Rain	7310	
2855	7/21/2006	Ky Aire PS	Boone	Heavy Rain	17325	
13 Reports				**Total Spilled**	**135293**	

Pump Station Releases Reported for approximately one year						
Overflow Number	**Date**	**Pump Station**	**County**	**Primary Cause**	**Est. Gallons Spilled**	**Comments**
2552	8/30/2005	Lakeview PS	Kenton	Heavy Rain	639000	
2603	11/15/2005	Lakeview PS	Kenton	Heavy Rain	246300	
2631	11/28/2005	Lakeview PS	Kenton	Heavy Rain	44400	
2644	12/15/2005	Lakeview PS	Kenton	Heavy Rain	2500	
2656	1/2/2006	Lakeview PS	Kenton	Heavy Rain	565000	
2664	1/11/2006	Lakeview PS	Kenton	Heavy Rain	57100	
2665	1/17/2006	Lakeview PS	Kenton	Heavy Rain	973300	
2677	1/22/2006	Lakeview PS	Kenton	Heavy Rain	117600	
2715	3/8/2006	Lakeview PS	Kenton	Heavy Rain	0	Station did not bypass
2712	3/9/2006	Lakeview PS	Kenton	Heavy Rain	13	
2711	3/11/2006	Lakeview PS	Kenton	Heavy Rain	4869	
2733	3/12/2006	Lakeview PS	Kenton	Heavy Rain	528500	
2752	3/31/2006	Lakeview PS	Kenton	Heavy Rain	25100	
2751	4/2/2006	Lakeview PS	Kenton	Heavy Rain	47100	
2790	5/25/2006	Lakeview PS	Kenton	Heavy Rain	492500	
2808	6/11/2006	Lakeview PS	Kenton	Heavy Rain	0	No bypass Error from Telemetry
2819	7/4/2006	Lakeview PS	Kenton	Heavy Rain	4400	
2857	7/21/2006	Lakeview PS	Kenton	Heavy Rain	10400	
16 Reports				**Total Spilled**	**3758082**	