Feasibility Study Report

WILKINS TOWNSHIP

JULY 2013

CHESTER ENGINEERS

FEASIBILITY STUDY REPORT

For

WILKINS TOWNSHIP

Prepared by:

Chester Engineers
for

WILKINS TOWNSHIP

July 2013

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EXECUTIVE SUMMARY

This Feasibility Study is the culmination of numerous activities and is intended to fulfill the requirements of the Wilkins Township Consent Order and Agreement (COA). The COA stems from existing water quality criteria in local streams not being met, some as a result of combined sewer overflows (CSO) and separate sanitary sewer overflows (SSO). CSO and SSO control goals were developed so that water quality criteria will be met after implementation of the regional wet weather plan that includes municipal alternatives. This report describes the work tasks performed and presents information regarding the development, evaluation and selection of the recommended alternatives for wet weather control.

Wilkins Township is primarily served by separate sanitary sewers, which are designed to accept sanitary sewage only from residential, commercial and industrial customers. There are also two small sewersheds, however, that are served by combined sewers, which also collect stormwater from the drainage area. Some areas of the separate sewer system, as well as the combined sewers, are subjected to high flows during wet weather events. Elevated wet weather flows result in SSOs and CSOs. Per the COA, all SSOs are illegal and are required to be controlled, and the CSOs are required to be controlled to a designated service level. The separate sanitary sewer system in Wilkins Township currently has two SSOs, which are both modeled to be active during 2 and 10-year summer design storm conditions. The flow monitoring and modeling efforts completed as part of the Feasibility Study also identified additional capacity deficient sewers. Two are within the Wilkins Township sewer system. The other is the Thompson Run interceptor sewers that Wilkins shares with neighboring municipalities to convey wastewater flows to the ALCOSAN system.

Various alternatives to address the problems identified in the Feasibility Study were developed and evaluated. Alternatives considered in the separate sewer areas included conveyance replacement, parallel pipe installation, storage of excess wet-weather flows and conveyance of wastewater to portions of a sewer system owned by the Municipality of Penn Hills. The implementation of the Penn Hills conveyance alternative would however be subject to the successful negotiation and execution of an appropriate inter-municipal agreement for the project. Additionally, Wilkins

Township is currently is the design stage of projects that will convert the combined sewers into separate storm and sanitary sewers, thus eliminating the CSOs.

The recommended and preferred alternatives for Wilkins Township are summarized below. Costs for improvements used exclusively by Wilkins residents will be financed by Wilkins alone. The cost for improvements to shared facilities was allocated to the different municipalities based on peak flow contributions.

Alternative Name	Total Estimated Cost	Wilkins' Share of Cost
Wilkins Delaney Drive Sewershed	$53,000	$53,000
Wilkins Combined Sewersheds	$1,570,000	$1,570,000
Rodi Road Sewershed	$1,838,000	$1,112,000
Thompson Run Interceptor, Conveyance Replacement	$19,648,000	$3,911,407
Totals	$23,109,000	$6,646,407

The recommended alternatives will eliminate CSOs and SSOs and allow wet weather flows from Wilkins and neighboring communities to be conveyed to the ALCOSAN system. However, the 8.5-mile long section of the ALCOSAN conveyance system between Wilkins' closest point of connection and the Monongahela River tunnel at POC M-29 is already capacity deficient during storm conditions. Because no changes are proposed to this conveyance segment, any improvements to facilities in the Wilkins area will only serve to transfer upstream SSO and CSO discharges to downstream locations at the ALCOSAN points of connection along Turtle Creek. The position of Wilkins and the other tributary municipalities is that the ALCOSAN system downstream of the points of connection should provide sufficient capacity to accept the additional flows that will be transported by the upgraded facilities recommended in this feasibility study.

1.0 INTRODUCTION

The Pennsylvania Clean Streams Law of 1937 and the Federal Clean Water Act (CWA) establishes criterion governing communities' sewage conveyance and treatment systems. Specifically, the Pennsylvania Clean Streams Law prohibits overflows from separate sanitary sewers and the Federal CWA through the Combined Sewer Policy, and requires certain controls be applied to reduce pollutants from combined sewer systems. For the 83 communities tributary to the Allegheny County Sanitary Authority (ALCOSAN) Conveyance and Collection System, ongoing non-compliance with these two laws resulted in the issuance of Administrative Consent Orders (ACOs) and Consent Order and Agreements (COAs) in early 2004 by the Allegheny County Health Department (ACHD) and Pennsylvania Department of Environmental Protection (PADEP), respectively. Subsequent to that, in January 2008, ALCOSAN, ACHD, and the Pennsylvania Department of Environmental Protection (PADEP) entered into a Consent Decree (CD) with the Federal Department of Justice (DOJ) and the United States Environmental Protection Agency (USEPA) to prepare and submit an approvable Wet Weather Plan (WWP) by January 2013.

These ACOs, COAs (collectively known as the Orders) and the ALCOSAN CD require the respective entities to gather data and information, characterize their respective systems, analyze and perform alternative analyses, and submit feasibility studies addressing work required to bring the systems into compliance with the Pennsylvania Clean Streams Law and the CWA, eliminate sanitary sewer overflows (SSOs), and fulfill the Pennsylvania and USEPA combined sewer overflow (CSO) Policy obligations. ALCOSAN's CD not only requires them to submit a plan to the regulators by January 2013 that outlines a program to comply with these laws but also requires the facilities, including the municipal facilities, to be constructed by 2026. The tributary municipalities are required to submit their feasibility studies to the regulators on or before July 2013 (within six months of ALCOSAN submitting its plan). These plans, which should be developed in coordination with ALCOSAN and all the municipalities that contribute flow to the ALCOSAN point of connection (POC), and should retain, store, convey and/or treat sewage overflows that either ALCOSAN cannot accommodate or that ALCOSAN can address but that

the municipalities decide to address. It is understood that the Feasibility Studies will serve as the basis for the next round of Orders that will mandate implementation of selected/approved alternatives. This report addresses the internal municipal alternatives that were evaluated as part of the feasibility study. Any alternatives developed as part of an ALCOSAN POC (also known as "complex") sewershed feasibility studies are included in the appendices of this report.

1.1 Feasibility Study Objectives

The Feasibility Study objectives for Wilkins Township system were generated from a combination of objectives outlined in the Feasibility Study Working Group (FSWG) Document 027 and the PADEP's Draft Feasibility Study Outline. The objectives of this feasibility study include:

- Participate and cooperate with ALCOSAN in the development of a WWP.
- July 2013 submit a municipal flow management compliance plan (Feasibility Study), which evaluates a range of practicable alternatives to:
    - Meet CWA and Clean Stream Law requirements
    - Eliminate SSOs
    - Fulfill Pennsylvania and USEPA CSO Policy obligations
    - Develop a Feasibility Study with other municipalities within the same ALCOSAN POC sewershed
    - Develop short-term and long-term flow management proposals that will meet the Municipality's flow management objectives through September 30, 2046

In response to SSOs within a given system, ACOs were negotiated between the municipalities tributary to the ALCOSAN service area and the ACHD. The ACO required certain tasks including Assessment (Phase I) and Flow Monitoring Plan (Phase II) on each of the municipal systems. Semi-Annual Progress Reporting was a mandated requirement of the ACO.

As part of a collaborative, multi-municipal effort, 3 Rivers Wet Weather (3RWW) developed a Flow Monitoring Working Group (FMWG) consisting of approximately 30 to 40 representatives made up of municipal managers, representatives from municipal engineering firms, regulatory agencies, 3RWW, and ALCOSAN. The FMWG ultimately developed the municipal Flow Monitoring Plan that was submitted to the regulatory agencies and implemented in 2008 and 2009.

After submittal of the Flow Monitoring Plan, the 3RWW FMWG evolved into the FSWG. The FSWG developed an engineering approach to the Feasibility Study that included a ten-task synopsis of the ACO requirements as follows:

- System Inventory/System Investigation;
- Flow Monitoring Program;
- System Characterization;
- System Capacity Analysis;
- System Infiltration/Inflow Investigation (separate sanitary sewer systems);
    - Initial Infiltration/Inflow Screening;
    - Detailed Infiltration/Inflow Investigation;
- Alternative Evaluation (1) – Internal Municipal Alternatives;
- Alternative Evaluation (2) – Multi-Municipal Alternatives (integrate regional alternatives);
- Compare/Review Internal/Multi-Municipal Alternatives with Regional/ALCOSAN System Alternatives;
- Financial and Institutional Analysis;

  - Financial Analysis;
  - Institutional Analysis; and
- Feasibility Study Report(s).

These tasks are defined in greater detail in the FSWG Document 002 dated June 9, 2009. As noted above, the final task is a Feasibility Study Report.

1.2 Report Contents

This report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives. This report presents information regarding the development, evaluation, and selection of recommended alternative for wet weather control. This Feasibility Study Report was prepared according to guidelines provided in the 3RWW FSWG Documents that were developed for such purpose, in cooperation with the participating municipalities.

This report is divided into eleven sections. Details on the information contained in each section are described below:

- Section 1.0 presents the objectives of this Feasibility Study.
- Section 2.0 provides a discussion of the regulatory background and requirements under which this Feasibility Study was prepared, the role that the 3RWW FSWG played in the development of this study, and an overview of municipal coordination.
- Section 3.0 provides a description of the ALCOSAN planning basins, the existing municipal systems that are the subject of this study, and the existing overflows that occur in those systems.

- Section 4.0 describes the 2008 Flow Monitoring Data that was collected for the system, provides a summary of sewer system investigations that were conducted, and discusses any defects that were identified and how they were addressed.

- Section 5.0 explains the development of the hydraulic analysis tools that were used and the model conditions that were developed and evaluated as a basis for alternative development.

- Section 6.0 presents the water quality issues that are the reason behind the need for controlling sewer overflows. Design storm development and the levels of control that will be evaluated are discussed.

- Section 7.0 goes through the alternative development process for alternatives that would be implemented entirely within the municipality including the technology screening and site screening processes, alternative formation, alternative evaluation criteria, cost estimating, green infrastructure, and alternative selection.

- Section 8.0 is similar to Section 7.0 except that it describes alternatives that were developed that would have to be implemented in and by more than one municipality in order to be effective for the control of overflows at the downstream ALCOSAN connection point.

- Section 9.0 provides a discussion of how costs will be allocated for the implementation of the recommended alternative including details on financial responsibility agreements, affordability analyses, and funding alternatives.

- Section 10.0 explains how the recommended alternative meshes with the internal municipal projects that are implemented separately from the recommended alternative, and how it will mesh with the overall regional ALCOSAN Recommended Alternative.

- Section 11.0 includes details about how the recommended alternative will be implemented including schedule, cost sharing agreements, and O&M agreements.

2.0 BACKGROUND

As discussed in Section 1, this Feasibility Study is the culmination of numerous studies and activities and will fulfill the requirements of Wilkins Township COA. Details of the regulatory requirements and activities performed leading to this Feasibility Study are presented in the following sections.

2.1 Regulatory Requirements

The regulatory requirements to be met are outlined in the municipal ACO/COA as well as in ALCOSAN's CD. The applicable sections of these documents are presented below.

2.1.1 ACO/COA Requirements for Municipalities

The ACO and COA include a section entitled "Feasibility Study in Conjunction with an ALCOSAN Enforcement Order," which has the following requirement:

<u>COA/ACO Definition (Section 15 of ACO)</u>

i. *Establishing with ALCOSAN the quantity and rate of sewage flow from the municipality that ALCOSAN will be able to retain, store, convey and treat upon implementation of a Wet Weather Plan and/or LTCP* [Long-Term Control Plan]*; and*

ii. *Developing a feasibility study with an alternatives analysis evaluating the Municipality's options to construct sewage facilities necessary to retain, store, convey and treat sewage flows from the Municipality including, but not limited to, any sewage flows that: (A) ALCOSAN cannot accommodate or (B) ALCOSAN could accommodate, but which the Municipality decides to address in a separate manner ("Feasibility Study").*

iii. *The Municipality shall submit to ACHD the Feasibility Study within six (6) months after ALCOSAN submits a Wet Weather Plan and/or LTCP to EPA and/or DEP as required by the Enforcement Order. The Feasibility Study shall evaluate a range of*

alternatives, including but not limited to, alternatives to eliminate SSOs, and shall estimate the cost and time necessary to implement or construct each alternative.

The section in the ACO on operations and maintenance also includes language that requires separate sewer systems to plan for adequate system capacities in order to eliminate SSOs. This requirement is reiterated below.

Operation and Maintenance Program (Section 17 of ACO)

(iii) Take all feasible steps to provide required capacity(ies) to eliminate SSOs in its Sanitary Sewer System and to plan for additional capacity, or other means to eliminate such SSOs.

2.1.2 Consent Decree Requirements as it Relates to Design Flows for Municipalities

ALCOSAN's Consent Decree requires the following:

A. ***Compliance Requirements:***

1. *Within the time frames established as part of the Wet Weather Plan process described in this Consent Decree, ALCOSAN shall:…*

   a. construct and operate conveyance, storage, and treatment facilities for flows from the Regional Collection System in accordance with Section VI, Subsections B (Planning, Design, and Construction Requirements) and C (Operational Requirements).

B. ***Planning, Design, and Construction Requirements***

1. Sanitary Sewer System Flow Within the time frames established as part of the Wet Weather Plan process described below, but in no event later than

September 30, 2026, ALCOSAN shall design and construct facilities for the Conveyance and Treatment System sufficient to:…….

a. eliminate all Sanitary Sewer Overflows from the Conveyance and Treatment System; and

b. capture and provide Treatment, for at least twenty years after completion of construction of the remedial controls, and implementation of the remedial activities, required under the Wet Weather Plan approved by the Plaintiffs, for a flow volume equivalent to all of the Sanitary Sewer System flow that is generated in the Regional Collection System. Notwithstanding the foregoing, ALCOSAN need not design and construct facilities to capture and provide Treatment for a given amount of Sanitary Sewer System flow from a Customer Municipality within the Regional Collection System if:

i. the Customer Municipality has constructed or is legally committed under an Enforceable Document to construct facilities to capture and provide Treatment for that amount of Sanitary Sewer System flow; or

ii. insufficient capacity exists to convey a given amount of flow from the Customer Municipality to the Conveyance and Treatment System, the Customer Municipality certifies that it does not intend to create and/or cannot create capacity sufficient to convey that given amount of flow to the Conveyance and Treatment System, and PADEP and EPA have determined that the Customer Municipality can comply with the Clean Water Act through means other than conveying this amount of flow to the Conveyance and Treatment System; and

iii. *ALCOSAN submits a proposal to the Plaintiffs to exclude such municipal flow on the grounds set forth above in Subparagraphs 17(b)(i) or 17(b)(ii), with sufficient detail for review and approval by EPA and PADEP, and for review and comment by ACHD, in accordance with Section VIII (Review and Approval of Submittals); and*

iv. *EPA and PADEP approve of ALCOSAN's proposal to exclude the municipal flow from its planning, design, and construction of such facilities.*

2. *Combined Sewer System Flow Within the time frames established as part of the Wet Weather Plan process described below, but in no event later than September 30, 2026, ALCOSAN shall design and construct facilities for the Conveyance and Treatment System sufficient to capture and treat flows from the Combined Sewer System for at least twenty years after completion of construction of the remedial controls, and implementation of the remedial activities, required under the Wet Weather Plan approved by the Plaintiffs, as follows:*

   a. *Demonstration Approach – If ALCOSAN submits the Wet Weather Plan utilizing the Demonstration Approach pursuant to Section VI, Subsections H (Wet Weather Plan – General Requirements) and J (Wet Weather Plan – Demonstration Approach), and EPA's Combined Sewer Overflow Policy, then: ALCOSAN shall design and construct facilities for the Conveyance and Treatment System sufficient to capture and provide Treatment to the volumetric equivalent of all Peak Dry Weather Flow generated in the Regional Collection System; and, for the volumetric equivalent of all Wet Weather Flow generated in the Combined Sewer System portion of the Regional Collection System, ALCOSAN shall design and construct facilities that will meet the*

requirements of the Clean Water Act, consistent with EPA's Combined Sewer Overflow Policy. Notwithstanding the foregoing, ALCOSAN need not design and construct facilities to capture and provide such treatment to a given amount of Combined Sewer System flow from a Customer Municipality within the Regional Collection System if:

i. the Customer Municipality has constructed or is legally committed under an Enforceable Document to construct facilities to achieve such capture and treatment; or

ii. insufficient capacity exists to convey a given amount of flow from the Customer Municipality to the Conveyance and Treatment System, the Customer Municipality certifies that it does not intend to create and/or cannot create capacity sufficient to convey that given amount of flow to the Conveyance and Treatment System, and PADEP and EPA have determined that the Customer Municipality can comply with the Clean Water Act through means other than conveying this amount of flow to the Conveyance and Treatment System; and

iii. ALCOSAN submits a proposal to the Plaintiffs to exclude such municipal flow on the grounds set forth above in Subparagraphs 18(a)(i) or 18(a)(ii), with sufficient detail for review and approval by EPA and PADEP, and for review and comment by ACHD, in accordance with Section VIII (Review and Approval of Submittals); and

iv. EPA and PADEP approve of ALCOSAN's proposal to exclude the municipal flow from its planning, design, and construction of such facilities.

N. Planning, Design, and Construction Requirements

75. Customer Municipality Input on Managing Sewer System Flow. As part of the evaluation of remedial controls and remedial activities that ALCOSAN shall undertake in developing the Wet Weather Plan in accordance with Appendix S (Wet Weather Plan Requirements for Demonstration Approach) or Appendix V (Wet Weather Plan Requirements for Demonstration Approach), ALCOSAN shall solicit input from each Customer Municipality on the following:

a. the forecasts of total flow (in gallons per day and, if available, in gallons-per-day-per-inch-mile of sewer line), that each Point of Connection will contribute to the Conveyance and Treatment System upon implementation of the Wet Weather Plan, and the total service population or each Point of Connection;

b. a characterization of the flows from both the contributing Combined Sewer System and/or the Sanitary Sewer System at each Point of Connection, a description of how each such characterization was prepared, and a description of how such flows will be managed and/or maintained at each Point of Connection; and

c. a program for managing contributions from the customer Municipality so that such contributions to the Conveyance and Treatment System do not result in exceedances of system capacity or do not preclude compliance with the requirements of the clean Water Act, consistent with EPA's Combined Sewer Overflow Policy.

2.2 Role of the FSWG

The role of the FSWG was to facilitate coordination between the municipalities and the regulatory agencies and to provide guidance to the municipalities through the course of achieving compliance with regulatory requirements. The FSWG coordinated at FSWG meetings with

PADEP specifically regarding the Feasibility Studies. The PADEP provided input on what they want to be addressed by each municipality in the feasibility studies. These points are as follows:

- Describe the combined sewer system (CSS) hydraulic characterization efforts, hydraulic characterization parameters, tools and other evaluation and estimation tools used by the Municipality to develop its Feasibility Study.
- Identify and summarize all additional flow monitoring efforts conducted (and other related flow information utilized by a Municipality) which is in addition to the ALCOSAN sponsored flow monitoring program.
- For each ALCOSAN POC-shed describe and comment on the inter-municipal and ALCOSAN cooperation and coordination efforts for which the Municipality has actively participated to develop its Feasibility Study.
- For each POC-shed briefly outline the flow management proposals developed with all municipalities and ALCOSAN. Should another municipality fail to propose Feasibility Study improvements the Municipality deems necessary to fulfill the Feasibility Study objectives, then the Municipality should outline those for ACHD and/or Department consideration.

The following sections describe the FSWG activities in more detail.

2.2.1 Objectives of the FSWG

The 3RWW FSWG evolved from the 3RWW FMWG to continue facilitation and coordination efforts with the 83 municipalities to develop this feasibility study. The group's objectives were as follows:

- To facilitate the municipal obligations to achieve compliance with the ACO/COA request for municipal Feasibility Studies.
- To establish a coordinated schedule.

- To facilitate identification of cost-effective and sustainable solutions.
- To facilitate technical, financial and institutional solutions.
- To develop standardized processes and reporting.
- To develop objectives and identify deliverables and due dates for Feasibility Study elements.
- To establish a reasonable schedule for the municipal Feasibility Studies in conjunction with ALCOSAN and the Basin Planners.
- To serve as a venue/forum for municipal engineers, ALCOSAN, Basin Planners, Agencies, 3RWW, 3RWW/Program Management (3RWW/PM) Team, for discussion of items related to Feasibility Studies.
- To foster intra- and inter-basin collaboration.
- To address issues from the Basin Planners.
- To facilitate utilization of the ALCOSAN-provided tools such as the hydraulic models and costing tool by the municipal engineer.
- To develop information to engage municipal/authority boards recording the Feasibility Study process.
- To develop ways to look at Feasibility Studies on a sewershed basis.
- To involve municipal managers in the Feasibility Study process.
- To provide a forum for sharing tools and techniques necessary to complete the Feasibility Studies.
- To achieve compliance with the ACO/COA.

2.2.2 Task List Developed by the FSWG

The 3RWW FSWG developed a detailed outline of tasks that will need to be completed by the municipalities in order to meet regulatory requirements. They are listed below:

Task 1 – System Inventory/System Investigation

Most of this work should already be completed by the municipality. Any data gaps identified in the later phases due to incomplete inventory and/or investigation will necessitate additional work by the municipality. (The ACO/COA require completion: physical survey by 5/31/07, closed-circuit television (CCTV) by 5/31/10, defect repairs by 11/30/10)

Outcomes/Deliverables:

- Geographic information systems (GIS) Map of Sewer System.
- Identify defects related to pipe structure, capacity restriction, and inflow.

Task 2 – Flow Monitoring Program

Subtasks:

- Regional Collection System Flow Monitoring Program administered by ALCOSAN and coordinated with Municipalities and Authorities (municipalities) by the Flow Monitoring Implementation Team and Flow Monitoring Working Group.
- QA/QC review by ALCOSAN and 3RWW program teams.
- Initial data review for data quality and consistency by the municipal engineers, begin investigation/resolution of any observed discrepancies or unexpected results.
- Acceptance of flow monitoring data by municipalities.

Outcomes/Deliverables:

- QA/QC'd flow monitoring data (glass box data set).
- Flow monitoring data summary and report submittal to ACHD and PADEP.

Task 3 – System Characterization

Required Inputs:

- Deconstructed hydrographs from 3RWW and ALCOSAN
- ALCOSAN Basin Planner model of portion of sewershed (if desired)

Subtasks:

- Confirm delineation of POC and flow-monitor sewersheds.
- Deconstruct or obtain deconstructed storm hydrographs.
- Evaluate flow data consistency to identify abnormalities. Identify any additional field work needed to ensure understanding of system connectivity.
- Identify any stream inflows.
- Develop hydrologic and hydraulic (H&H) Tools or H&H Model – municipality to choose best methodology from the following four basic approaches –
    - develop a regression analysis tool,
    - develop a unit hydrograph from flow data,
    - develop a synthetic unit hydrograph (RTK or other) using available SHAPE Program from ALCOSAN/CDM, and/or

  - develop full hydraulic model or extend the ALCOSAN model to include upstream areas not covered by the Basin Planner's model.

- Calibrate/Verify H&H tools or models using info from the flow monitoring program for dry and wet weather flows.

- Dry weather evaluation.

- Wet weather evaluation.

- For areas with insufficient flow monitoring data either collect additional data or use data from similar monitored areas to estimate flows.

- Identify and develop methodology for estimating dry and wet weather flows for unmonitored areas.

- Coordinate the chosen approach with ALCOSAN's Basin Planner.

Outcomes/Deliverables:

- Calibrated Analysis Tool or H&H Model.

- Capture values for each flow monitor.

- Wet weather/runoff derived inflow and infiltration (RDII) volumes and peak rates for monitored storms.

- Volume, frequency and duration for each overflow during monitored events.

- Dry weather flows (24-hour volume and peak flow).

- Estimate dry and wet weather flows for unmonitored areas using similitude.

Task 4 – System Capacity Analysis

Required Inputs:

- Regulatory design criteria and compliance requirements for both separate sanitary systems (SSS) and CSS from PADEP and ACHD
- Identify existing inter-municipal and ALCOSAN sewer agreements for upstream and downstream sewage conveyance and sewer ownership.
- Preliminary flows (FSWG definition) from upstream and downstream municipalities (iterative process as Task 4 is refined by all municipalities)

Subtasks:

- Establish baseline conditions that include near-term improvements and application of nine-minimum controls (CSS) and Operation and Maintenance (O&M) plan (for SSS).
- Identify population growth and commercial development and corresponding future flows for the chosen design year (2046) and coordinate with Basin Planner.
- Wet weather evaluation for selected rainfall events using regulatory criteria. Perform evaluation of the sewer system to determine existing capacity and compare with future conditions. For combined sewer systems show levels of surcharge for each design storm. Also, for combined sewer systems develop a typical year's overflow statistics for each outfall.
- Share preliminary flows (FSWG definition) with upstream and downstream municipalities.
- Identify capacity deficiencies.

- Consider capacity (deficiencies) in regard to existing inter-municipal sewer agreements.
- Identify the need for inter-municipal sewer agreements with upstream and downstream municipalities and refer to the municipal manager and board for the commencement of discussions.
- Identify required capacities. For combined sewer systems, municipalities can determine "level of service" to provide to its customers.
- Estimate overflow volumes and peak rates for various flow conditions (typical year/design storms as discussed in FSWG Document 003).
- Plot wet weather control alternatives for each design storm or level of service versus present worth costs to develop a cost benefit analysis in order to identify the cost effective "knee of the curve" for the minimum design storm.
- Coordinate design storm selection (SSS) (knee-of-the-curve results) with other municipalities and ALCOSAN.
- Coordinate with ALCOSAN and submit consolidated design storm for review, comment and approval.

Outcomes/Deliverables:

- Map of sewer surcharge levels (for CSS).
- Map of areas of deficient sewer capacity (for SSS).
- Annual overflow statistics for combined sewer overflow (CSO) outfalls.
- Quantification of peak rates and volumes lost from the system (for SSS).

- Identification and understanding of current inter-municipal ownership of sewers and service agreements.
- Information for completing alternative development and evaluation.
- Preliminary flows (current and future) if all flow is conveyed to ALCOSAN without regard to actual intra or inter-municipal pipe conveyance capacity or deficiencies for the 1, 2, 5 & 10 year design storm (SSS) and the typical year (for CSS) – FSWG Definition (provide to ALCOSAN and upstream/downstream municipalities).
- Submission of Design Storm recommendations to Agencies (PADEP and ACHD) for review and acceptance of design storm control level.

Task 5 – System Infiltration/Inflow Investigation (separate sanitary sewer systems)

This Task to proceed in parallel with Tasks 3 and 4.

Task 5A – Initial Infiltration/Inflow Screening

Required Inputs:

- Flow monitoring data.
- System characteristics (area, footage by diameter, population).

Subtasks:

- Define criteria for screening process.
    - Peaking factor, gpdim, gpad, gpcd, “C.”
    - SSOs and/or basement flooding issues.
    - Capacity deficiencies.

  - Capacity allocation issues.

- Apply screening criteria to metershed flow data.
- Determine need for flow isolation studies.
- Prepare approach and methodology.
- Outline schedule to perform the study.

Outcomes/Deliverables:

- Quantification and distribution of Infiltration/Inflow on a metershed basis.
- Decision whether to perform a flow isolation study.
- Plan for I/I flow isolation study (if needed).

Task 5B – Detailed Infiltration/Inflow Investigation

Required Inputs:

- Results from Task 5A screening.

Subtasks:

- Perform nighttime flow isolation field study.
- Analysis of flow isolation field study results.

Outcomes/Deliverables:

- Quantification and distribution of Infiltration/Inflow on a sub-unit basis.

Task 6 – Alternative Evaluation (1) – Internal Municipal Alternatives

The identification and development of control alternatives for Municipal separate and combined systems, including internal municipal CSOs and SSOs, was coordinated with ALCOSAN, other municipalities in the sewershed and the FSWG. At this point each municipality could look at what is required to resolve the deficiencies internal to the municipality first (Task 6) and then look regionally (Task 7).

Required Inputs:

- Alternative technology list with preliminary design and performance criteria.
- ALCOSAN's cost tool (Part of ALCOSAN Technical Memo 6 [TM-6]).
- Task 4 Outcomes and Deliverables.
- Quantification and distribution of Infiltration/Inflow on a sub-unit basis.
- Preliminary flows (current and future) if all flow is conveyed to ALCOSAN without regard to actual intra or inter-municipal pipe conveyance capacity or deficiencies (FSWG Definition).
- ALCOSAN Transport and Treat cost.
- ALCOSAN's proposed billing basis (surcharge vs. water consumption).
- Water quality objectives (internal municipal CSOs).
- Agency (PADEP and ACHD) comments/approval of design storm control levels

Subtasks:

- FSWG review of all technologies
    - Listing of pros and cons.

- Develop short list of technologies for the municipalities to consider.

- Municipal screening of technology(ies)
  - Use surviving technologies for further alternative formation.
- Develop evaluation criteria – Cost & Non-cost Factors.
  - Define all the non-cost factors (including siting/zoning, expandability of sites, operability, work force training, community acceptability, etc.).
  - Include municipality assigned weight for each factor.
  - Obtain buy-in from stakeholders and municipality.
- Use surviving technologies (including green solutions) to formulate feasible alternatives for municipal systems for each of the design storms and CSS surcharge levels or SSS deficient sewers.
  - Transport (parallel relief or other).
  - Storage (basin or tunnel).
  - Flow reduction (I/I) removal.
  - Satellite treatment (combined systems).
- Develop Present Worth Costs
  - Capital costs and O&M costs.
  - Compute present worth value (use common interest rates and term). (FSWG discussion issue: Consider design life/ salvage value?).

- The FSWG will review ALCOSAN's cost tool (Part of TM-6) to ensure the tool is applicable to municipalities. Supplement with additional cost tools required to develop internal municipal alternatives.

- Apply evaluation criteria to alternatives and rank all alternatives.
- Select "highest ranked" wet weather control alternative(s) for the internal municipal alternative.
- Present selected alternatives to local governing body at a public meeting for review, comment and consensus.

Outcomes/Deliverables:

- Internal municipal sewershed based evaluation (size, layout and cost) and ranking of alternative solutions including:
  - Convey all flow to ALCOSAN.
  - Store and convey all flow to ALCOSAN.
  - Flow Reduction.
  - Satellite Treatment (Combined systems only).
- Identification of highest ranked alternative(s) for municipality's internal option.
- If the municipality is the only contributor to a point-of-connection, this analysis results in interim design flows from the municipality to ALCOSAN with control alternatives for the ALCOSAN Basin Planner's use.

Task 7 – Alternative Evaluation (2) – Multi-Municipal Alternatives (integrate regional alternatives)

After completing, or concurrent with Task 6, the municipality was in a position to work with other neighboring municipalities to identify and analyze cooperative ways to combine their respective wet weather solutions. This resulted in a series of multi-municipal alternatives. The identification and development of these alternatives was facilitated by the FSWG and the Basin Planner in order to ensure that the procedure for alternative development was consistent with both local and regional approaches. Required Inputs:

- Tasks 4 and 5 Outcomes and Deliverables.
- Alternative technology list with preliminary design and performance criteria.
- ALCOSAN's cost tool (Part of Technical Memorandum TM-6).
- Quantification and distribution of Infiltration/Inflow on a sub-unit basis.
- Preliminary flows (current and future) if all flow is conveyed to ALCOSAN without regard to actual intra or inter-municipal pipe conveyance capacity or deficiencies (FSWG Definition).
- ALCOSAN Transport and Treat cost.
- ALCOSAN's proposed billing basis (surcharge vs. water consumption).
- Water quality objectives (internal municipal CSOs).
- Highest ranked alternative(s) for municipality's internal option, when available.

Subtasks:

- Develop process and schedule for multi-municipal evaluations.

- FSWG review of all technologies.
  - Listing of pros and cons.
  - Develop short list of technologies for each group of municipalities to consider.
- Screen technology(ies).
  - Use surviving technologies for further alternative formation.
- Continue discussions on and development of multi-municipal sewer agreements with municipal manager and board.
- Develop evaluation criteria – Cost & Non-cost factors.
  - Define all the non-cost factors (including siting/zoning, operability, work force training, community acceptability, etc.).
  - Include municipality assigned weight for each factor.
  - Obtain buy-in from stakeholders and municipalities.
- Use surviving technologies (including green solutions) to formulate feasible alternatives for multi-municipal systems.
  - Transport (parallel relief or other).
  - Storage (basin or tunnel).
  - Flow reduction (I/I) removal.
  - Satellite treatment (combined systems).
- Develop Present Worth Costs
- Capital costs and O&M costs.

- Compute present worth value (use common interest rates and term). (FSWG discussion issue: Consider design life/ salvage value?).
- The FSWG will review ALCOSAN's cost tool (Part of ALCOSAN TM-6) to ensure the tool is applicable to multi-municipal alternatives. Supplement with additional cost tools required to develop multi-municipal alternatives.

- Apply evaluation criteria to alternatives and rank all alternatives.
- Select "highest ranked" wet weather control alternative(s) for the multi-municipal alternative.
- Work with municipal managers to refine selected alternative scope and required multi-municipal sewer agreement outlining cost sharing, ownership, O&M, future capacity requirements for proposed solutions.
- Present alternatives to local governing body at a public meeting for review, comment and consensus.

Outcomes/Deliverables:

- Identification and understanding of required multi-municipal sewer agreements and ownership of sewers.
- Multi-municipal sewershed based evaluation (size, layout and cost)and ranking of alternative solutions including:
  - Convey all flow to ALCOSAN.
  - Store and convey all flow to ALCOSAN.
  - Flow Reduction.
  - Satellite Treatment (Combined systems only).

- Identify highest ranked alternative for the multi-municipal approach. Will likely include the internal municipal alternatives as a subset.
- Size, layout and cost of highest ranked alternative for municipality's multi-municipal (regional) option. It is possible to have 2 best alternatives.
- Interim design flows (for municipalities choosing a multi-municipal approach) to ALCOSAN Basin Planners.
- Draft multi-municipal sewer agreement outlining cost sharing, ownership, O&M, future capacity requirements for proposed solutions.

Task 8 – Compare/Review Internal/Multi-municipal Alternatives with Regional /ALCOSAN System Alternatives

Following the identification of the highest ranked internal municipal alternatives as well as the highest ranked multi-municipal alternatives (Tasks 6 and 7), ALCOSAN's Basin Planner identified a highest ranked "Planning Basin-wide or ALCOSAN System-wide" alternative to implement at/near the Point-of-Connection. Under Task 8, the respective engineering teams further refined and developed alternative approaches including achieving consensus of effectiveness of each alternative in wet weather flow reduction, identifying and quantifying cost elements that affect selection, and preparing a life cycle based present worth cost analysis of surviving alternatives. Alternatives were then be ranked.

Required Inputs:

- ALCOSAN's viable regional alternatives identified by the Basin Planners including preliminary site plans, and design basis/limitations.
- Outcomes/deliverables from Tasks 6 & 7.
- ALCOSAN's updated Transport and Treatment costs and billing basis for each remaining viable alternative under consideration.

- Local governing body acceptance of internal and multi-municipal approaches**.**

Subtasks:

- Review updates to ALCOSAN's transport and treatment costs and billing basis for impact on highest ranked alternatives. Update internal and multi municipal alternatives as needed.
- Meet with Basin Planner and understand Planning Basin and System alternatives for the municipal sewershed.
- Discuss with the Basin Planner how the internal and multi-municipal alternatives affect the Planning Basin and System alternatives.
- Identify economies that can be achieved through modification of the internal and multi-municipal alternatives or the Planning Basin and System alternatives.
- Identify economies that can be achieved through combining of the internal and multi-municipal alternatives and the Planning Basin and System alternatives into joint facilities.
- Present alternatives to local governing body at a public meeting for review, comment and consensus.

Outcomes/Deliverables:

- Coordinated evaluation of alternatives with ALCOSAN.
- Improved cost effectiveness of internal and multi-municipal alternatives and Planning Basin and System alternatives.
- Identify final highest ranked alternative for the municipality (internal/multi-municipal/regional).

- Size, layout and cost of the highest ranked alternative for the municipality(ies).
- Final design flows to ALCOSAN based on the final highest ranked alternative from the municipal feasibility study.

Task 9 – Financial and Institutional Analysis

Task 9A – Financial Analysis

The engineer kept the municipal manager informed as the ongoing analyses and present worth costs were developed for the highest ranked alternatives in Tasks 6, 7 and 8. On an ongoing basis, each municipality evaluated their ability to pay for or finance their portion of the required system improvements, if any. If the costs were beyond the municipality's financial abilities, then alternative approaches, such as an institutional change, could be considered.

Required Inputs:

- Project/financing life-cycle term
- Capital Cost
- O & M Cost
- Wet Weather flow surcharge rate structure
- Consecutive Service costs (conveyance, transport and treatment)

Subtasks:

- Determine ability of Municipality to incur additional debt (LGUDA)
- Complete Financial Capacity and affordability analysis
- Identify Revenue Sources and borrowing base
- Identify funding Alternatives

- Calculate User Fees under identified funding alternatives.

Outcomes/Deliverables:

- Clear understanding of implementation costs and how costs will be addressed.
- Understanding of financial requirements.
- User Fee Schedule

Task 9B – Institutional Analysis

Each municipality considered the benefits and reasonableness of their current institutional framework to implement the required obligations of the ACO/COA and the municipal feasibility study. Municipalities could then decide if they can operate, maintain, and provide service for the best interests of their residents and the region.

Required Inputs:

- Existing Administration and management structure
- Existing Ordinances and regulations
- O&M Plan
- Existing Inter-Municipal/Agency Agreements
- Institutional Alternatives

Subtasks:

- Perform asset inventory and valuation
- Identify new or alternative institutional framework necessary to implement the Plan. Alternatives may include:

- No Change
- Contracted O & M
- Form an Authority – There are financial and political advantages to formation of an authority where the sewer system is presently owned and operated by the municipality.
- Form a Joint Authority – There may be additional efficiencies to be gained by formation of a joint authority where the sewer system is presently owned and operated by a municipality or a small authority.
- Convey ownership of the system to an Authority – Not every municipality needs to be in the sewer business. The professional operation of the sewer system can provide efficiency and improved operations.

- Identify and prepare, as necessary, new or updated Administrative and O&M Plans.
- Prepare new or updated inter-municipal sewer agreements, as necessary.
- Prepare new or updated municipal ordinances, as necessary.
- Select preferred institutional framework.

Outcomes/Deliverables:

- Municipal selection of the final alternatives, schedules, and costs.
- Municipal consideration of sewer consolidation.
- Understanding of institutional options, advantages and disadvantages.
- Defined best institutional framework for the future.
- Draft Ordinances and Agreements

Task 10 – Feasibility Study Report(s)

Required Inputs:

- Outcomes and deliverables from all prior tasks.

Subtasks:

This Feasibility Study Report is the final product of Task 10. Each municipality with an ACO or COA must submit this study to the governing agency. In addition, if the municipality is part of an ALCOSAN-defined "complex" sewershed, ALCOSAN has requested that the municipality also contribute information to the POC Feasibility Study Report(s) to which it is tributary. The FSWG has developed a uniform format for both types of feasibility studies that the municipality may use as a template.

Outcomes/Deliverables:

- Draft Feasibility Study Report
- Final Feasibility Study Report

2.3 Municipal Coordination Overview

An overall plan for municipal coordination is presented in 3RWW FSWG Document 002A.

FSWG meetings were held on a monthly basis at the Greentree Municipal Building. These meetings were attended by representatives of Chester Engineers on the behalf of Wilkins Township.

Wilkins Township held regular coordination meetings with neighboring municipalities to identify potential control alternatives, discuss alternative evaluations, determine recommended alternatives and agree on cost-sharing arrangements for projects that will be jointly financed. Table 2-1 indicates the involved communities for each sewershed to which Wilkins is tributary.

TABLE 2-1: COMMUNITIES TRIBUTARY TO WILKINS TOWNSHIP SEWERSHEDS

Sewershed	Tributary Communities	POC Location
TR-05	Penn Hills, Wilkins	Wilkins
TR-04-14	Wilkins	Wilkins
TR-04	Churchill, Wilkins	Wilkins
TR-03-08	Wilkins	Wilkins
TR-03	Wilkins	Wilkins
TR-02-04	Wilkins	Wilkins
TR-02-02	Turtle Creek, Wilkins	Turtle Creek
TR-01-06	Turtle Creek, Wilkins	Turtle Creek
T-07	Churchill, Turtle Creek, Wilkins	Turtle Creek

Meetings regarding these sewersheds also included representatives from ALCOSAN and 3RWW.

3.0 EXISTING SYSTEM DESCRIPTION

3.1 Municipal Systems

A description of the existing municipal system is provided below.

3.1.1 Existing Sewershed Description for Wilkins Township

Wilkins Township is located in Allegheny County east of downtown Pittsburgh. Wilkins has separate sanitary and combined sewer systems that serve residential and commercial customers. It is located within the Turtle Creek / Thompson Run Planning Basin. Figure 3-1 shows the location of Wilkins Township with respect to the seven ALCOSAN Planning Basins. A map of Wilkins Township sewer system and sewersheds is presented in Figure 3-2. A sewershed/POC schematic diagram for Wilkins and tributary communities is shown in Figure 3-3.

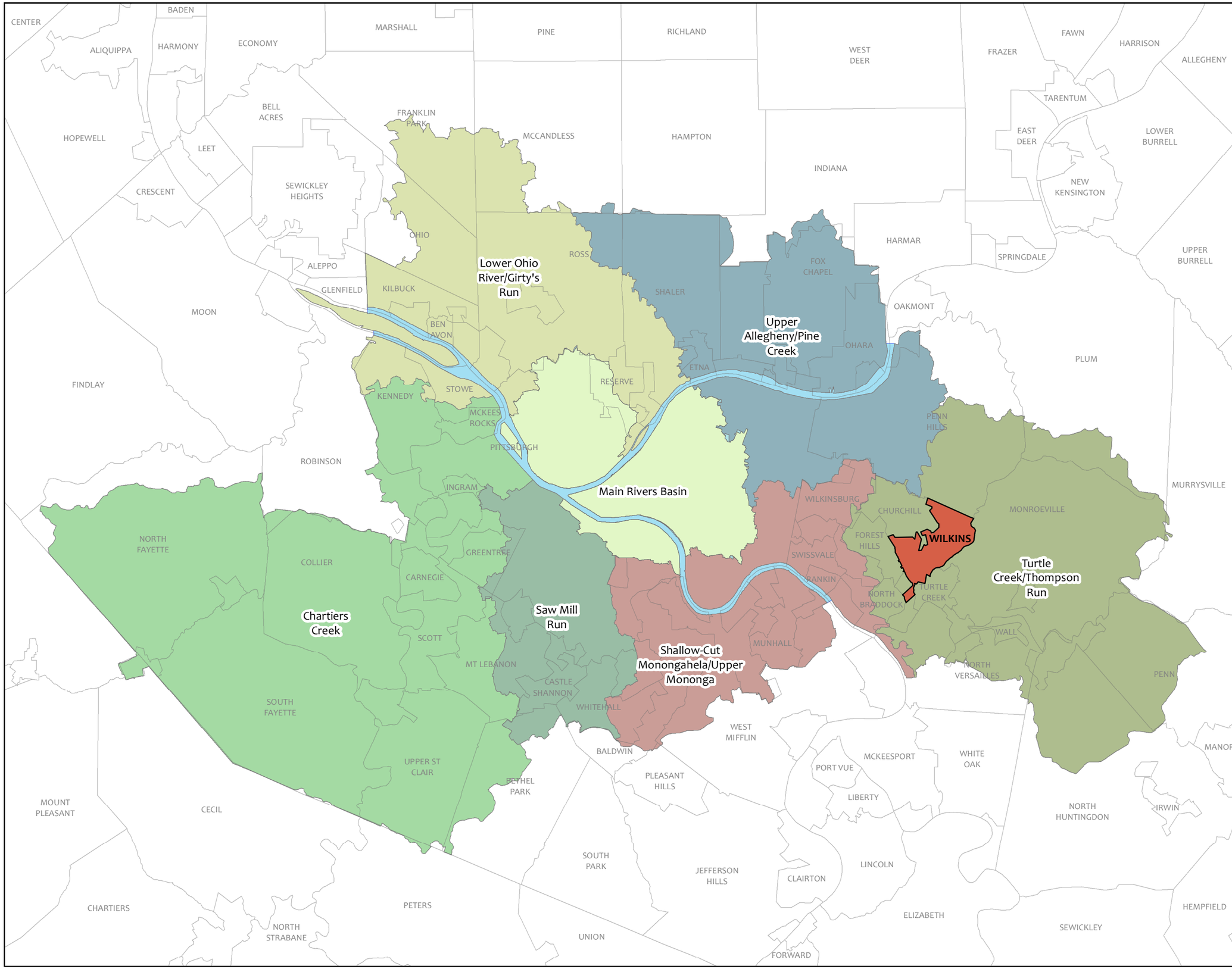
Table 3-1 lists information for Wilkins Township including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on building counts for the municipality by sewershed.

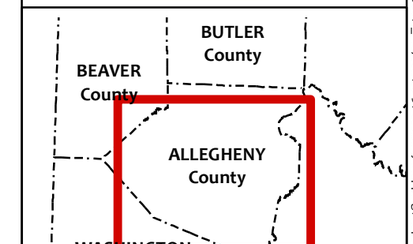
Tables 3-2, 3-3 and 3-4 present characteristics for the combined, separate sanitary and storm sewer systems in Wilkins Township.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 3-1 ALCOSAN Planning Basins





Legend

- Municipal Boundaries
- Wilkins

Planning Basins

- Rivers
- Chartiers Creek
- City of Pittsburgh
- Lower Ohio River/Girty's Run
- Saw Mill Run
- Upper Mononga
- Turtle Creek/Thompson Run
- Upper Allegheny/Pine Creek

N

1:156,000

1 inch = 13,000 feet

0 6,500 13,000 26,000 Feet

Author: Peter Smith

Date: 7/9/2013

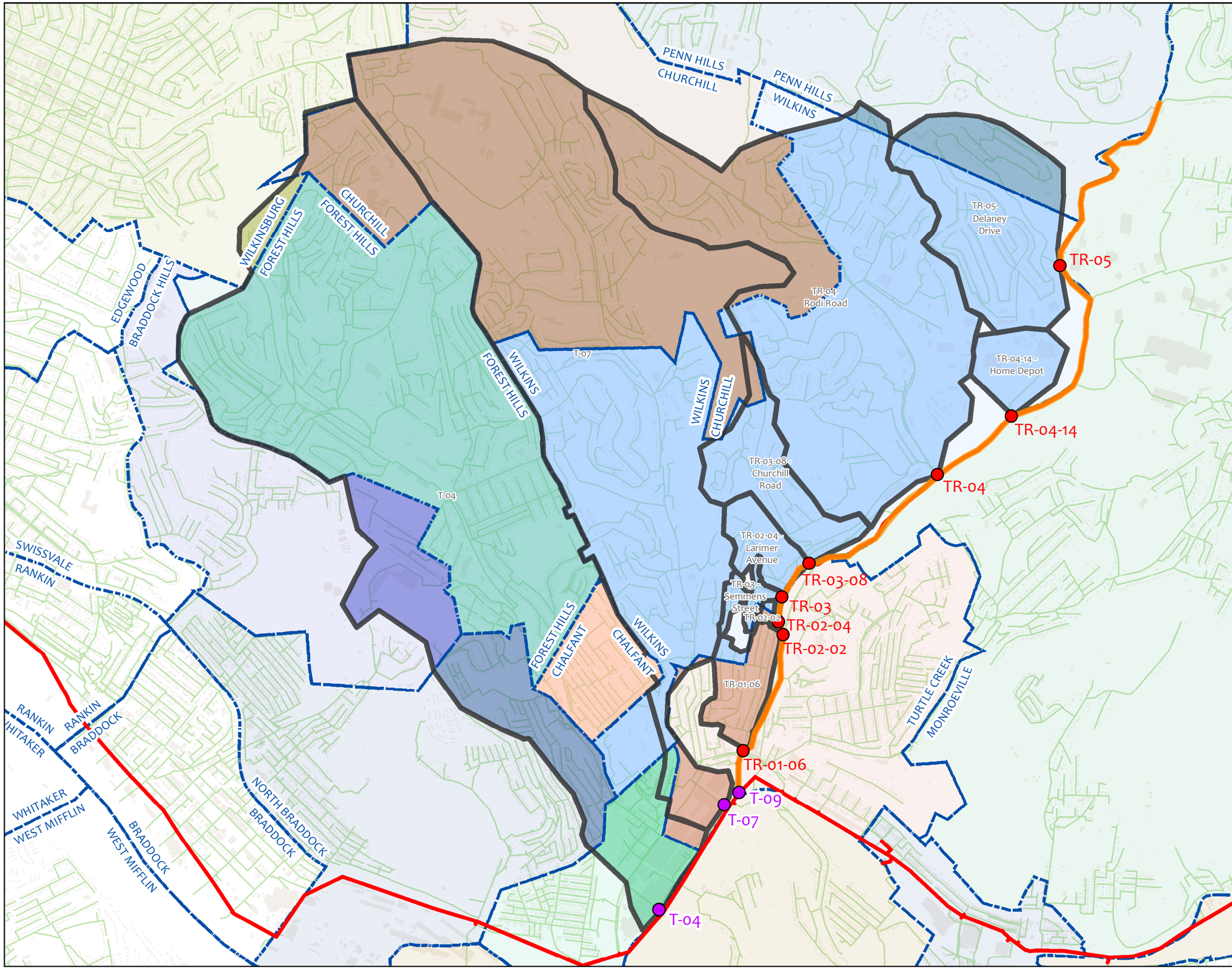
CHESTER ENGINEERS

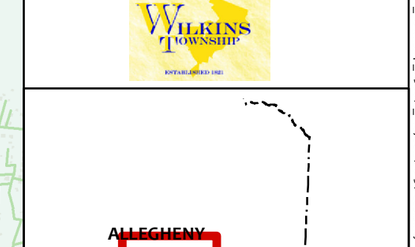
Document Path: G:\CLIENT\Wilkins_Township_650013_Projects\2013\Feasibility Mapping\Maps\Municipal Maps\WK_Fig_3-1.mxd

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 3-2 Sewershed Map





Legend

- ALCOSAN POC
- Municipal POC
- ALCOSAN Interceptors
- Thompson Run Interceptor
- One Overall Lines
- Sewersheds
- Municipal Boundaries

N

1:22,800

1 inch = 1,900 feet

0 950 1,900 3,800 Feet

Author: Peter Smith

Date: 7/10/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Wilkins_Township_650\b_Projects\2013\Feasibility Mapping\Maps\Municipal Maps\WK_Fig_3-2.mxd

Figure 3-3 Sewershed Schematic

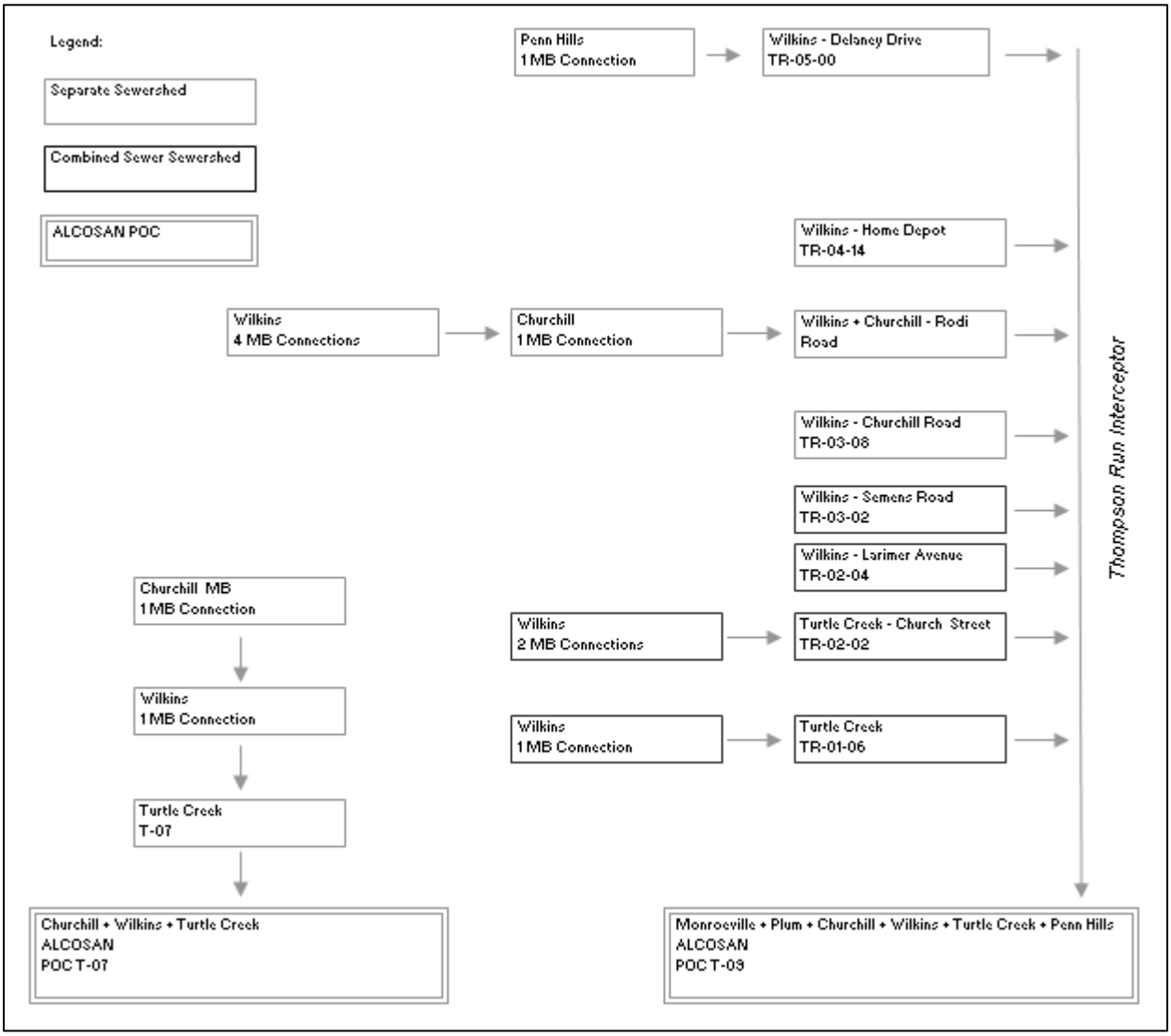


TABLE 3-1: WILKINS TOWNSHIP AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Penn Hills (4)	TR-05	62	100	2.38	238
Wilkins	TR-05	165	519	2.14	1,111
Wilkins	TR-04-14	160	1	2.14	3
Churchill (4)	TR-04	445	159	2.34	373
Wilkins	TR-04	604	619	2.14	1,325
Wilkins	TR-03-08	54	218	2.14	467
Wilkins	TR-03	17	79	2.14	135
Wilkins	TR-02-04	28	101	2.14	217
Wilkins	TR-02-02	26	12	2.14	26
Turtle Creek (4)	TR-02-02	43	20	2.16	44
Wilkins	TR-01-06	13	8	2.14	18
Turtle Creek (4)	TR-01-06	68	240	2.16	519
Churchill (4)	T-07	552	867	2.16	1,873
Turtle Creek (4)	T-07	33	440	2.34	94
Wilkins	T-07	393	1,036	2.14	2,218

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

(4) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for .each of these communities.

TABLE 3-2: WILKINS TOWNSHIP COMBINED SEWER CHARACTERISTICS

Combined (1)				
Municipality	**Sewershed**	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills	TR-05	0	0	0
Wilkins	TR-05	0	0	0
Wilkins	TR-04-14	0	0	0
Churchill	TR-04	0	0	0
Wilkins	TR-04	0	0	0
Wilkins	TR-03-08	0	0	0
Wilkins	TR-03	7.5	4218.72	0.44
Wilkins	TR-02-04	13.4	6,574	0.48
Wilkins	TR-02-02	0.5	311.5	0.02
Turtle Creek	TR-02-02	3.1	1,129.9	0.07
Wilkins	TR-01-06	1.2	729.0	0.09
Turtle Creek	TR-01-06	31.6	14,240	0.46
Churchill	T-07	0	0	0
Turtle Creek	T-07	0.76	7,049	0.78
Wilkins	T-07	0	0	0

(1) Combined Sewer information obtained from 3RWW GIS Web Map.

TABLE 3-3: WILKINS TOWNSHIP SEPARATE SEWER CHARACTERISTICS

Separate (1)				
Municipality	**Sewershed**	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills	TR-05	9.5	6,278	0.15
Wilkins	TR-05	47.7	31,300	0.29
Wilkins	TR-04-14	2.3	1,362	0.01
Churchill	TR-04	34.9	23,021	0.08
Wilkins	TR-04	105.5	69,242	0.17
Wilkins	TR-03-08	28.4	18,654	0.53
Wilkins	TR-03	0	0	0
Wilkins	TR-02-04	0	0	0
Wilkins	TR-02-02	0	0	0
Turtle Creek	TR-02-02	0	0	0
Wilkins	TR-01-06	0	0	0
Turtle Creek	TR-01-06	0	0	0
Churchill	T-07	112.7	73,688	0.2
Turtle Creek	T-07	0	0	0
Wilkins	T-07	121	72,822	0.31

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 3-4: WILKINS TOWNSHIP STORM SEWER CHARACTERISTICS

Storm (1)				
Municipality	**Sewershed**	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills	TR-05	N/A	N/A	N/A
Wilkins	TR-05	N/A	N/A	N/A
Wilkins	TR-04-14	N/A	N/A	N/A
Churchill	TR-04	N/A	N/A	N/A
Wilkins	TR-04	N/A	N/A	N/A
Wilkins	TR-03-08	N/A	N/A	N/A
Wilkins	TR-03	N/A	N/A	N/A
Wilkins	TR-02-04	N/A	N/A	N/A
Wilkins	TR-02-02	N/A	N/A	N/A
Turtle Creek	TR-02-02	N/A	N/A	N/A
Wilkins	TR-01-06	N/A	N/A	N/A
Turtle Creek	TR-01-06	N/A	N/A	N/A
Churchill	T-07	N/A	N/A	N/A
Turtle Creek	T-07	N/A	N/A	N/A
Wilkins	T-07	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

3.1.2 Multi-Municipal System(s) and Complex Sewersheds

There are some ALCOSAN POCs that receive flow from more than one municipality. These are considered to be "multi-municipal" systems because more than one municipality contributes flow and a solution for managing flow would have to consider each of the contributing municipalities. There are over 100 such multi-municipal sewersheds contributing to ALCOSAN POCs. Some of these multi-municipal systems are more complex than others and, as such, were defined by ALCOSAN as "complex sewersheds." There are 48 complex sewersheds in the ALCOSAN system. ALCOSAN sent letters to each municipality in the complex sewersheds, dated November 7, 2011, requesting that one comprehensive feasibility study, designated by POC, be submitted for each complex sewershed. ALCOSAN also requested that each complex sewershed feasibility study be submitted with a "Resolution" from the governing bodies of the participating municipalities. The Resolution should acknowledge the joint effort of the participating municipalities and authorize the release of the feasibility study to ALCOSAN for planning and review purposes.

Flows from Wilkins Township are tributary to nine sewersheds. Eight of these sewersheds are tributary to the T-09 Complex Sewershed. Figure 3-4 illustrates the T-09 Complex Sewershed. For more information reference is made to the T-09 Complex Sewershed Report prepared by the Municipality of Monroeville.

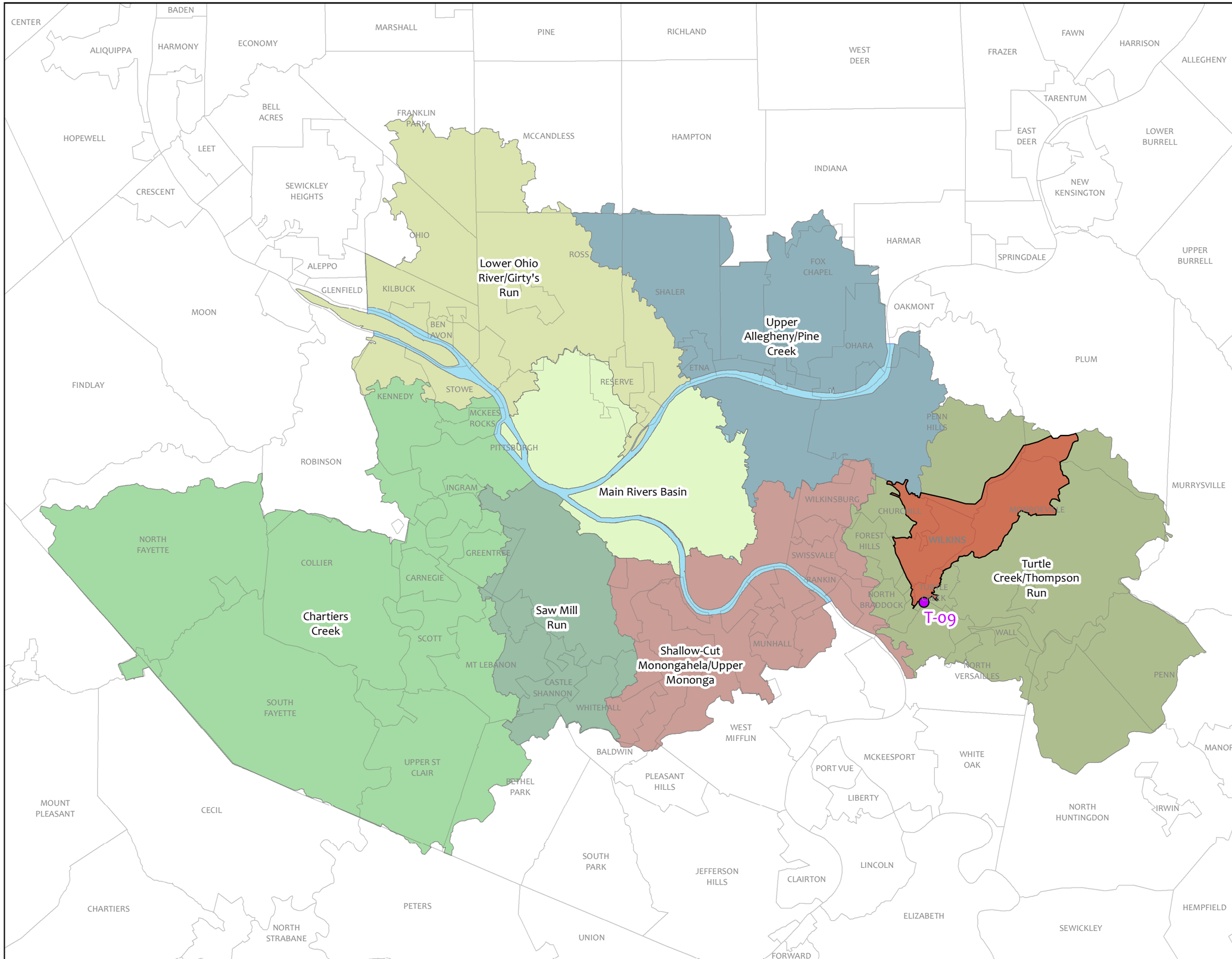
3.1.3 Current Flow Management Agreements

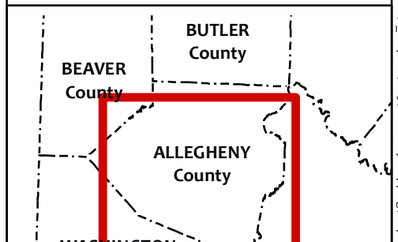
The current flow management and treatment agreement with ALCOSAN for sewers tributary to the Thompson Run Interceptor was made effective August 1, 1963 and was signed by ALCOSAN, Churchill, Monroeville, Turtle Creek, and Wilkins.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 3-4 Wilkins Complex Sewersheds





Legend

- ALCOSAN POC
- Municipal Boundaries
- T-09 Sewershed

Planning Basins

- Rivers
- Chartiers Creek
- City of Pittsburgh
- Lower Ohio River/Girty's Run
- Saw Mill Run
- Upper Mononga
- Turtle Creek/Thompson Run
- Upper Allegheny/Pine Creek

N

1:156,000

1 inch = 13,000 feet

0 6,500 13,000 26,000 Feet

Author: Peter Smith

Date: 7/10/2013

CHESTER ENGINEERS

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Reference is made to Section 9.1, and MOU and Inter-Municipal Agreements attached in the appendices of this report.

3.2 Existing Overflows

Table 3-5 presents information about existing overflows in Wilkins Township including municipal regulatory ID, location, receiving waters and owner. Figure 3-5 shows the locations of these discharge points.

TABLE 3-5: KNOWN CONSTRUCTED DISCHARGE LOCATIONS IN WILKINS TOWNSHIP.

Municipal Regulatory ID	Overflow Type	Location	Receiving Waters	Owner(s)
TR-05-00	SSO	Along bank of Thompson Run across from the Union Switch and Signal complex.	Thompson Run	Wilkins
TR-04	SSO	Along bank of Thompson Run near intersection of Rodi Road and Thompson Run Road	Thompson Run	Wilkins
TR-03	CSO	Along bank of Thompson Run near intersection of Semmens Street and Thompson Run Road	Thompson Run	Wilkins
TR-03A (1)	CSO	Along bank of Thompson Run ~275 LF upstream of Overflow TR-03	Thompson Run	Wilkins

(1) Overflow TR-03A was classified in the original H&H report as being part of the TR-03 sewershed. Based on field investigations performed after this report was submitted, overflow TR-03A was reassigned to the TR-02-04 sewershed.

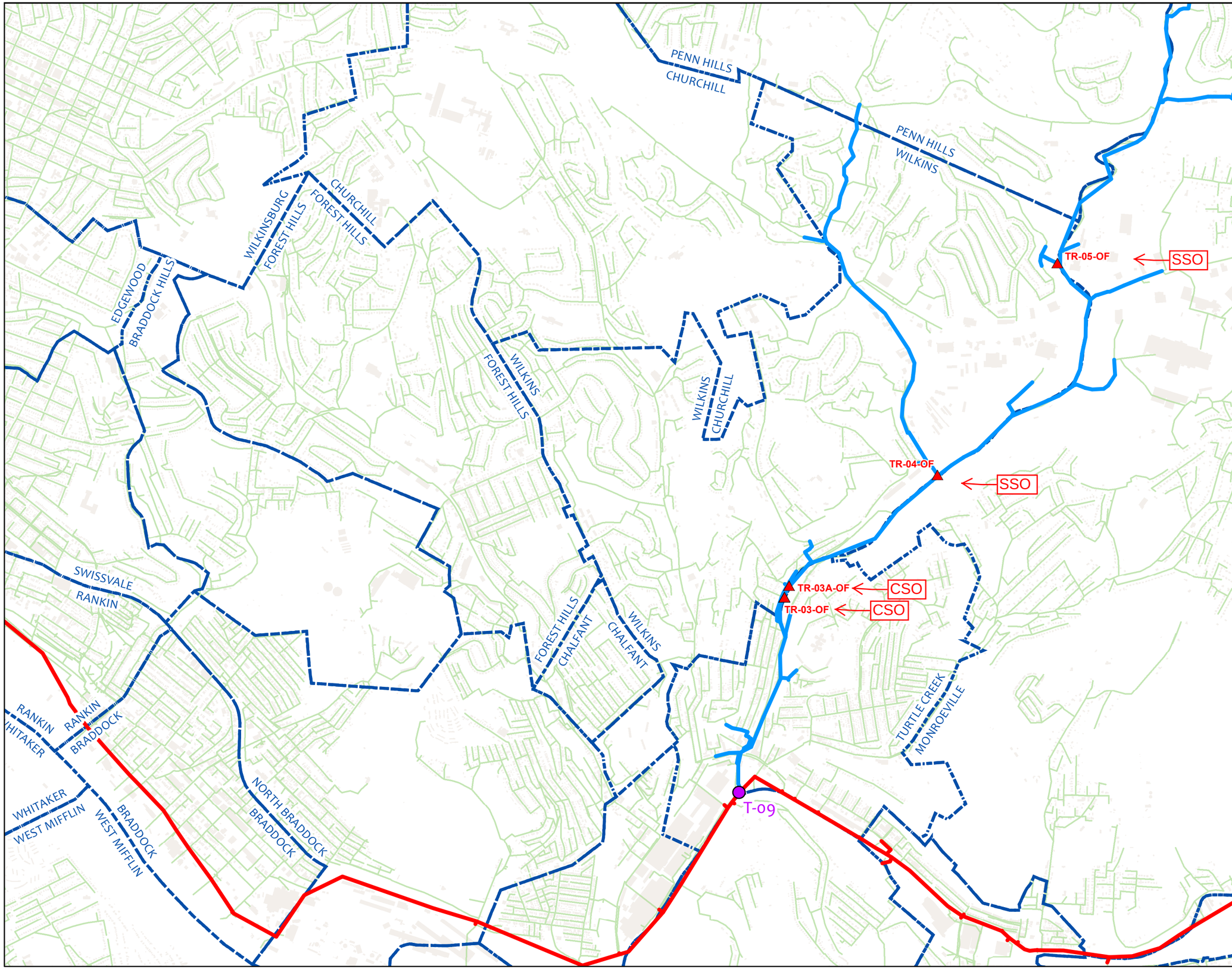
3.3 Direct Stream Inflows

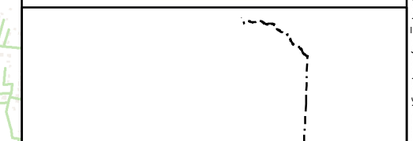
There are no known direct stream inflows into the combined or separate sanitary sewer system in Wilkins Township.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 3-5 Existing Overflow Locations





Legend

Outfall Type

- Constructed Outfall
- Overflowing Manhole
- ALCOSAN POC
- ALCOSAN Interceptors
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:22,800

1 inch = 1,900 feet

0 950 1,900 3,800 Feet

Author: Peter Smith

Date: 7/25/2013

CHESTER ENGINEERS

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4.0 SEWER SYSTEM CHARACTERIZATION

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring, and outlines the location of the flow monitors. Also discussed is identification of system defects and repairs.

4.1 2008 Flow Monitoring Data Evaluation

The 3RWW/PM Team, along with the municipalities, developed guidelines for implementing a system-wide flow monitoring program. The program that was implemented is described below.

4.1.1 Flow Monitoring Program Background

On June 1, 2006, a Regional Flow Monitoring Plan (RFMP) was submitted to the PADEP and the ACHD for review and approval. The purpose of the plan was to comply with the Orders and to document the efforts expended in developing the plan. The RFMP was assembled by 3RWW and the 3RWW/PM Team with direct input from ALCOSAN and the FMWG. The FMWG was composed of municipal engineers, some municipal managers and other interested parties. Concurrently, ALCOSAN was developing a flow monitoring plan to meet the requirements of the draft CD issued to ALCOSAN. In response to Agencies' comments and provisions of the CD, ALCOSAN developed and delivered a Regional Collection System Flow Monitoring Plan (RCSFMP) that incorporated most of the provisions of the RFMP and provided comprehensive flow monitoring of both the ALCOSAN system and the municipal collection systems. Implementation of the RCSFMP by ALCOSAN fulfilled the flow monitoring required by the municipal Orders.

More details on the Flow Monitoring Program are included in Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements (3RWW/PM Team, June 30, 2009).

4.1.2 Additional Flow Monitoring

After the ACO/COA 2008/2009 flow monitoring, no additional flow monitoring was performed within Wilkins Township.

4.1.3 Flow Monitoring Results

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

Table 4-1 provides a summary of monitors installed as part of ACO/COA 2008/2009 flow monitoring.

4.2 Description of Flow Isolation Studies and Sewer System Evaluation Surveys

The 3RWW FSWG Document 009 (entitled *Infiltration/Inflow Screening Guideline/Flow Isolation Study Decision Criteria Guidelines*) provided the decision making guidance as to whether a municipality/authority should consider a sanitary sewer system flow isolation study to locate areas of excessive infiltration. If the municipality conducted a flow isolation study, general concepts and techniques typically employed in performing such studies along with guidance in securing professional services towards implementation of a flow isolation study were considered by the Municipality. In addition, the USEPA Construction Grants Program originated and developed the concept of "excessive inflow and infiltration (I/I)." This program mandated I/I studies and Sewer System Evaluation Surveys (SSES) to evaluate removal of extraneous flow quite literally at the source (i.e. the joint, roof leader, etc.). Over the years, based partially on lack of effectiveness of this approach, (i.e. search/fix to remove I/I), the objective has evolved to "flow reduction" in the form of store/contain. However, the long term cost of simple

TABLE 4-1: SUMMARY OF FLOW MONITORS FOR WILKINS TOWNSHIP

Municipality	Sewershed	Monitor Name	Monitor Type (1)	Monitor Duration	Comment
Wilkins + Penn Hills	TR-05	TR-05-00-M3	POC	2004 to 2005	Past Credit Monitor
Wilkins	TR-04-14	TR-04-14-M2	POC	2007 to 2009	
Wilkins + Churchill	TR-04	TR0400_-POC-L-01_	POC	2008-2009	
Wilkins + Churchill	TR-04	TR-04-00-M1	POC	2004-2005	Historical
Wilkins	TR-04	TR0400_-IM-S-02_	IM	2008	
Wilkins	TR-04	TR0400_-IM-S-03_	IM	2008	
Wilkins	TR-04	TR0400_-IM-S-04_	IM	2008	
Wilkins + Churchill	TR-04	TR0400_-MB-L-05_	MB	2008	
Wilkins	TR-03-08	N/A	N/A	N/A	(2)
Wilkins	TR-03	TR0200_-OSC-M-03_	OSC	2008	
Wilkins	TR-03	TR0200_-OSC-M-03O_	OSC	2008	
Wilkins	TR-02-04	N/A	N/A	N/A	(2)
Turtle Creek	TR-02-02	N/A	N/A	N/A	(2)
Turtle Creek	TR-01-06	N/A	N/A	N/A	(2)
Wilkins + Churchill	T-07	T0700_-MB-L-01	MB	2008	
Wilkins	T-07	T0700_-MB-L-02	MB	2008	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, multi-municipal boundary, overflow, etc.).

(2) The noted sewershed was not monitored.

contain/store/treat can be prohibitive. Additionally, diversion of stream recharge flow to downstream remote sewage treatment facilities is not consistent with the intent of maintaining local stream quantity.

4.2.1 Flow Isolation Study/SSES Procedures

Wilkins Township did not conduct any SSES or flow isolation studies. Flow monitoring data collected at each sewershed point of connection and at upstream points in large sewersheds was used to determine I/I at various points within the Wilkins sewer system.

4.3 Recommendations Resulting from Wilkins Township Flow Isolation Studies/SSES

Wilkins Township did not conduct any SSES or flow isolation studies.

4.4 Summary of Defect Repairs

Wilkins Township has been committed to making the necessary repairs to their sanitary sewer system to meet the COA requirements. The projects completed by the Township in recent years include the following:

- During the system inventory, Township staff discovered two manholes in the Rodi Road sewershed that allowed sewage to overflow during wet weather events through holes in the manhole walls. The holes were patched, eliminating the overflows. These manholes are routinely inspected after rainfall events, with no evidence of subsequent overflows.

- The Township instituted a program of repairing any significant sewer system defects found during the internal inspection activities. This work is performed by Township forces. To date, 11 manholes that were found to be either buried or in low-lying areas that could accept runoff have been raised to grade, and multiple defects rated 4 or 5 on the NASSCO scale have been repaired.

- During the system inventory, Township staff discovered that the existing sanitary sewer system in the Dowling Avenue neighborhood included segments of 6-inch and 4-inch diameter pipes, some of which were close to or at ground level. This area has some of the oldest sewers in the Township, most of which were not well documented, making it difficult to verify the existence of illegal connections or sources of infiltration and inflow. The Township initiated a multi-phased program of replacing the sewers in the neighborhood with new PVC pipe, standard manholes and proper residential connections. The second phase of the project will be completed in 2013, after which a total of over 2,000 feet of undersized and defective sanitary sewer will have been replaced. A third phase, of approximately 1,500 feet of sewer, is scheduled for 2014.

Table 4-2 illustrates the completed repairs in Wilkins Township.

TABLE 4-2: WILKINS TOWNSHIP SUMMARY OF COMPLETED SEWER REPAIRS.

Sewershed	Repair Description	Quantity
Rodi Road Sewershed	SSO in Manholes	2
Multiple	Locate and Raise Manholes	11
Brown Avenue	Replace Undersized and Defective Sewers	2,150 ft
Multiple	Sewer Defects	10-20

5.0 SEWER SYSTEM CAPACITY ANALYSIS

This section of the report discusses the use of the data to determine preliminary flow estimates, and review and accept the calibration of the ALCOSAN Hydrologic and Hydraulic (H&H) model developed by the Basin Planners.

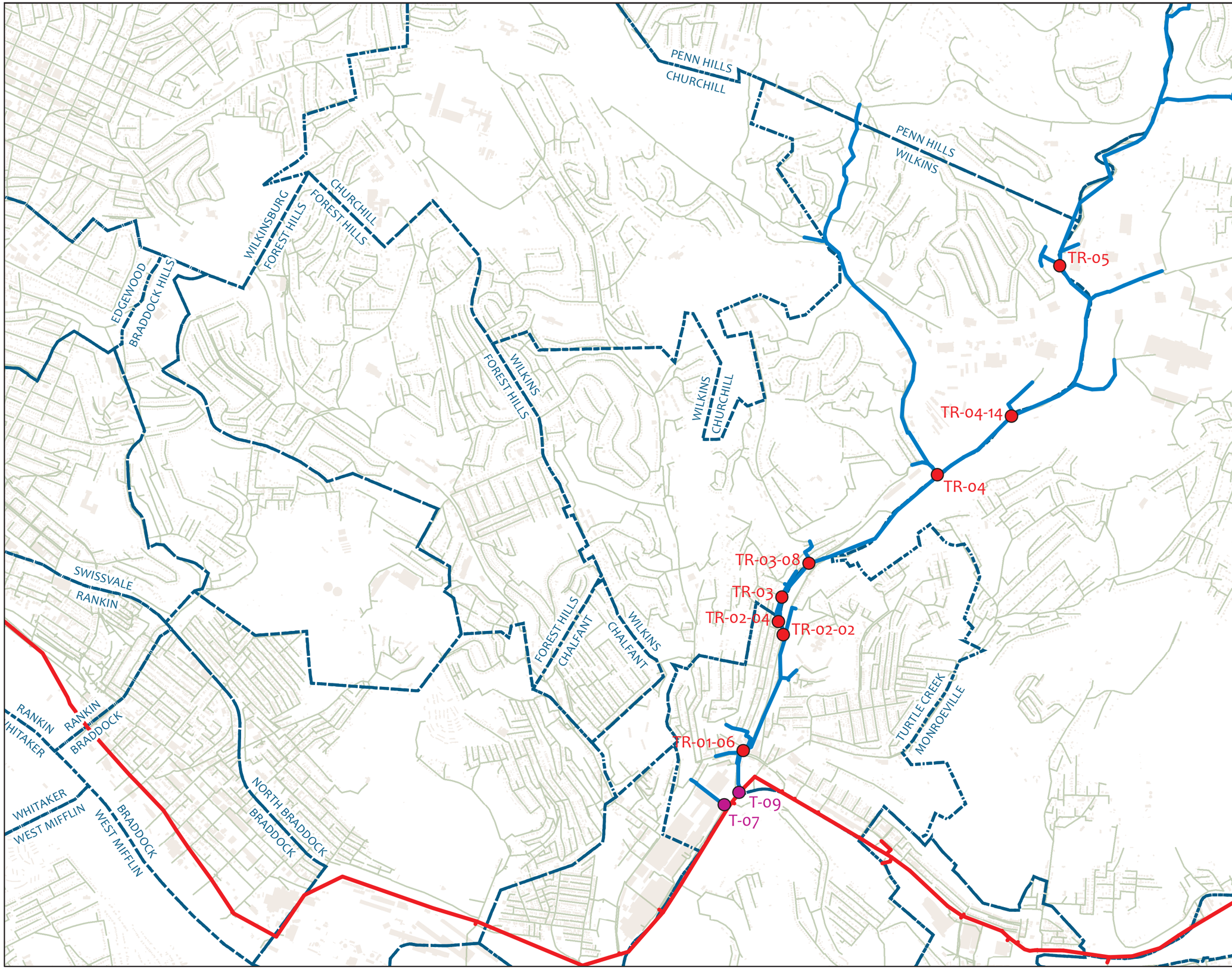
5.1 Development and Calibration/Verification of H&H Tools

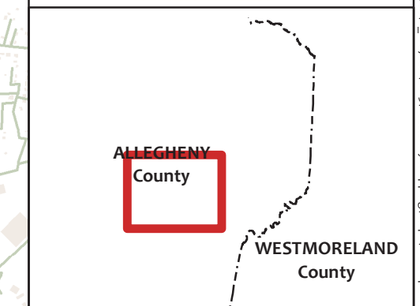
The approach used by the municipality was developed by the Three Rivers Wet Weather (3RWW) PM Team and vetted by the Feasibility Study Working Group (FSWG). For separate sanitary systems, this approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. For combined sewer systems, design flows were based on peak flow responses corresponding with 2003 Typical Year precipitation. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances were these values varied by more than 25%, the municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations. Figure 5-1 shows a view of the model extents for the Wilkins sewersheds. For more detail, reference is made to the individual sewershed reports provided in the appendix of this report. Additionally, reference is made to the Feasibility Study Reports for Churchill, Turtle Creek, Penn Hills, and Complex Sewershed T-09.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 5-1 SWMM Model Extents





Legend

- ALCOSAN POC
- ALCOSAN Interceptors
- Model Extents
- One Overall Lines
- Municipal Boundaries

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1:22,800

1 inch = 1,900 feet

0 950 1,900 3,800 Feet

Author: Peter Smith

Date: 7/25/2013

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5.2 Baseline Conditions

The municipalities are required by The Orders and the ALCOSAN CD to coordinate with ALCOSAN in providing municipal planning information for the development of control alternatives. Information on which the baseline conditions H&H model could be based was developed by municipalities for incorporation into the municipal and ALCOSAN models. The planning horizon date for the models is September 2046.

This section describes the development of a Baseline Condition H&H model for predicting 2046 wastewater flow. There are a number of factors that need to be accounted for in the development of a future conditions model. The impacts on expected dry weather and wet weather flow from population shifts, future development, and planned collection system modifications need to be estimated.

5.2.1 Tributary Area (Existing and Future)

All tributary areas in the Wilkins Township sewersheds are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 5-1 provides a summary of existing and expected future tributary sewershed areas by community.

5.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 5-2 provides a summary of existing and expected future population by community in the tributary sewersheds.

TABLE 5-1: EXISTING AND FUTURE TRIBUTARY AREAS FOR WILKINS TOWNSHIP

Sewershed	Municipality	Tributary Area (acres) (1)		
		Existing	Future	Percent Difference(2)
TR-05	Penn Hills (3)	62	62	0%
TR-05	Wilkins	165	165	0%
TR-04-14	Wilkins	160	160	0%
TR-04	Churchill (3)	445	445	0%
TR-04	Wilkins	604	604	0%
TR-03-08	Wilkins	54	54	0%
TR-03	Wilkins	17	17	0%
TR-02-04	Wilkins	28	28	0%
TR-02-02	Wilkins	26	26	0%
TR-02-02	Turtle Creek (3)	43	43	0%
TR-01-06	Wilkins	13	13	0%
TR-01-06	Turtle Creek (3)	68	68	0%
T-07	Churchill (3)	552	552	0%
T-07	Turtle Creek (3)	33	33	0%
T-07	Wilkins	393	393	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

(3) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for each of these communities.

TABLE 5-2: EXISTING AND FUTURE POPULATION FOR WILKINS TOWNSHIP

Sewershed	Municipality	Population			
		Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
TR-05	Penn Hills (4)	238	19.89%	25%	298
TR-05	Wilkins	1,111	6.44%	25%	1,389
TR-04-14	Wilkins	3	6.44%	25%	4
TR-04	Churchill (4)	373	-4.00%	25.00%	467
TR-04	Wilkins	1,325	6.44%	25.00%	1,657
TR-03-08	Wilkins	467	6.44%	25%	584
TR-03	Wilkins	135	6.44%	25%	169
TR-02-04	Wilkins	217	6.44%	25%	272
TR-02-02	Wilkins	26	6.44%	25%	33
TR-02-02	Turtle Creek (4)	44	15.92%	15.92%	52
TR-01-06	Wilkins	18	6.44%	25%	23
TR-01-06	Turtle Creek (4)	519	15.92%	15.92%	602
T-07	Churchill (4)	1,873	-4.0%	25%	2,342
T-07	Turtle Creek (4)	94	15.92%	15.92%	109
T-07	Wilkins	2,218	6.44%	25%	2,773

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

(4) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for .each of these communities.

5.2.3 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in these sewersheds were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream most conduit connecting to each POC. Existing and future GWI values were distributed by inch-miles of tributary sewer.

All areas within Wilkins Township are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins Township is complying with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 5-3 presents existing and projected groundwater infiltration (GWI) by community for the various tributary sewersheds.

5.2.4 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consists of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Flows for GWI and BWWF were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream most conduit connecting to each POC. Future BWWFs were extrapolated to year 2046 based on assumed population change as discussed in Section 5.2.2. GWI flow distributions are discussed in Section 5.2.3. Table 5-4 summarizes dry weather flows by community for the various tributary sewersheds.

TABLE 5-3: EXISTING AND FUTURE GWI FOR WILKINS TOWNSHIP

Sewershed	Municipality	Tributary Area (acres)	GWI Flow		
			Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
TR-05	Penn Hills (2)	62	0.027	0.033	25%
TR-05	Wilkins	165	0.133	0.167	25%
TR-04-14	Wilkins	160	0.05	0.06	25%
TR-04	Churchill (2)	445	0.15	0.19	25%
TR-04	Wilkins	6 04	0.45	0.56	25%
TR-03-08	Wilkins	54	0.08	0.1	25%
TR-03	Wilkins	17	0.02	0.025	25%
TR-02-04	Wilkins	28	0.003	0.038	25%
TR-02-02	Wilkins	26	0.009	0.009	25%
TR-02-02	Turtle Creek (2)	43	0.001	0.001	25%
TR-01-06	Wilkins	13	0.002	0.0023	25%
TR-01-06	Turtle Creek (2)	68	0.048	0.06	25%
T-07	Churchill (2)	552	0.15	0.19	25%
T-07	Turtle Creek (2)	33	0.035	0.043	25%
T-07	Wilkins	393	0.16	0.2	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(2) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for .each of these communities.

TABLE 5-4: SUMMARY OF DRY WEATHER FLOWS FOR WILKINS TOWNSHIP

Sewershed	Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
			Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
TR-05	Penn Hills (1)	62	0.053	0.066	26%
TR-05	Wilkins	165	0.247	0.309	29%
TR-04-14	Wilkins	160	0.275	0.36	30.9%
TR-04	Churchill (1)	445	0.19	0.24	26.2%
TR-04	Wilkins	604	0.6	0.76	27.1%
TR-03-08	Wilkins	54	0.178	0.23	29.2%
TR-03	Wilkins	17	0.058	0.075	29.3%
TR-02-04	Wilkins	28	0.07	0.09	29.4%
TR-02-02	Wilkins	26	0.009	0.011	22.2%
TR-02-02	Turtle Creek (1)	43	0.017	0.019	11.8%
TR-01-06	Wilkins	13	0.004	0.0048	21.1%
TR-01-06	Turtle Creek (1)	68	0.11	0.13	20.0%
T-07	Churchill (1)	552	0.3	0.39	29.1%
T-07	Turtle Creek (1)	33	0.043	0.052	21.6%
T-07	Wilkins	393	0.34	0.44	29.5%

(1) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for each of these communities.

5.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream most conduit connecting to each POC during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas within Wilkins Township are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins Township is complying with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 5-5 presents existing and projected rainfall dependent infiltration and inflow (RDII) flow rates by community for the tributary sewersheds.

5.2.6 Estimation Process for Unmonitored Areas

The flow estimation process for unmonitored areas is detailed in Section 2 of the Turtle Creek / Thompson Run H&H Model Validation and Calibration Report. The distribution of flows to upstream areas that were not modeled is discussed in detail in Sections 5.2.3, 5.2.4, and 5.2.5.

5.2.7 Planned Projects Incorporated Into Future Model

Table 5-6 lists planned projects that are incorporated into the future model by community for the tributary sewersheds. At this time, projects are planned for two of the tributary sewersheds.

5.3 Preliminary Flow Estimates

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

Information for peak flow rates for the various Summer Design storm conditions in the tributary sanitary sewer sewersheds is listed by community in Table 5-7A.

TABLE 5-5: EXISTING AND FUTURE RDII FOR WILKINS TOWNSHIP

Sewershed	Municipality	Tributary Area (acres)	RDII Flow (1)		
			Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
TR-05	Penn Hills (2)	62	0.22	0.22	0%
TR-05	Wilkins	165	1.1	1.1	0%
TR-04-14	Wilkins	160	0.98	0.98	0%
TR-04	Churchill (2)	445	0.36	0.36	0%
TR-04	Wilkins	604	2.45	2.45	0%
TR-03-08	Wilkins	54	0.56	0.56	0%
TR-03	Wilkins	17	4.1	4.1	0%
TR-02-04	Wilkins	28	0.39	0.39	0%
TR-02-02	Wilkins	26	0.28	0.28	0%
TR-02-02	Turtle Creek (2)	43	1.7	1.7	0%
TR-01-06	Wilkins (3)	13	1.2	1.2	0%
TR-01-06	Turtle Creek (3)	68	31.6	31.6	0%
T-07	Churchill (2)	552	3.0	3.0	0%
T-07	Turtle Creek (2)	33	27.1	27.1	0%
T-07	Wilkins	393	3.3	3.3	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

(2) Values for Churchill, Penn Hills Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for each of these communitie

(3) TR-01-06 PFE Values provided by Glen Engineering. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

TABLE 5-6: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR WILKINS TOWNSHIP

Sewershed	Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
TR-05	Penn Hills (1)	None	N/A	N/A	N/A
TR-05	Wilkins	None	N/A	N/A	N/A
TR-04-14	Wilkins	None	N/A	N/A	N/A
TR-04	Churchill (1)	None	N/A	N/A	N/A
TR-04	Wilkins	None	N/A	N/A	N/A
TR-03-08	Wilkins	None	N/A	N/A	N/A
TR-03 (2)	Wilkins	Storm Sewer Separation	Design Phase July, 2013	TBD	2014
TR-02-04 (2)	Wilkins	Storm Sewer Separation	Design Phase July, 2013	TBD	2015
TR-02-02	Wilkins	None	N/A	N/A	N/A
TR-02-02	Turtle Creek (1)	None	N/A	N/A	N/A
TR-01-06	Wilkins	None	N/A	N/A	N/A
TR-01-06	Turtle Creek (1)	None	N/A	N/A	N/A
T-07	Churchill (1)	None	N/A	N/A	N/A
T-07	Turtle Creek (1)	None	N/A	N/A	N/A
T-07	Wilkins	None	N/A	N/A	N/A

(1) Chester Engineers is currently not aware of any planned projects in Churchill, Penn Hills or Turtle Creek. For more information reference is made to the the Feasibility Study Reports for each of these communities.

(2) Storm sewer separation projects are planned for Wilkins sewersheds TR-03 and TR-02-04. Modeling and flow estimations were performed for these two sewersheds. However, for conservatism in the solution development process for the Thompson Run Interceptor the combined flows from the original H&H model were used. Reference is made to the T-09 Complex Sewershed Report.

TABLE 5-7A: PROJECTED SUMMER PEAK FLOW RATES – SEPARATE SYSTEM

Sewershed	Tributary Community	Peak Flow Rate (mgd) / Design Storm			
		1 Year	2 Year	5 Year	10 Year
TR-05	Penn Hills (1)	0.25	0.28	0.33	0.37
TR-05	Wilkins	1.25	1.42	1.64	1.83
TR-04-14	Wilkins	1.18	1.34	1.55	1.72
TR-04	Churchill (2)	0.52	0.59	0.7	0.82
TR-04	Wilkins	2.54	3.22	3.16	4.11
TR-03-08	Wilkins	0.69	0.79	0.94	1.07
TR-03	Wilkins (3)	0.21	0.24	0.27	0.3
TR-02-04	Wilkins (3)	0.43	0.48	0.56	0.61
TR-02-02	Wilkins (4)				
TR-02-02	Turtle Creek (4)				
TR-01-06	Wilkins (4)				
TR-01-06	Turtle Creek (4)				
T-07	Churchill (1)	2.66	3.02	3.54	3.95
T-07	Turtle Creek (1), (4)	20.04	27.1	37.32	45.77
T-07	Wilkins	2.88	3.26	3.82	4.26

(1) Values for Churchill, Penn Hills, and Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for these communities.

(2) The 2 and 10-Year Peak Flow values for Churchill were provided by Gateway Engineers. The 1 and 5-Year values were interpolated from 2 and 10-Year data.

(3) Values represent post storm sewer separation flow estimates. TR-03 Peak Flow values are included with TR-02-04 values. Separate sanitary flows from the TR-03 sewershed will be routed to TR-02-04 sewershed as part of the planned storm sewer separation projects.

(4) These sewersheds are combined. Where available, peak flow estimates are provided for typical year precipitation in Table 5-8A

Table 5-7B provides information for flow volumes for the various Summer Design storm conditions in the tributary sanitary sewer sewersheds is listed by community in Table 5-7A.

TABLE 5-7B: PROJECTED SUMMER 24-HOUR VOLUMES – SEPARATE SYSTEM

Sewershed	Tributary Community	Volume (MG) / Design Storm			
		1 Year	2 Year	5 Year	10 Year
TR-05	Penn Hills (1)	0.18	0.19	0.2	0.21
TR-05	Wilkins	0.92	0.94	0.98	1.02
TR-04-14	Wilkins	0.83	0.84	0.86	0.88
TR-04	Churchill (2)	0.48	0.49	0.54	0.55
TR-04	Wilkins	2.34	2.67	2.44	2.77
TR-03-08	Wilkins	0.386	0.395	0.425	0.444
TR-03	Wilkins (3)	0.09	0.1	0.104	0.11
TR-02-04	Wilkins (3)	0.54	0.55	0.56	0.57
TR-02-02	Wilkins (4)				
TR-02-02	Turtle Creek (4)				
TR-01-06	Wilkins (4)				
TR-01-06	Turtle Creek (4)				
T-07	Churchill (1)	0.49	0.5	0.52	0.54
T-07	Turtle Creek (1), (4)	3.72	4.46	5.48	6.29
T-07	Wilkins	0.53	0.54	0.56	0.59

(1) Values for Churchill, Penn Hills, and Turtle Creek are estimated. Reference is made to the Feasibility Study Reports for these communities.

(2) Volumes are estimated based on peak flows provided by Gateway Engineers.

(3) Values represent post storm sewer separation flow estimates. TR-03 Peak Flow values included with TR-02-04 values. Separate sanitary flows from the TR-03 sewershed will be routed to TR-02-04 sewershed as part of the planned storm sewer separation projects.

(4) These sewersheds are combined. Where available, peak flow estimates are provided for typical year precipitation in Table 5-8B

Information for peak flow rates for 2003 Typical Year precipitation conditions in the tributary combined sewer sewersheds is listed by community in Table 5-8A.

TABLE 5-8A: PROJECTED TYPICAL YEAR PEAK FLOW RATES – COMBINED SYSTEM SEWERSHEDS

Sewershed	Municipality	Overflow ID	# of Overflows Per Year	Peak Flow Rate (mgd) by CSO Control Level – Number of Overflow Events Per Year					
				1	2	3	5	7	11
TR-03	Wilkins	TR-03-OF (1)	4	0.73	0.56	0.44	0	0	0
TR-03	Wilkins	TR-03-OF1 (1)	0	0	0	0	0	0	0
TR-02-04	Wilkins	TR-03A-OF	5	3.1	1.15	0.95	0.75	0	0
TR-02-02	Wilkins (2)	N/A							
TR-02-02	Turtle Creek (2)	N/A							
TR-01-06	Wilkins	(3)	(3)	1.42	0.58	0.49	0.3	0.18	0.04
TR-01-06	Turtle Creek	(3)	(3)	37.31	15.37	12.93	7.97	4.7	1.17
T-07	Turtle Creek (4)	T-07-OF	31	14.2	9.6	7.3	2.9	1.7	1.1

(1) POC Structure TR-03 has two overflows.

(2) This sewershed was not modeled. 3RWW Web mapping does not show an overflow structure for this sewershed. These values cannot be determined by estimation. No flow data in this sewershed has been collected. Verification of flows with flow monitors is recommended.

(3) The original H&H model did not include an overflow structure at this location. However, the 3RWW Web Map indicates that an overflow is present. For more information reference is made to the Turtle Creek Feasibility Study.

(4) Value for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report.

Information for flow volumes for 2003 Typical Year precipitation conditions in the tributary combined sewer sewersheds is listed by community in Table 5-8B.

TABLE 5-8B: PROJECTED TYPICAL YEAR VOLUMES – COMBINED SYSTEM SEWERSHEDS

Sewershed	Municipality	Overflow ID	# of Overflows Per Year	Flow Volume (MG) by CSO Control Level – Number of Overflow Events Per Year					
				1	2	3	5	7	11
TR-03	Wilkins	TR-03-OF (1)	4	0.08	0.03	0.1	0	0	0
TR-03	Wilkins	TR-03-OF1 (1)	0					0	0
TR-02-04	Wilkins	TR-03A-OF	5	0.13	0.02	0.03	0.016	0	0
TR-02-02	Wilkins (2)	N/A							
TR-02-02	Turtle Creek (2)	N/A							
TR-01-06	Wilkins	(3)	(3)	0.047	0.012	0.019	0.011	0.015	0.001
TR-01-06	Turtle Creek	(3)	(3)	1.229	0.317	0.494	0.285	0.38	0.021
T-07	Turtle Creek (3)	T-07-OF	31	1.25	1.23	0.61	0.3	0.26	0.09

(1) This sewershed was not modeled. 3RWW Web mapping does not show an overflow structure for this sewershed. These values cannot be determined by estimation. No flow data in this sewershed has been collected. Verification of flows with flow monitors is recommended.

(2) The original H&H model did not include an overflow structure at this location. However, the 3RWW Web Map indicates that an overflow is present. For more information reference is made to the Turtle Creek Feasibility Study.

(3) Value for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report.

5.4 Capacity Deficient Sewers

Accepted engineering practice for the design of sanitary sewers provides for foreseeable future flows and results in sewer capacity where the current and future flows are transported within the pipe system without surcharging, basement backups, manhole pops, or overflows; and includes a factor of safety. In the current analyses required for the Feasibility Study under the municipal orders, the possibility exists for a portion of the sanitary sewer system to be slightly under capacity. Under these conditions, where the remedy could be extremely costly on a per foot basis, the engineer may want to consider the extent of surcharging and evaluate whether limited surcharge is appropriate for submission to the regulatory agencies for their review. Operating sewers in consistent surcharge (especially where the original design did not intend such

operation) can result in continued deterioration of the sewer system as well as potential exfiltration and eventual undermining of the sewer line potentially resulting in surface or sewer collapse/breaks, etc. Older systems, particularly those with less resilient joints or structurally weakened by cracks can sustain physical damage when operated under surcharge. Accelerated pipe failure associated with cyclical surcharge/non-surcharge operation is a risk to be considered. However, the municipal engineer who is knowledgeable about the local municipal system may determine it is appropriate to consider surcharge in their deficiency analyses.

The following provides a summary of capacity conditions for 2 and 10-Year summer design storm conditions in the Wilkins Township sewersheds. For more detail including hydraulic grade line (HGL) profiles, reference is made to the individual sewershed reports provided in the appendices of this report. Figures 5-2 and 5-3 located at the end of the section show free flowing sewers, surcharged pipes and overflowing manholes for all modeled areas in Wilkins Township during 2 and 10-Year Summer Design Storm conditions.

TR-05 Delaney Drive Sewershed

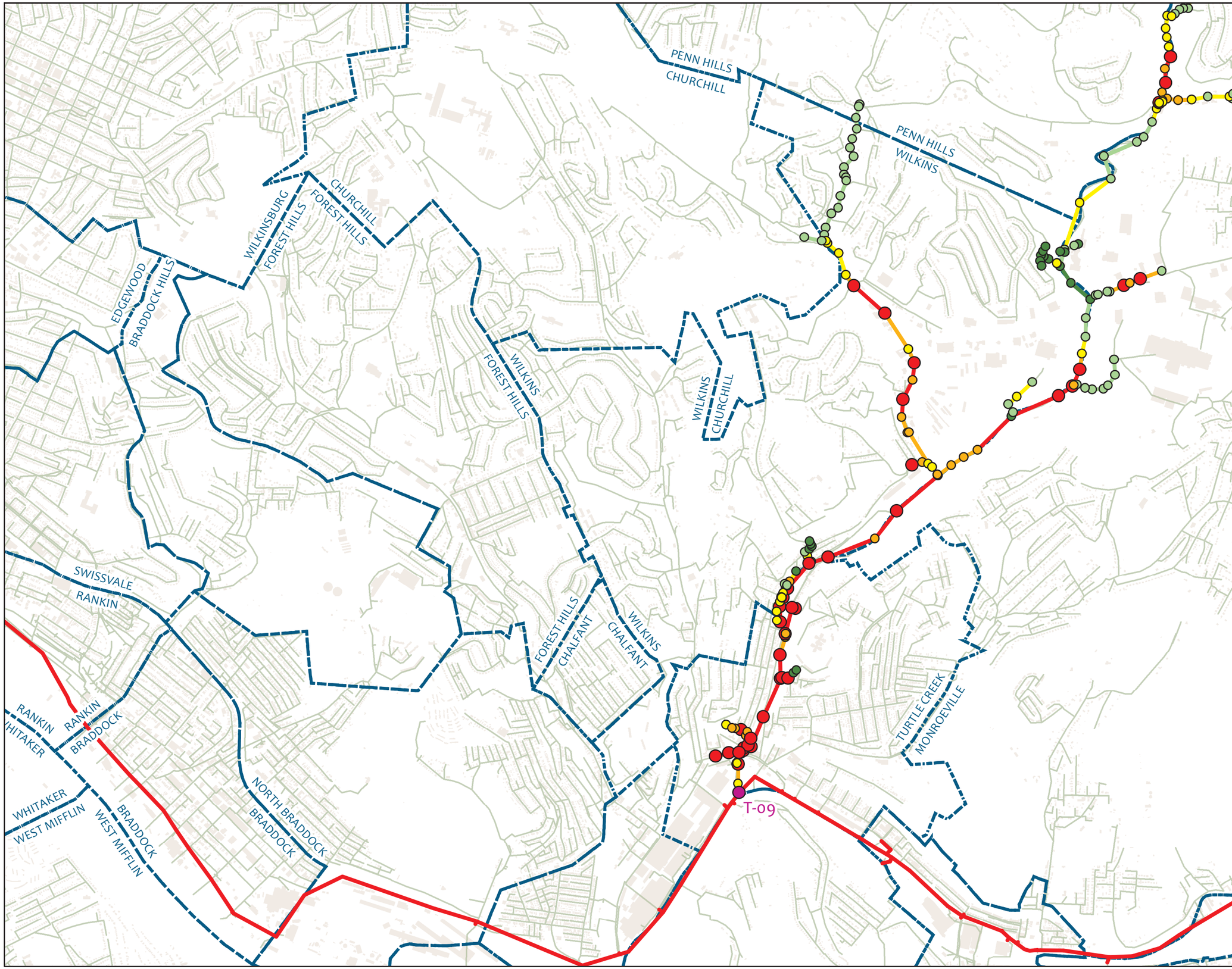
Under 2-Year Summer Design Storm conditions, the Delaney Drive trunk sewer is not shown to be capacity deficient. The downstream surcharge is caused by a constructed flow restriction at the TR-05-00 regulator structure, which limits flows to the Thompson Run Interceptor. Additionally, the elevation of the HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm.

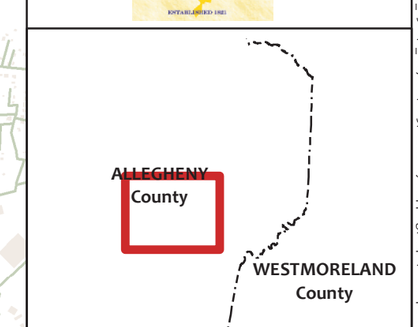
Under 10-Year Summer Design Storm conditions, the Delaney Drive trunk sewer is not shown to be capacity deficient. The downstream surcharge is caused by a constructed flow restriction at the TR-05-00 regulator structure, which limits flows to the Thompson Run Interceptor. Additionally, the elevation of the HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 5-2 2-Year Summer Storm Conditions Surcharge Map





Legend

- ALCOSAN POC
- ALCOSAN Interceptors
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:22,800

1 inch = 1,900 feet

0 950 1,900 3,800 Feet

Author: Peter Smith

Date: 7/25/2013

CHESTER ENGINEERS

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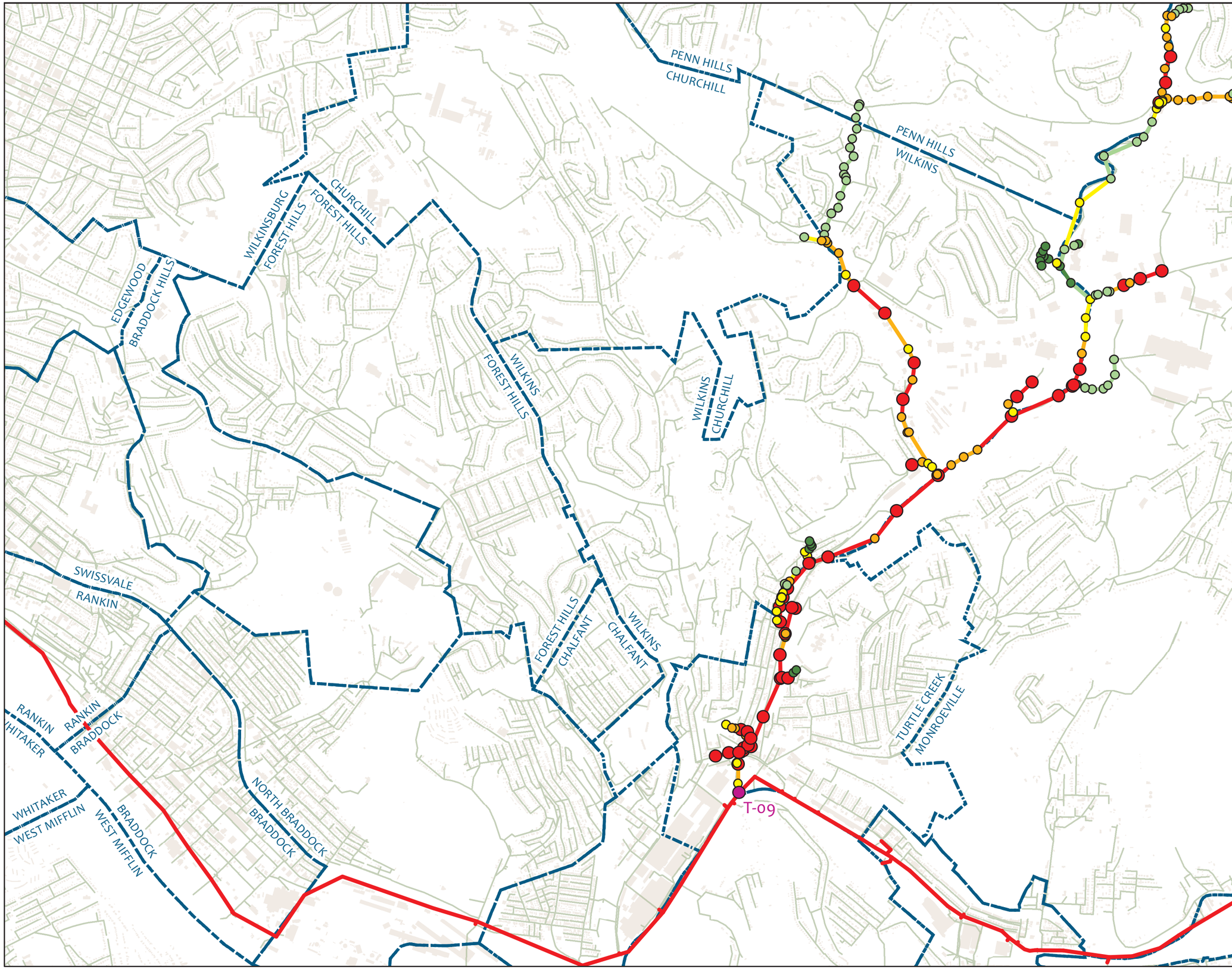
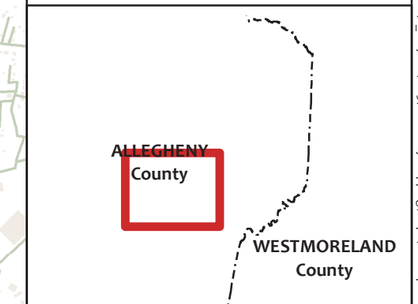
Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 5-3 10-Year Summer Storm Conditions Surcharge Map





Legend

- ALCOSAN POC
- ALCOSAN Interceptors
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:22,800

1 inch = 1,900 feet

0 950 1,900 3,800 Feet

Author: Peter Smith

Date: 7/25/2013

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TR-04 Home Depot Sewershed

Under 2-Year Summer Design Storm conditions, the Home Depot trunk sewer is modeled with a significant surcharge at LBs_1204382. Therefore, the model indicates that this sewer is slightly capacity deficient under these conditions.

Under 10-Year Summer Design Storm conditions, the Home Depot trunk sewer is modeled with significant surcharge and bypassing upstream of LBs_1204382. Therefore, the model indicates that this sewer is severely capacity deficient under these conditions. However, it is noted that overflowing manholes in the existing sewer system have not been reported in this sewershed.

TR-04 Rodi Road Sewershed

Under 2-Year Summer Design Storm conditions, the Rodi Road trunk sewer is shown to be severely capacity deficient along most of its length. The elevation of the modeled HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm. However, no overflows have been reported along this sewer line.

Under 10-Year Summer Design Storm conditions, the Rodi Road trunk sewer is shown to be capacity deficient along most of its length. The elevation of the modeled HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm. However, no overflows have been reported along this sewer line.

TR-03-08 Churchill Road Sewershed

Under 2-Year Summer Design Storm conditions, the Churchill Road trunk sewer is modeled with no surcharge. Therefore, the model indicates that it is not capacity deficient under these conditions.

Under 10-Year Summer Design Storm conditions, the Churchill Road trunk sewer is modeled with no surcharge. Therefore, the model indicates that it is not capacity deficient under these conditions.

TR-03 Semmens Street Sewershed

Under 2-Year Summer Design Storm conditions, the Semmens Street trunk sewer is not shown to be capacity deficient. There is some surcharging near POC TR-03. However, this surcharging is caused by excess combined system flows which leave the system at the combined sewer overflow TR-03.

Under 10-Year Summer Design Storm conditions, the Semmens Street trunk sewer is not shown to be capacity deficient. There is some surcharging near POC TR-03. However, this surcharging is caused by excess combined system flows which leave the system at the combined sewer overflow TR-03.

TR-02-04 Larimer Avenue Sewershed

Under 2-Year Summer Design Storm conditions, the Larimer Avenue trunk sewer is shown to be capacity deficient along approximately 1,000 LF if its length. In the existing conditions model, the surcharge is controlled by the active CSO TR-03A.

Under 10-Year Summer Design Storm conditions, the Larimer Avenue trunk sewer is shown to be capacity deficient along approximately 1,000 LF if its length. In the existing conditions model, the surcharge is controlled by the active CSO TR-03A.

TR-02-02 McMasters Avenue Sewershed

This sewershed was not modeled. Design storm specific information is not available. However, there are no reported capacity deficiencies or overflows in the Wilkins portion of this sewershed.

TR-01-06 Clugston Avenue Sewershed

The SWMM model extents for this sewershed only included Turtle Creek. Design storm specific information is not available for the Wilkins portion of this sewershed. However, there are no reported capacity deficiencies or overflows in the Wilkins portion of this sewershed.

T-07 Brown Avenue

The SWMM model extents for this sewershed only included Turtle Creek. Design storm specific information is not available for the Wilkins portion of this sewershed. While flow monitoring data indicates surcharge which would indicate capacity deficiencies, there are no reported overflows in the Wilkins portion of this sewershed.

5.4.1 Existing Basement Flooding Areas–History and Locations

There are no reported areas of basement flooding within Wilkins Township sewersheds.

5.4.2 Capacity Requirements for Various Design Storms and Levels of Protection

Table 5-9 provides a summary of sewersheds with and without capacity deficiencies. A value of 'yes' indicates that the sewershed was modeled to be capacity deficient for the given design storm. A value of 'no' indicates that it was not modeled to be capacity deficient.

TABLE 5-11: SEWERSHED CAPACITY DEFICIENCIES FOR 2-YEAR, 10-YEAR, AND TYPICAL YEAR DESIGN STORMS

Sewershed	2 Year Capacity Deficiency	10 Year Capacity Deficiency	Typical Year Capacity Deficiency
TR-05	YES	YES	YES
TR-04-14	NO	NO	NO
TR-04	YES	YES	YES
TR-03-08	NO	NO	NO
TR-03 (1)	NO	NO	NO
TR-02-04 (1)	YES	YES	YES
TR-02-02	Unknown (2)	Unknown (2)	Unknown (2)
TR-01-06	NO (3)	NO (3)	NO (3)
T-07	YES (4)	YES (4)	YES (4)

(1) Capacity deficiency indications for TR-03 and TR-02-04 are obtained from modeling based on estimates of post storm sewer separation project conditions. Post project flow monitoring, field observations, and modeling will be required for confirmation.

(2) This sewershed was not modeled. Confirmation through field investigation and flow monitoring is required.

(3) The Wilkins portion of this sewershed was not modeled. However, it is not observed to be capacity deficient. For information pertaining to capacity deficiency in the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Study Report.

(4) The Wilkins portion of this sewershed was not modeled. However, available flow data indicates significant surcharge which indicates capacity deficiency. For information pertaining to capacity deficiency in the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Study Report.

5.5 Overflow Frequency and Volume

Pertinent data for modeled SSOs in Wilkins Township is reported in Table 5-10.

TABLE 5-10: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR WILKINS TOWNSHIP SEWERSHEDS

SSO Outfall	Owner	2-yr Design Storm		10-yr Design Storm	
		Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
TR-05-00	Wilkins	0.67	0.04	1.15	0.08
TR-04-00	Wilkins	1.26	0.25	1.30	0.33

Pertinent data for modeled CSOs in Wilkins Township is reported in Table 5-11.

TABLE 5-11: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR WILKINS TOWNSHIP SEWERSHEDS

				Peak Rate (mgd)		
CSO Outfall	Owner – Sewershed	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
TR-03-OF	Wilkins – TR-03	4	0.05	1.8	0.26	0
TR-03-OF1	Wilkins – TR-03	0	0	0	0	0
TR-03A-OF	Wilkins – TR-02-04	5	0.31	3.1	0.95	0
TR-01-06 (1)	Turtle Creek					
T-07 (2)	Turtle Creek	31	5.7	14.2	2.9	1.1

(1) The original H&H model did not include an overflow structure at this location. However, the 3RWW Web Map indicates that an overflow is present. For more information, reference is made to the Turtle Creek Feasibility Study.

(2) Value for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report.

Table 5-12 provides a summary of Wilkins Township manholes that were modeled with overflows for the 2-Year Design Storm.

TABLE 5-12: BASELINE CONDITION 2-YEAR SUMMER DESIGN STORM OVERFLOWING MANHOLE SUMMARY FOR WILKINS SEWERSHEDS

2-Year Summer Design Storm				
Sewershed	**Node**	**Maximum Rate (mgd)**	**Volume (MG)**	**Comment**
N/A (1)	N/A	N/A	N/A	N/A
		Total Number of Nodes	**Peak Maximum Rate (mgd)**	**Total Volume (MG)**
		0	0	0

Table 5-13 provides a summary of Wilkins Township manholes that were modeled with overflows for the 2-Year Design Storm.

TABLE 5-13: BASELINE CONDITION 10-YEAR SUMMER DESIGN STORM OVERFLOWING MANHOLE SUMMARY FOR WILKINS SEWERSHEDS

10-Year Summer Design Storm				
Sewershed	**Node**	**Maximum Rate (mgd)**	**Volume (MG)**	**Comment)**
N/A (1)	N/A	N/A	N/A	N/A
		Total Number of Nodes	**Peak Maximum Rate (mgd)**	**Total Volume (MG)**
		0	0	0

6.0 CSO/SSO CONTROL GOALS

Water quality issues are the driving force behind the ALCOSAN CD and municipal COA and ACO requirements. These requirements stem from the existing water quality criteria in the local streams that are not being met, some as a result of combined and separate overflows. CSO and SSO control goals were developed by ALCOSAN and each municipality so that water quality criteria will be met after implementation of the regional wet weather plan that includes municipal alternatives.

The detailed methodology used to develop the CSO and SSO control goals is described in the FSWG Document 031 "Water Quality based Approach to Feasibility Study Development." The CSO and SSO control goals that were selected are provided in the following section.

6.1 Background for Selection of Control Level

6.1.1 CSO Control Level

Storm sewer separation projects are planned for the TR-02-04 and TR-03 combined system sewersheds. Therefore, the intended level of CSO control for these sewersheds is 0 overflow events per year.

Wilkins combined flows to TR-02-02 and TR-01-06 are tributary to the Turtle Creek combined system. Turtle Creek CSOs are located in Turtle Creek near their respective point of connection with the Thompson Run Interceptor. The preferred alternative for the Thompson Run Interceptor involves Conveyance Replacement to convey 10-Year Summer Design Storm flows to ALCOSAN POC T-09. Therefore, the intended level of CSO control for Wilkins sewersheds is 0 overflow events per year. Reference is made to the T-09 Thompson Run Interceptor Complex Sewershed Feasibility Report.

6.1.2 SSO Control Level

Separate sanitary sewers are typically designed to accept only sanitary sewage from residential, commercial and industrial areas of any given municipality. As a result of aging or improperly constructed and maintained infrastructure, these sewers are subjected to high flows during wet weather events. These flows result in SSOs, and/or basement flooding. By definition, SSOs are illegal and need to be controlled.

During the preliminary discussions in the FSWG meeting on March 26, 2009, the PADEP introduced a concept to be used for establishing separate sanitary transport and SSO control criteria.

SSO Control and Separate Sanitary Sewer Transport Capacity Criteria

- Develop a "knee-of-the-curve" analysis utilizing the 1-yr, 2-yr, 5-yr and 10-yr, 24-hour storms at a minimum to determine the break-even- point for SSO control. The design rainfall depths for the design storms should match rainfall depths used or proposed by ALCOSAN. This evaluation will be performed under the auspices of the FSWG and the approach and results will be summarized in a different (later) document.

- The design storm approach acknowledges that a 2-year summer rainfall that occurs when there is snow on the ground would result in runoff that exceeds the intended 2-year summer storm design. Given this possibility, the FSWG developed a methodology that includes the selection of a design month. This design month, in addition to the selected design storm return frequency would represent the overall intended design conditions.

- Additional discussion was developed around the idea of matching/using the selected design storm used by ALCOSAN for its separate sanitary sewer interceptors.

The two Wilkins SSO sewersheds, TR-05 and TR-04, are both tributary to the Thompson Run Interceptor. Both SSOs are located near the point of connection to the interceptor. For TR-05 the preferred alternative for the Thompson Run Interceptor involves Conveyance Replacement to convey 10-Year Summer Design Storm flows to ALCOSAN POC T-09. Therefore, the intended level of SSO control this sewersheds is 0 overflow events per year. For TR-04, the preferred alternative involves the routing of Wilkins flows from the Rodi Road trunk sewer into Penn Hills facilities. This is intended to eliminate SSOs in this sewershed. Reference is made to the T-09 Thompson Run Interceptor Complex Sewershed Feasibility Report.

6.2 Recommendations for Control Levels

Wilkins Township is served by separate and combined sanitary sewers. While Wilkins is a COA community, there are still SSOs that are required to be controlled. Therefore, the recommendation for SSO control level is to provide for the most conservative level of control that is economically reasonable to attain.

6.3 Water Quality Standards

Table 6-1 lists applicable water quality standards for waterways within Wilkins Township. Stream designations are from Chapter 93 Water Quality Standards.

TABLE 6-1: APPLICABLE WATER QUALITY STANDARDS FOR WILKINS TOWNSHIP

Receiving Stream	Stream Designation (1)	TMDL (Y/N) (If No, is a TMDL proposed)	TMDL Parameter	Is TMDL CSO Related (Y/N)	In Attainment with TMDL (Y/N)
Thompson Run	WWF	Y	Aluminum Iron	N	N

(1) WWF = Warm Water Fishery

7.0 ALTERNATIVE EVALUATION (INTERNAL MUNICIPAL)

Project alternatives are recommended only for sewersheds TR-05 and TR-04. As these sewer are multi-municipal, they will be discussed in Section 8.

8.0 MULTI-MUNICIPAL SEWERSHED RECOMMENDED ALTERNATIVES

This section is intended to be a summary of a more detailed analysis of the recommended alternatives in sewersheds TR-05 and TR-04. Table 8-1 provides a summary of alternative evaluated for each Wilkins Sewershed. For more information, reference is made to the individual sewershed reports located in the appendix of this report.

TABLE 8-1: LISTING AND DESCRIPTION OF ALTERNATIVES EVALUATED BY PROJECT AREA

Project Area Location Description	Flow Type	Alternatives Evaluated
TR-05 Near POC	Sanitary	Conveyance Replacement Conveyance Parallel
TR-04-14	Sanitary	No alternatives necessary
TR-04 Trunk Sewer	Sanitary	Conveyance Replacement Conveyance Parallel Route Flows to Penn Hills Trunk Sewer
TR-03-08	Sanitary	No alternatives necessary
TR-03 (1)	Combined	No alternatives necessary
TR-02-04 (1)	Combined	No alternatives necessary
TR-02-02 (2)	Combined	No alternatives necessary
TR-01-06 (3)	Combined	No alternatives necessary (3)
T-07	Separate and Combined	No alternatives necessary (4)

(1) TR-03 and TR-02-04 are currently combined sewer systems. Storm sewer separation projects are planned to be completed for both sewersheds by 2015. No additional projects are anticipated to be required. Post-project flow monitoring and field observation will be required for verification of this assumption.

(2) This sewershed was not monitored. Verification of this recommendation through field observation and flow monitoring is required.

(3) No alternatives are required for the Wilkins portion of this sewershed. For information pertaining to the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Report.

(4) No alternatives are required for the Wilkins portion of this sewershed. For information pertaining to the Churchill and Turtle Creek portion of this sewershed reference is made to the Feasibility Reports for these communities.

Table 8-2 provides a listing and description of project alternatives considered for the TR-05 Delaney Drive Sewershed.

TABLE 8-2: ALTERNATIVES EVALUATED FOR TR-05 DELANEY DRIVE SEWERSHED

Alternative Name	System Type	Control Level	Description	ACT Total Present Worth Cost
Manhole Replacement	SSO	2-year, 24-hour summer design storm	N/A	N/A
Pipe Replacement POC TR-05-02 to regulator structure TR-05-00	SSO	2-year, 24-hour summer design storm	100 LF @ 12-inch	$53,000
		10-year, 24-hour summer design storm	100 LF @ 12-inch	$53,000
Parallel Pipe POC TR-05-02 to regulator structure TR-05-00	SSO	2-year, 24-hour summer design storm	120 LF @ 12-inch	$59,000
		10-year, 24-hour summer design storm	120 LF @ 12-inch	$59,000
Storage	SSO	2-year, 24-hour summer design storm	N/A	N/A
		10-year, 24-hour summer design storm	N/A	N/A

Table 8-3 provides a listing and description of alternatives considered for the TR-04 Rodi Road Sewershed.

TABLE 8-3: ALTERNATIVES EVALUATED FOR TR-04 RODI ROAD SEWERSHED

Alternative Name	System Type	Control Level	Description	ACT Total Present Worth Cost (1)
Manhole Replacement	SSO	2-year, 24-hour summer design storm	N/A	N/A
Pipe Replacement TR-04 to LBs_1234675 Churchill MB Includes 320 LF Boring	SSO	2-year, 24-hour summer design storm	1,860 LF @ 15-inch 3,750 LF @ 12-inch Boring - 320 LF @ 24-inch	$6,941,000
		10-year, 24-hour summer design storm	1,540 LF @ 18-inch 2,920 LF @ 15-inch 830 LF @ 12-inch Boring - 320 LF @ 24-inch	$7,036,000
Crossover Connections to Penn Hills Trunk Sewer (1)	SSO	2-year, 24-hour summer design storm	400 LF @ 12-inch	$1,728,100
		10-year, 24-hour summer design storm	500 LF @ 15-inch	$1,827,100
Storage	SSO	2-year, 24-hour summer design storm	0.25 MG Storage 780 LF @ 12-inch Boring - 320 LF @ 24-inch	$6,574,000
		10-year, 24-hour summer design storm	0.3 MG Storage 2,340 LF @ 12-inch Boring - 320 LF @ 24-inch	$7,781,000

(1) Total cost to Churchill and Wilkins

(2) Includes tap-in fees assessed by Penn Hills

8.1 Evaluation Criteria Development

As there are a limited number of feasible alternatives for the required work in Wilkins sewersheds, a weighted criteria approach was determined to be unnecessary. The primary gauge of effectiveness for SSO sewersheds is compliance with the COA where SSOs are controlled to specified design storm conditions. The second criterion is cost. Finally, consideration is given

to non-economic factors such as future operations and maintenance burden on the municipality and extent of disruption to the community that the project may cause during its lifespan.

8.2 Cost Estimates

Cost estimates were prepared using the ALCOSAN Alternative Costing Tool (ACT). The municipality independently developed total present worth cost estimates including operation and maintenance costs for 20 years. While the ACT tended to produce slightly higher costs, the results from the two costing methodologies were within 15%. Therefore, cost estimates from the ACT tool were used. Summaries of present worth cost estimates for TR-05 and TR-04 are provided below.

Present worth cost estimates for the TR-05 sewershed are provided in Tables 8-4. The level of SSO control is also indicated.

TABLE 8-4: TR-05 SEWERSHED SUMMARY OF UNTREATED OVERFLOW VOLUME AND PRESENT WORTH COSTS FOR RECOMMENDED ALTERNATIVE – ALL CONTROL LEVELS

Alternative Name	CSO Control					
	Untreated CSO Volume (MG)	CSO Control Level	PW Capital Cost (1) ($ million)	PW O&M Cost ($ million)	PW R&R Cost ($ million)	TPW CSO Control ($ million)
N/A	N/A	10	N/A	N/A	N/A	N/A
N/A	N/A	4	N/A	N/A	N/A	N/A
N/A	N/A	0	N/A	N/A	N/A	N/A
Alternative Name	**SSO Control**					
	Untreated SSO Volume (MG)	**SSO Control Level**	**PW Capital Cost (1) ($ million)**	**PW O&M Cost ($ million)**	**PW R&R Cost ($ million)**	**TPW SSO Control ($ million)**
Pipe Replacement POC TR-05-02 to regulator structure TR-05-00	0	10-Year 24 Hour Design Storm	$0.050	$0.003	$0	$0.053
TPW CSO andSSO Control ($ million)						$0.053

(1) Total Project Costs (Construction + Contingency + Soft Costs)

Present worth cost estimates for the TR-04 Rodi Road Sewershed are provided in Tables 8-5. The level of CSO and SSO control is also indicated.

TABLE 8-5: TR-04 SEWERSHED - SUMMARY OF UNTREATED OVERFLOW VOLUME AND PRESENT WORTH COSTS FOR COST-EFFECTIVE ALTERNATIVE – ALL CONTROL LEVELS

Alternative Name	CSO Control					
	Untreated CSO Volume (MG)	CSO Control Level	PW Capital Cost (1) ($ million)	PW O&M Cost ($ million)	PW R&R Cost ($ million)	TPW CSO Control ($ million)
N/A	N/A	10	N/A	N/A	N/A	N/A
N/A	N/A	4	N/A	N/A	N/A	N/A
N/A	N/A	0	N/A	N/A	N/A	N/A
Alternative Name	**SSO Control**					
	Untreated SSO Volume (MG)	**SSO Control Level**	**PW Capital Cost (1) ($ million)**	**PW O&M Cost ($ million)**	**PW R&R Cost ($ million)**	**TPW SSO Control ($ million)**
Crossover Connections to Penn Hills Trunk Sewer	0	10-Year 24 Hour Design Storm	$0.457	$0.012	$0	$0.468
TPW Cost To Wilkins + Churchill: (2)						$0.457
Wilkins Tap In Fee Requested by Penn Hills:						$0.75
Churchill Tap In Fee Requested by Penn Hills:						$0.62
TPW CSO and SSO Control ($ million)						$1.838

(1) Total Project Costs (Construction + Contingency + Soft Costs)

(2) Cost distributions based on allocation of one crossover connection to Churchill and four to Wilkins.

8.2 Alternative Selection Process

Details of the alternative selection process for each sewershed area are provided in the individual sewershed reports located in the appendices of this report. A summary is provided below:

TR-05 Delaney Drive Sewershed

The Delaney Drive Sewershed has one active SSO which is illegal per the COA and must be eliminated from the system by 2026. To achieve compliance with the COA, two general categories of control alternative are available: Storage and Conveyance.

The alternatives that were developed for evaluation in the TR-05 Delaney Drive Sewershed are described below.

Manhole Replacement

This alternative would include the replacement of manholes where they are deteriorated, leaking through sides or covers, or have inefficient hydraulic flow channels. This alternative is not feasible for the Delaney Drive Sewershed because it will not achieve compliance with the COA.

Conveyance - Pipe Replacement – POC to Upstream SSO 2388A

This alternative includes the replacement and upsizing of 100 LF of pipe from POC TR-05-02 to the existing overflow structure TR-05-00.

Conveyance - Parallel Pipe – POC to Upstream SSO 2388A

This alternative includes the installation of 100 LF of parallel pipe from POC TR-05-02 to the existing overflow structure TR-05-00. Note that an additional 20 LF of pipe is assumed for the parallel cross connections.

Storage and Replacement

Storage alternatives were not evaluated for this sewershed due to the close proximity of the existing overflow location and its point of connection to the Thompson Run Interceptor.

TR-04 Rodi Road Sewershed

Manhole Replacement

This alternative would include the replacement of manholes where they are deteriorated, leaking through sides or covers, or have inefficient hydraulic flow channels. This alternative is not feasible for the Rodi Road sewershed because it will not achieve compliance with the COA.

Conveyance - Pipe Replacement – POC to Churchill/Wilkins Municipal Boundary

This alternative includes the replacement and upsizing of 5,610 LF of pipe from POC TR-04-02 to manhole LBs_1234675 at the Churchill/Wilkins municipal boundary. The downstream portion requires a 320 LF boring below a 30 LF deep tract of land which is owned by the railroad where an active rail line is still present. Per the ACT, this boring is estimated to cost $586,000.

Conveyance – Parallel Pipe

This alternative was not evaluated as there are two existing trunk sewers from Churchill/Wilkins and Penn Hills, which leaves limited space along Rodi Road for an additional sewer line.

Conveyance – Cross Connection – Rodi Road Cross Connections to Penn Hills Trunk Sewer

This alternative includes the installation of multiple cross connections to divert all flows from the shared Wilkins/Churchill Trunk Sewer into to the Penn Hills Trunk Sewer. This would result in the complete removal of Wilkins and Churchill flows tributary to TR-04, and would free up an equal amount of capacity along the Thompson Run Interceptor. Based on the existing H&H model, the 2-Year Design Storm condition required 4 relief connections. The 10-Year required 5 connections. Each relief connection was assumed to be 100 LF for conservative purposes. This alternative also includes tap-in fees as requested by Penn Hills.

Storage and Replacement

Storage alternatives included a 0.25 MG tank and 0.3 MG tank for the 2 and 10 Year Design Storm conditions. The location of the tank is at MH LBs_1203600, which is along Rodi Road approximately 1,000 LF downstream of the William Penn highway overpass. For 2-Year Storm conditions, the tank was sufficient to eliminate surcharging along the central portion of the trunk sewer. However, downstream surcharge caused by additional flows resulted in overflowing at SSO TR-04. This required an additional 780 LF of conveyance. Additionally, the 320 LF bore was still required. The 10-Year storm required an additional 1,200 LF of upstream conveyance to convey flows from the Churchill municipal boundary to the site of the storage tank.

8.3 Alternative Evaluation Results

TR-05 Delaney Drive Sewershed

The Conveyance – Replacement Alternative for the 10-Year Summer Design Storm is selected as the preferred alternative for the Delaney Drive Sewershed tributary to Thompson Run Interceptor POC TR-05.

TR-04 Rodi Road Sewershed

The Conveyance – Crossover Alternative for the 10-Year Summer Design Storm is selected as the preferred alternative for the Rodi Road Sewershed tributary to Thompson Run Interceptor POC TR-04, based on total cost alone. New inter-municipal agreements would be required to implement this alternative.

8.4 Recommended Alternative Description

TR-05 Delaney Drive Sewershed

The preferred cost-effective alternative consists of 100 LF of 12-inch conveyance replacement pipe from POC TR-05 to regulator structure TR-05-00.

TR-04 Rodi Road Sewershed

The recommended alternative consists of a conservative allowance of five crossover connections each assumed to be 100 LF long and 15-inch in diameter from the Churchill/Wilkins municipal boundary downstream to TR-04. The actual number of required crossover connections will be determined at the time of final design.

8.5 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.

2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.

3. System Cleaning as necessary.

4. System Maintenance as necessary.

8.6 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in any of the Wilkins Sewersheds.

9.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

9.1 MOU and Inter-Municipal Agreements

Copies of the following Inter-Municipal Agreements are provided in the appendix of this report.

1. Wilkins / Monroeville / Churchill / Turtle Creek / ALCOSAN
2. Wilkins / Churchill / Westinghouse Electric Company
3. Wilkins / Penn Hills

It is noted the communities retain their rights to renegotiate any of these agreements at any time.

9.2 Funding Alternatives

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

Bonded Indebtedness

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

A municipality may also issue special assessment bonds when certain properties are recipients of special benefits not available to all properties within the municipality. This method of financing is intended to apportion the project cost among the benefited property owners. Special assessment bonds are not backed by the municipality, so they are considered a greater risk and

carry a higher interest rate than general obligation bonds. Special assessment bonds are predominantly used to finance local area sewers.

Revenue bonds are payable from fees and charges assessed for services provided by the organization that sold the bonds. No further backing is required other than the obligation that the borrower will operate the utility and collect revenues to buy back the bonds. Revenue bonds are most commonly used to finance capital costs for wastewater projects. Revenue bonds are also the predominant method used by municipal authorities to raise funds. Unlike general obligation bonds, which are limited by statutes regarding total indebtedness of the municipality, revenue bonds are not considered debts against the community and do not affect a municipality's ability to borrow money for other purposes.

Long-Term Bank Financing

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

Available Funding Sources

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

H20 PA Program

The H2O PA Act was established by the Pennsylvania General Assembly in July 2008. The Act provides grants to municipalities or municipal authorities to assist with the construction of drinking water, sanitary sewer, and storm sewer projects. The program is administered by the Pennsylvania Department of Community and Economic Development. The applicant must provide matching funds of not less than 50 percent of the amount awarded under the H2O PA Program. Details of the program are summarized below:

- Grants are available for projects with a total cost of $500,000 or more.
- Grants shall not exceed a total of $20 million for any project.
- Multi-year grants may not be given for a period of more than six years and shall not exceed a total of $20 million for any project.
- A minimum of 50 percent of the grants shall be awarded to projects that will consolidate two or more systems into regional systems.
- Match requirements for grants may be acquired through any local, state, or federal program.
- Except for those projects described in the Pennsylvania Gaming Economic Development and Tourism Fund, no funding will be authorized or distributed for any project within a city or county of the first or second class. This requirement will remain in effect until an amount equal to $750 million has been authorized and distributed from the H2O PA Program for projects outside cities or counties of the first or second class.

PENNVEST (Act 16-1988)

Act 16 of 1988 established the Pennsylvania Infrastructure Investment Authority (PENNVEST) to assist local governments in financing sewer and water projects. The PENNVEST program

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

Funding under the PENNVEST program is primarily in the form of low-interest, twenty-year loans. The PENNVEST Board has the power to set loan terms and may provide deferment of principal payments for up to five years. The minimum interest rate on any loan is 1.0 percent, and the maximum rate varies depending on the unemployment rate in the county or municipality being served by the project. The current interest rate set by PENNVEST for Allegheny County is 1.666 percent for the first five years and 2.140 percent for the remaining fifteen years of the loan. The PENNVEST Board may provide grant funds if it determines that the recipient is unable to proceed without a grant or will be unable to repay the loan. Currently, the amount of funds available for grants is limited to the amount of interest earnings on PENNVEST loans or additional amounts specifically designated for this purpose.

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

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

- Does the project improve the health, safety, welfare, or economic well being of the people?
- Will the project provide a cost-efficient and effective or complete solution to the problem?

- Is the project consistent with state and regional plans?
- Has the applicant demonstrated the ability to operate and/or maintain the project?
- Does the project encourage consolidation of existing systems?
- What is the availability of other project funding mechanisms to the applicant?

Community Development Block Grant (CDBG)

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

Infrastructure Development Program (IDP)

This state funded program has been established to make grants and loans to eligible applicants for specific infrastructure improvements necessary to complement eligible capital investment by private companies and private developers. To be eligible, all infrastructure improvement projects must be necessary for the operation of an eligible private company or companies at a specific site. The company site and the site of the related infrastructure improvement do not have to be the same, as the improvement could be made at a central sewage treatment site.

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

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

The USDA Rural Development Water and Environmental Program (WEP) provide loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies, non-profit organizations and recognized Indian tribes may qualify for assistance. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems.

9.3 User Cost Analysis

The user cost analysis provides a direct comparison between the current annual cost per household and the cost per household after implementation of the recommended alternative or alternatives. Current costs include annual operations and maintenance expenses, and annual debt service principal and interest.

Table 9-1 presents the total cost of all recommended alternatives for Wilkins Township.

TABLE 9-1: ALTERATIVE TOTAL PRESENT WORTH COSTS FOR WILKINS TOWNSHIP

Sewershed	Alternative	Total Cost of TR-04 Recommended Alternative	Comments
TR-05	Conveyance Replacement	$53,000	(1)
TR-04	Conveyance Crossover	$1,112,000	(2)
T-09 Thompson Run Interceptor	Conveyance Replacement	$3,911,407	(3)
TR-02-04 and TR-03	Sewer Separation	$1,570,000	(4)
	Total TWP	$6,646,407	

The affordability analysis was performed using the US EPA Long Term Control Plan EZ (LTCP-EZ) Template which is a planning tool for small communities to develop long term control plans for the elimination or control of CSOs. While the form is designed for CSO systems, it can be applied to sanitary systems for purposes of determining project affordability.

Table 9-2 presents estimated annual costs per household after implementation of the recommended alternative.

TABLE 9-2: ESTIMATED ANNUAL COST PER HOUSEHOLD AFTER IMPLEMENTATION OF RECOMMENDED ALTERNATIVE

Municipality	Current Annual Cost Per Household	Cost Per Household After Recommended Alternative Implementation	Percent Increase	Comments
Churchill (1)	$470	$1,273	70.8%	
Penn Hills	(2)	(2)	(2)	(2)
Turtle Creek	(2)	(2)	(2)	(2)
Wilkins	$403	$655	39.4%	

(1) Values provided by Gateway Engineers. Reference is made to Feasibility Study Reports for Churchill.

(2) Reference is made to Feasibility Study Reports for Penn Hills, and Turtle Creek.

9.4 Affordability

Table 9-3 presents a summary of Schedule 6 affordability factors by community.

TABLE 9-3: SUMMARY OF SCHEDULE 6 CSO AFFORDABILITY FACTORS

Municipality	FORM LTCP-EZ Line Number / Benchmark / Indicator (1)								
	22 Residential	25 Bond Rating	31 Net Debt	35 Unemployment Rate	40 Median Household Income	44 Property Tax	47 Collection Rate	50 Permittee Financial Capability	52 Financial Capability Burden
Churchill	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Penn Hills	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Turtle Creek	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Wilkins	Mid-Range	Weak	Mid-Range	Mid-Range	Mid-Range	Strong	Weak	Mid-Range	Medium

(1) Values determined with FORM LTCP-EZ.

(2) Reference is made to Feasibility Study Reports for Churchill, Penn Hills, and Turtle Creek.

10.0 INTEGRATION OF SELECTED ALTERNATIVES

The paragraphs below discuss the effect of the recommended alternatives in each sewershed area on the overall ALCOSAN Recommended Regional Wet Weather Plan. Figure 10-1 provides a map showing the relationship of the Wilkins sewersheds to ALCOSAN Structures M-29, which represents the extent of the 2026 Recommend Plan in the Shallow Cut Monongahela Basin.

All Wilkins sewersheds with recommended projects are tributary to the Thompson Run Interceptor at POCs TR-05, TR-04, TR-03, and TR-02-04. The interceptor is tributary to ALCOSAN POC T-09. It is capacity deficient along its approximately 22,000 LF length, and will require an estimated $8M to $20M of capital improvements to convey flows to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh, approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the points of connection along the Thompson Run Interceptor and M-29, any work done in the Wilkins sewersheds is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

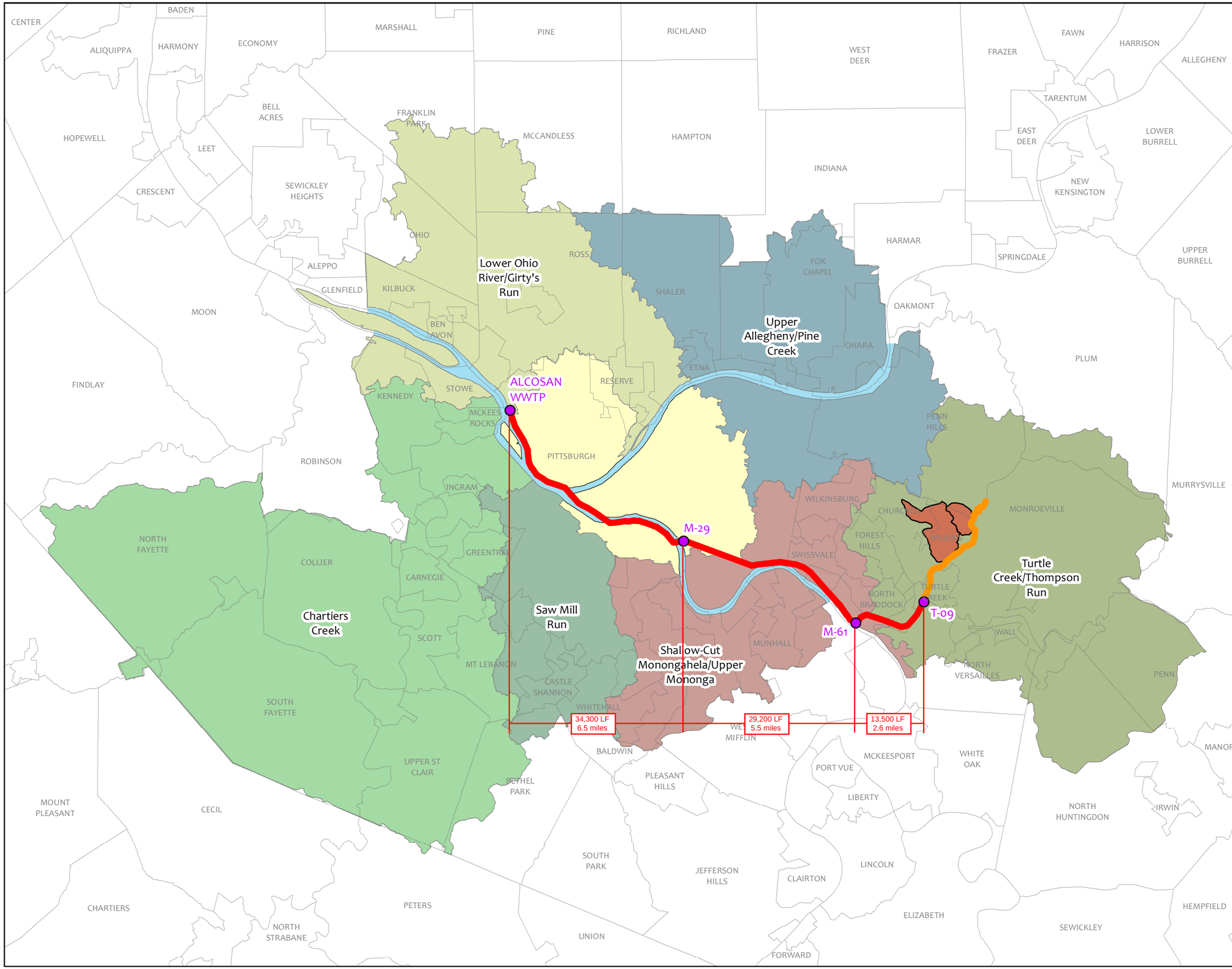
The TR-04 Rodi Road conveyance crossover alternative routes flows out of the Thompson Run Interceptor and into the Penn Hills system. The Penn Hills system has a dedicated interceptor which runs parallel to the Thompson Run Interceptor where the Thompson Run Interceptor ties into the ALCOSAN interceptor system at T-09. The Penn Hills interceptor ties in approximately 3,000 LF downstream at T-04. However, T-04 is still approximately 10,500 LF upstream of M-61 which is 5.5 miles away from the upstream extent of the capacity improvements associated with ALCOSAN’s Recommended Plan. While this re-re-routing of flows will eliminate SSOs at TR-04, the increased flow into the ALCOSAN system at T-04 will likely result in increased CSO overflows into Turtle Creek from structures downstream of TR-04. Therefore, this project is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

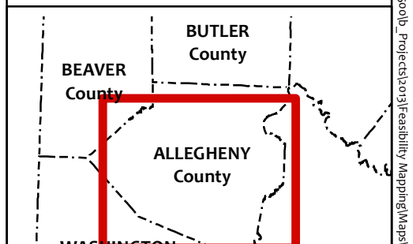
The sewer separation projects in the TR-03 and TR-02-04 sewersheds will result in the removal of a significant volume of CSO discharges into Thompson Run. However, as the flows into the Thompson Run Interceptor at TR-03 and TR-02-04 are already restricted to dry weather flows, it is not anticipated that there will not be a noticeable reduction on total flows to the interceptor. As mentioned above, T-09 is approximately 13,500 LF upstream of M-61 which is 5.5 miles away from the upstream extent capacity improvements associated with ALCOSAN's Recommended Plan. Therefore, these sewer separation projects are unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

Municipal Feasibility Study Report

Wilkins Municipal Report

Figure 10-1 Location of Recommended Municipal Projects and ALCOSAN Recommended 2026 Plan Facilities





- ALCOSAN Structures
- Thompson Run Interceptor
- ALCOSAN Interceptor conveyence
- Sewersheds
- Municipal Boundaries

Planning Basins

- Rivers
- Chartiers Creek
- City of Pittsburgh
- Lower Ohio River/Girty's Run
- Saw Mill Run
- Upper Monongahela
- Turtle Creek/Thompson Run
- Upper Allegheny/Pine Creek

N

1:156,000

1 inch = 13,000 feet

0 6,500 13,000 26,000 Feet

Author: Peter Smith

Date: 7/15/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Wilkins_Township_650013_Projects\2013\Feasibility Mapping\Maps\MunicipalMaps\WK_Fig_10-1.mxd

11.0 IMPLEMENTATION

11.1 Implementation Schedule

The paragraphs below discuss the implementation of the various project alternatives in each sewershed as they relate to the implementation schedule of ALCOSAN's Recommended Plan.

TR-05 Delaney Drive Sewershed – Conveyance Replacement

The construction of this alternative will convey SSO flows approximately 100 LF from the TR-05 SSO structure to the Thompson Run Interceptor. As the Thompson Run Interceptor is currently capacity deficient during storm events, the construction of this project would only serve to relocate the SSO from its present location to the interceptor. Additionally, the construction of a new SSO structure along the interceptor could result in increased SSO discharges to Thompson Run. Therefore, the TR-05 conveyance replacement alternative would be required to be constructed after sufficient capacity has been established in the Thompson Run Interceptor.

TR-04 Rodi Road Sewershed – Conveyance - Crossover

The construction of this alternative would eliminate SSOs at TR-04 and remove a substantial amount of flow from the Thompson Run Interceptor. Therefore, if the inter-municipal agreements needed to implement this alternative can be executed, it is recommended that this project be completed prior to any work being initiated in the Thompson Run Interceptor. If the conveyance alternative consisting of replacing the existing Rodi Road Trunk Sewer with larger pipe must be implemented, its construction would have to occur after sufficient capacity has been established in the Thompson Run Interceptor to convey all flows to ALCOSAN POC T-09.

TR-02-04 Larimer Avenue and TR-03 Semens Street Sewersheds – Sewer Separation

These sewer separation projects are scheduled to be completed in 2014 and 2015. The projects will result in the removal of a significant amount of CSO discharges into to Thompson Run. However, their effect on total flows to the Thompson Run Interceptor will not be as significant.

Since flows will be reduced, it is recommended that these projects be completed prior to any work being initiated in the Thompson Run Interceptor.

T-09 Thompson Run Interceptor – Conveyance Replacement

The ALCOSAN System downstream of T-09 is capacity deficient during wet weather flows. Therefore, any capacity increases implemented in the Thompson Run Interceptor will only result in increased CSO discharges into Turtle Creek downstream of ALCOSAN POC T-09. At this time, the position of the tributary municipalities is to defer any construction for capacity improvements in the Thompson Run Interceptor until the ALCOSAN system downstream of POC T-09 can provide sufficient capacity to accept the additional flows that will be transported by the recommended conveyance facilities.

Table 11-1 provides a summary of the planned implementation schedule for the various Sewersheds

TABLE 11-1: PREFERRED ALTERATIVE IMPLEMENTATION SCHEDULE BY SEWERSHED

Sewershed	2013	2014	2015	TBD (1)	TBD+1 Year	TBD+3 Years
T-09	Feasibility Assessment Submitted	Ongoing Flow Studies			Design	Construction Post – Construction Flow Monitoring
T-03 and T-02-04	Feasibility Assessment Submitted	Design	Construction			
T-04	Feasibility Assessment Submitted				Design	Construction Post – Construction Flow Monitoring
T-05	Feasibility Assessment Submitted				Design	Construction Post – Construction Flow Monitoring

(1) Date to be determined when ALCOSAN facilities downstream of T-09 have sufficient capacity to convey additional Thompson Run Interceptor flows.

11.2 Joint Municipal Planning and Implementation

The primary inter-municipal flow management strategy developed by Wilkins Township in coordination with neighboring municipalities is to provide sufficient capacity in the shared sewers that convey flows to ALCOSAN POC T-09 For T-09, it is expected that all tributary sewersheds will convey 10-Year Summer Design Storm peak flows to their connections to the Thompson Run Interceptor. To convey these flows to ALCOSAN POC T-09, the capacity of the Thompson Run Interceptor will be increased. In this case it was determined that storage facilities would not provide an optimal solution to existing capacity limitations.

The main component of the flow management plan for POC T-09 will be cost sharing arrangements between the municipalities that intend to share the proposed facilities. Preliminary cost breakdowns are presented in the T-09 Complex Sewershsed Feasibility Study Report. These preliminary cost sharing figures will have to be further discussed and formalized in binding legal agreements between the municipalities before the proposed capital improvements projects can be implemented.

Costs for improvements to shared facilities were proportionately allocated to the various municipalities on the basis of peak flow contributions. Municipal representatives that attended coordination meetings during preparation of the feasibility studies agreed with the cost estimates and proposed cost sharing arrangements presented in this report. However, as noted above, these items will have to be discussed further and be formally approved by the responsible Authority Board Members, Borough Councilpersons or Township Supervisors.

No specific conflicts or concerns arose during the coordinated municipal facilities planning process. Discussions took place regarding the proposed cost sharing arrangement and alternatives that would be least costly for individual municipalities. However, no issues that could deter implementation of a POC-shed based flow management proposal were identified.

No institutional or administrative obstacles that may impede implementation of the feasibility study were identified during the planning process.

11.3 Regulatory Compliance Reporting

The Post-Construction Compliance Monitoring Plan (PCCMP) will include flow monitors at the following locations described in Table 11-2.

TABLE 11-2: POST-CONSTRUCTION FLOW MONITORING LOCATIONS

Sewershed / POC	Monitor Location	Comment
TR-05	Upstream of POC	Total tributary flow to POC and verification of surcharge.
TR-04-14	N/A	No additional monitoring anticipated at this time.
TR-04	Upstream of POC Along Penn Hills trunk sewer	Total tributary flow to Penn Hills trunk sewer connection to Penn Hills Thompson Run Interceptor, and verification of surcharge.
TR-03-08	N/A	No additional monitoring anticipated at this time.
TR-03	Upstream of connection point to TR-02-04 trunk sewer	Total sewershed flows.
TR-02-04	Upstream of POC Along trunk sewer	Total tributary flow to POC and verification of trunk sewer surcharge.
TR-02-02	Upstream of POC	Total tributary flow to POC and verification of surcharge.
TR-01-06	N/A (1)	No additional monitoring anticipated at this time.
T-07	N/A (2)	No additional monitoring anticipated at this time.

(1) No additional flow monitoring is anticipated for the Wilkins portion of this sewershed. For information pertaining to the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibilty Report.

(2) Additional flow monitoring is anticipated for the Wilkins portion of this sewershed. For information pertaining to the Churchill and Turtle Creek portions of this sewershed reference is made to the Feasibilty Reports for each community.

The number of monitor locations and their locations are considered to be preliminary. Wilkins Township and tributary communities reserve the right to change the number and location of

monitors to suit system conditions at the time of installation. Additional monitors may be installed at Churchill and Turtle Creek municipal boundary connections. The information from these monitors may be used as a basis for renegotiation of current municipal agreements.

The duration of the PCCMP will continue for no more than a period of one wet weather season or until such time that the system operation has been reasonably demonstrated to be in compliance with COA mandates. All post-construction flow monitoring data and findings will be provided on request. For POC sewersheds, the post construction flow monitoring will also be used to update peak flow estimates. Additionally, the updated monitoring data may be used to update O&M cost distributions to the communities.

Appendix A
TR-05 Delaney Drive Sewershed

FEASIBILITY STUDY REPORT

For

TR-05 DELANEY DRIVE SEWERSHED

Prepared for:

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN Point of Connection (POC) T-09.

1.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

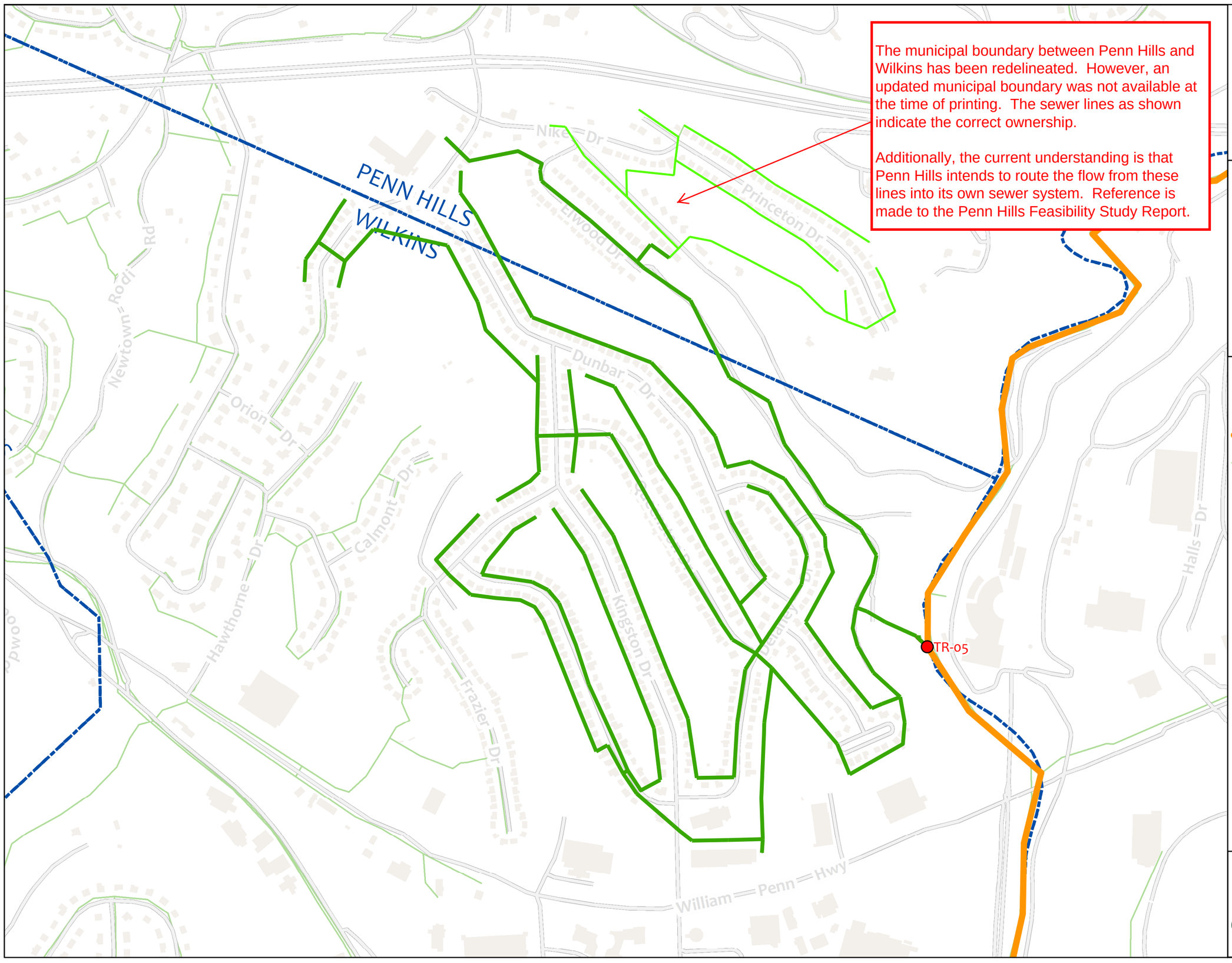
This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-05 Delaney Drive Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-05 Delaney Drive Sewershed is located in the northeast section of Wilkins Township. The sewershed is comprised entirely of separate sewage facilities that serve primarily single family residential households and a small number of residential apartment complexes. The upstream portion of the sewershed lies within the Municipality of Penn Hills. A map of the TR-05 Delaney Drive Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.

Table 1-1 lists information for the Delaney Drive Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.21 person per household figure for Wilkins Township from the 2010 US Census.



The municipal boundary between Penn Hills and Wilkins has been redelineated. However, an updated municipal boundary was not available at the time of printing. The sewer lines as shown indicate the correct ownership.

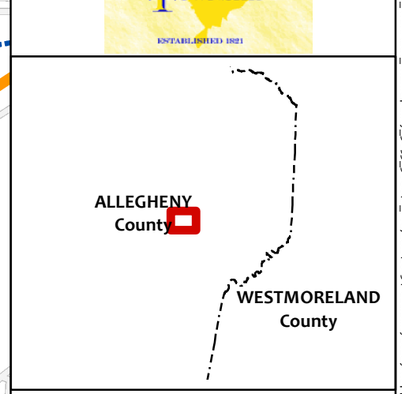
Additionally, the current understanding is that Penn Hills intends to route the flow from these lines into its own sewer system. Reference is made to the Penn Hills Feasibility Study Report.

Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 1-1 Sewershed Map

WILKINS TOWNSHIP
ESTABLISHED 1821



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Separate)
- Penn Hills (Separate)

N

1:6,000

1 inch = 500 feet

0 250 500 1,000 Feet

Author: Patrick Moulden

Date: 4/29/2013

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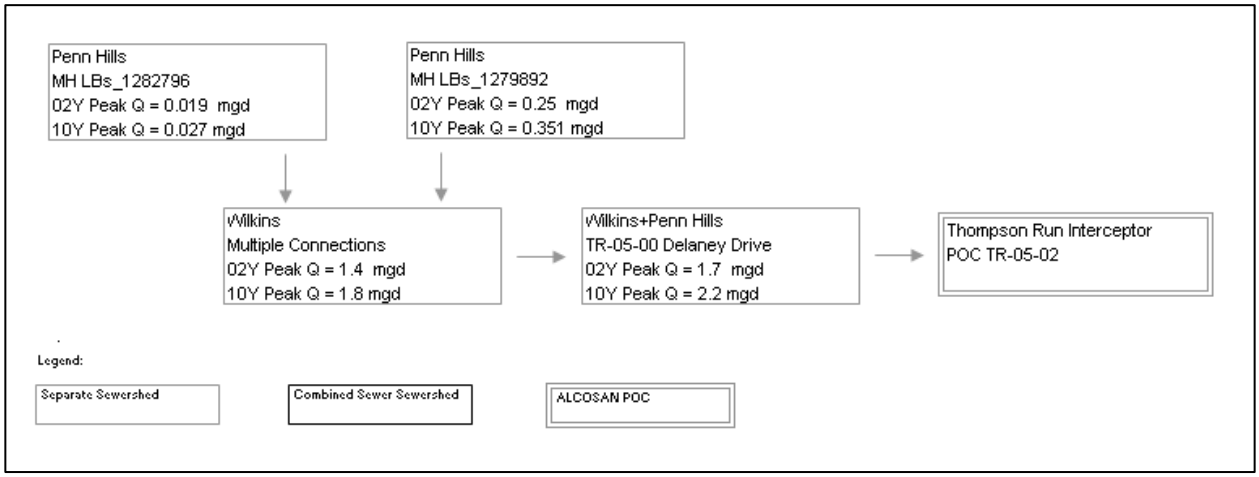
Figure 1-2: Sewershed Schematic



The Delaney Drive Sewershed has a separate sanitary sewer system; there are no combined sewers. Information on the storm sewers in the Delaney Drive area is not available.

TABLE 1-1: TR-05 DELANEY DRIVE SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Penn Hills (4)	TR-05	30	25	2.38	238
Wilkins	TR-05	165	519	2.14	1,111
Total: Wilkins + Penn Hills	TR-05	227	619	N/A	1,349

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

(4) Values provided by Gateway Engineers.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Delaney Drive sewershed.

TABLE 1-2: TR-05 DELANEY DRIVE SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills (1)	0	0	0
Wilkins (2)	0	0	0
Total: Wilkins + Penn Hills	0	0	0

(1) Combined Sewer information provided by Gateway Engineers.

(2) Combined Sewer information obtained from 3RWW GIS Web Map. There are no combined sewers in this sewershed.

TABLE 1-3: TR-05 DELANEY DRIVE SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills (1)	6.8	4,475	0.23
Wilkins (2)	47.7	31,300	0.29
Total: Wilkins + Penn Hills	57.2	37,578	0.44

(1) Separate Sewer information provided by Gateway Engineers.

(2) Separate Sewer information obtained from 3RWW GIS Web Map. There are no combined sewers in this sewershed.

TABLE 1-4: TR-05 DELANEY DRIVE SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Penn Hills	N/A	N/A	N/A
Wilkins	N/A	N/A	N/A
Total: Wilkins + Penn Hills	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-05 Delaney Drive Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-05 Delaney Drive Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

Table 1-5 presents information about the single existing overflow including municipal regulatory ID, location, receiving waters and owner. Figure 1-3 shows the location of the discharge points in the TR-05 Delaney Drive Sewershed.

TABLE 1-5: KNOWN CONSTRUCTED DISCHARGE LOCATIONS IN THE TR-05 DELANEY DRIVE SEWERSHED

Municipal Regulatory ID	Location	Receiving Waters	Owner(s)
TR-05-00	Along bank of Thompson Run across from the Union Railroad complex.	Thompson Run	ALCOSAN

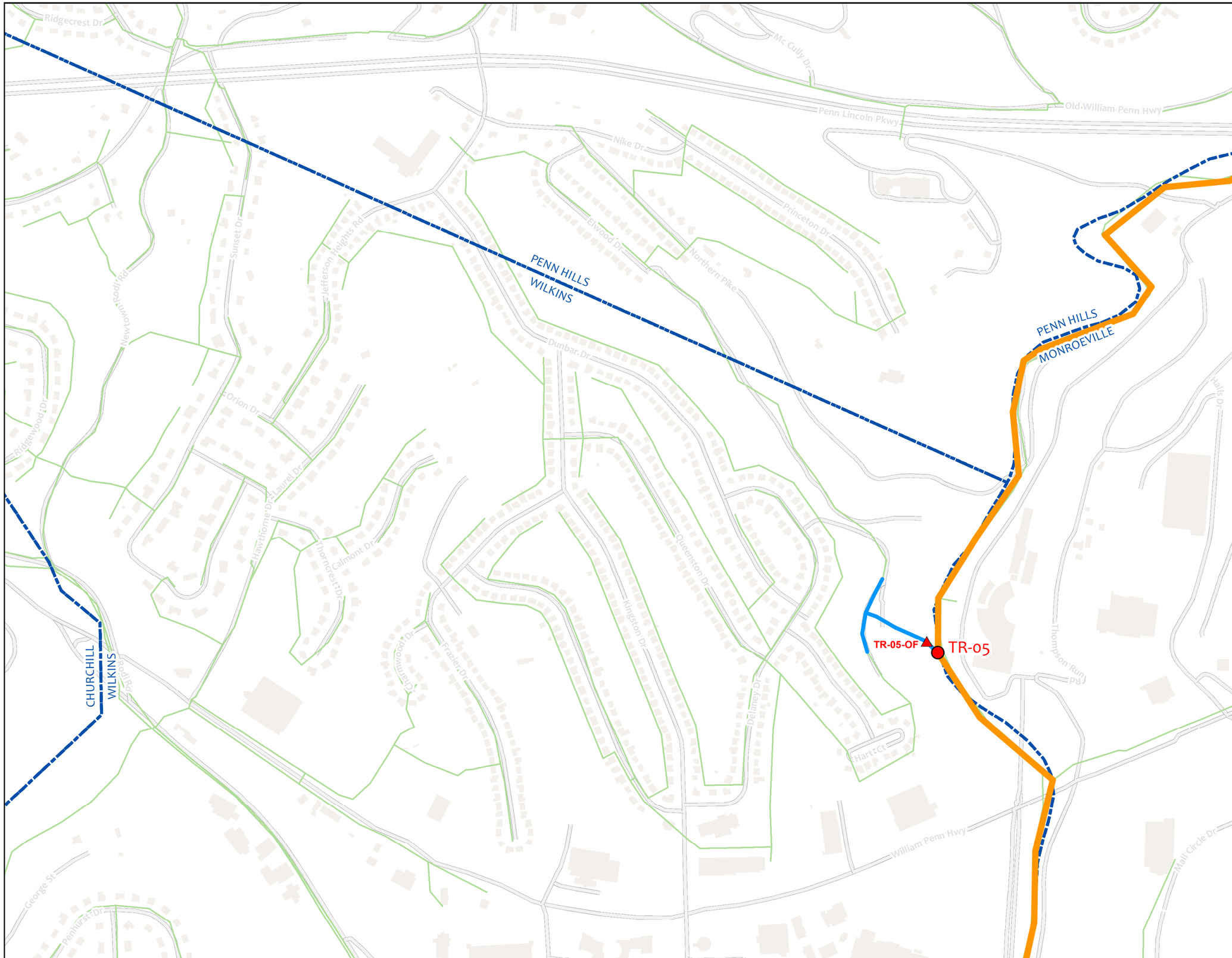
1.2.4 Direct Stream Inflows

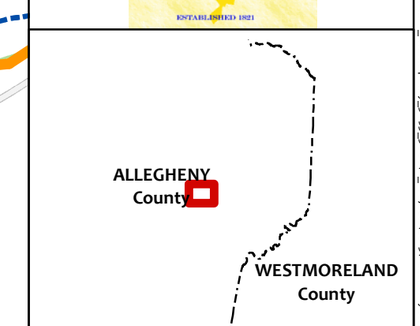
There are no known direct stream inflows into the separate sanitary sewer system in the TR-05 Delaney Drive Sewershed.

Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 1- 3 Existing Overflow Locations and SWMM Model Extents





Legend

Outfall Type

- Constructed Outfall
- Overflowing Manhole
- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

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1 inch = 500 feet

0 250 500 1,000 Feet

Author: Peter Smith

Date: 7/1/2013

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2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

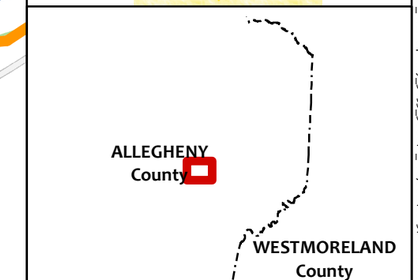
The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

The original H&H model extent included 500 LF of sewer upstream from TR-05. No revisions to the model of this trunk sewer were made from the original H&H model. Figure 2-1 depicts the extents of the original H&H model.

Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 2-1 SWMM Model Extents



Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:6,000

1 inch = 500 feet

0 250 500 1,000 Feet

Author: Peter Smith

Date: 7/1/2013

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Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-05-02 Delaney Drive.mxd

2.2.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This trunk sewer was monitored in 2004/2005. No additional flow monitoring was performed. Monitors that were installed in the TR-05 Delaney Drive Sewershed are summarized in Table 2-1.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-05 DELANEY DRIVE SEWERSHED

Municipality	Monitor Name	Monitor Type (1)	Monitor Duration	Comments
Wilkins	TR-05-00-M3	POC	2004 to 2005	Past Credit Monitor

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township, and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-05 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-05 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Penn Hills (3)	30	30	0%
Wilkins	165	165	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.
(2) All tributary areas are considered to be 100% built-out
(3) Values provided by Gateway Engineers.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-05 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Penn Hills (4)	186	21%	21%	225
Wilkins	1,111	6.44%	25%	1,389

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.
(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.
(3) Future Population based on Assumed Percent Difference.
(4) Values provided by Gateway Engineers.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-05 which were determined by downstream flow monitoring data at monitor TR-05-00-M3. Future BWWFs were extrapolated to year 2046 based on assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-05 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Penn Hills	30	0.053	0.066	26%
Wilkins	165	0.247	0.309	29%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-05. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-05 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely in the Wilkins portion of the sewershed. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-05 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Penn Hills	62	0.027	0.033	25%
Wilkins	165	0.133	0.167	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-05 during 2-Year

Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-05 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-05 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Penn Hills	62	0.22	0.22	0%
Wilkins	165	1.1	1.1	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

In the TR-05 Sewershed, the two Penn Hills municipal boundary connections were not monitored due to insufficient flow present to allow for the suitable collection of flow monitor data. The estimation process of these areas is discussed in detail in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed. Note that at this time there are no planned projects in any of the tributary communities.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-05 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Penn Hills	None	N/A	N/A	N/A
Wilkins	None	N/A	N/A	N/A

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Delaney Drive trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

Under 2-Year Summer Design Storm conditions, the Delaney Drive trunk sewer is not shown to be capacity deficient. The downstream surcharge is caused by a constructed flow restriction at the TR-05-00 regulator structure, which limits flows to the Thompson Run Interceptor. Additionally, the elevation of the HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm.

Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Delaney Drive trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

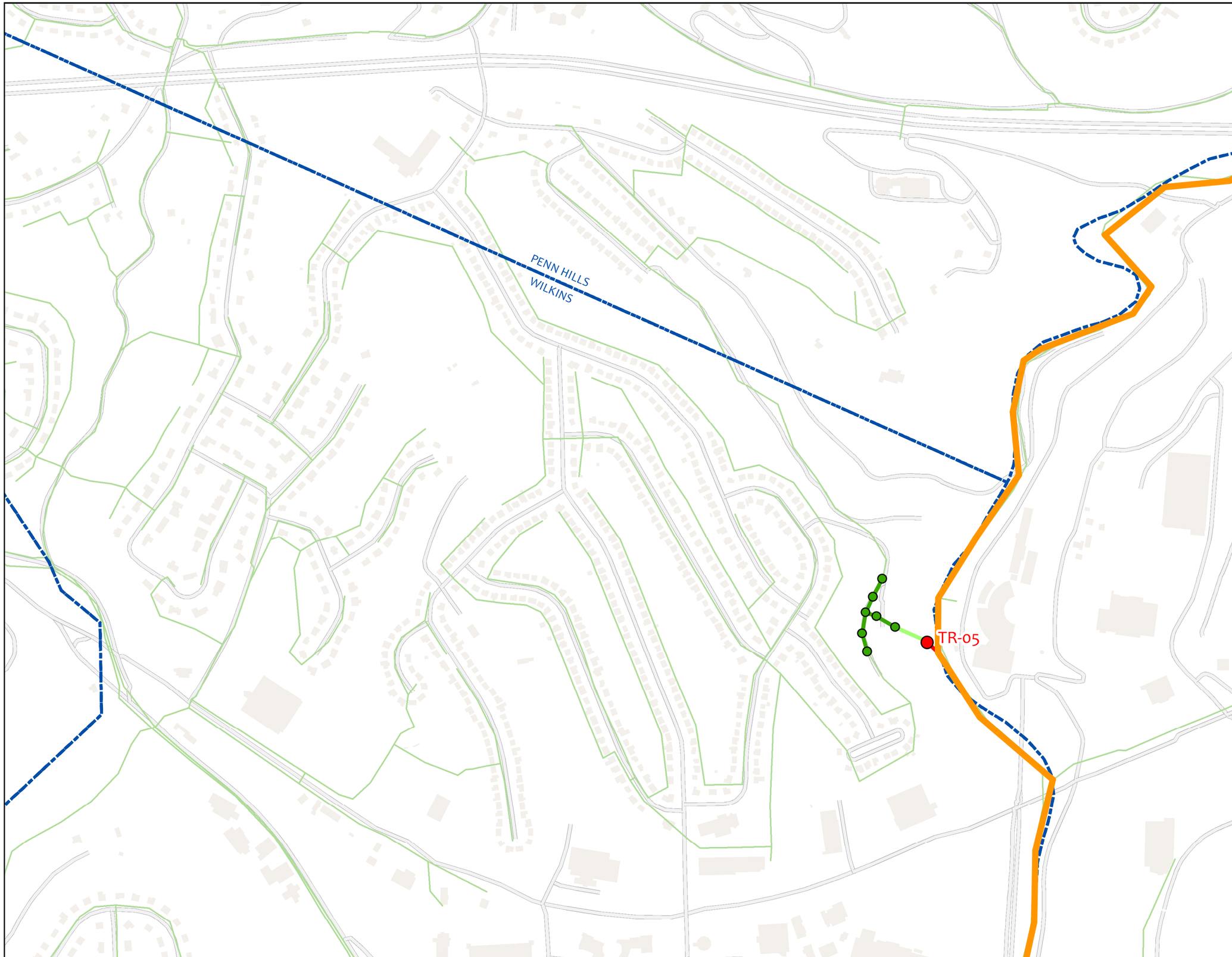
Under 10-Year Summer Design Storm conditions, the Delaney Drive trunk sewer is not shown to be capacity deficient. The downstream surcharge is caused by a constructed flow restriction at the TR-05-00 regulator structure which limits flows to the Thompson Run Interceptor. Additionally, the elevation of the HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Delaney Drive sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

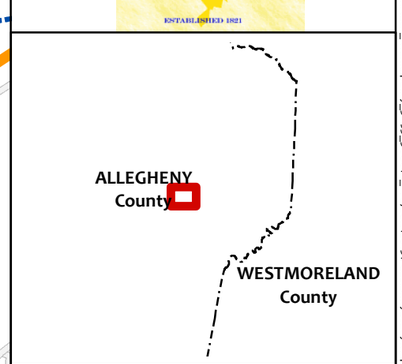
The trunk sewer receives no additional flow from sidelines. Therefore, the capacity requirements are constant and limited by the pipe segment with the shallowest slope. The peak flows for the tributary communities are listed in Table 2-8.



Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions



Legend

- Municipal POC
- ALCOSAN Interceptors
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:6,000

1 inch = 500 feet

0 250 500 1,000 Feet

Author: Peter Smith

Date: 7/1/2013

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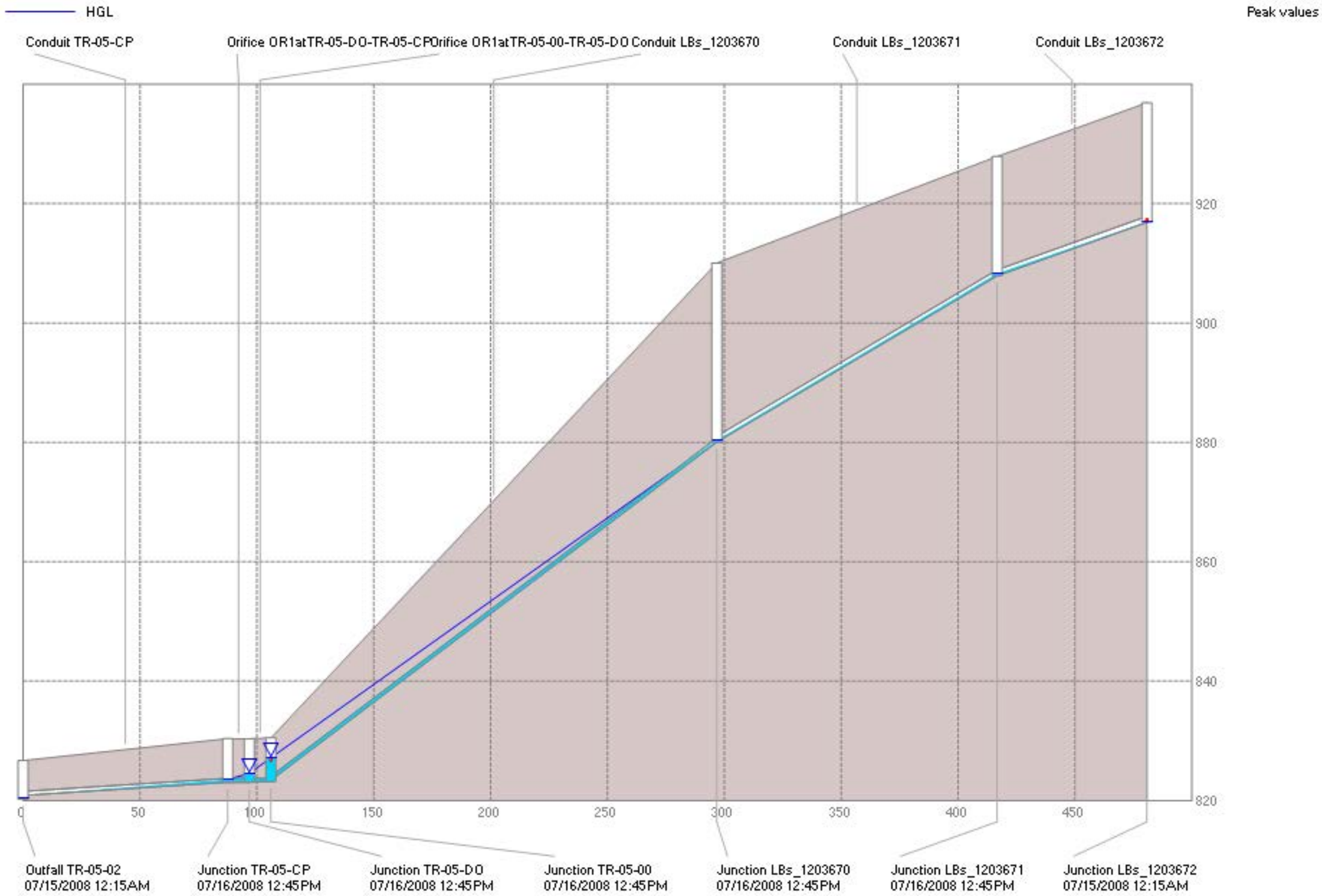
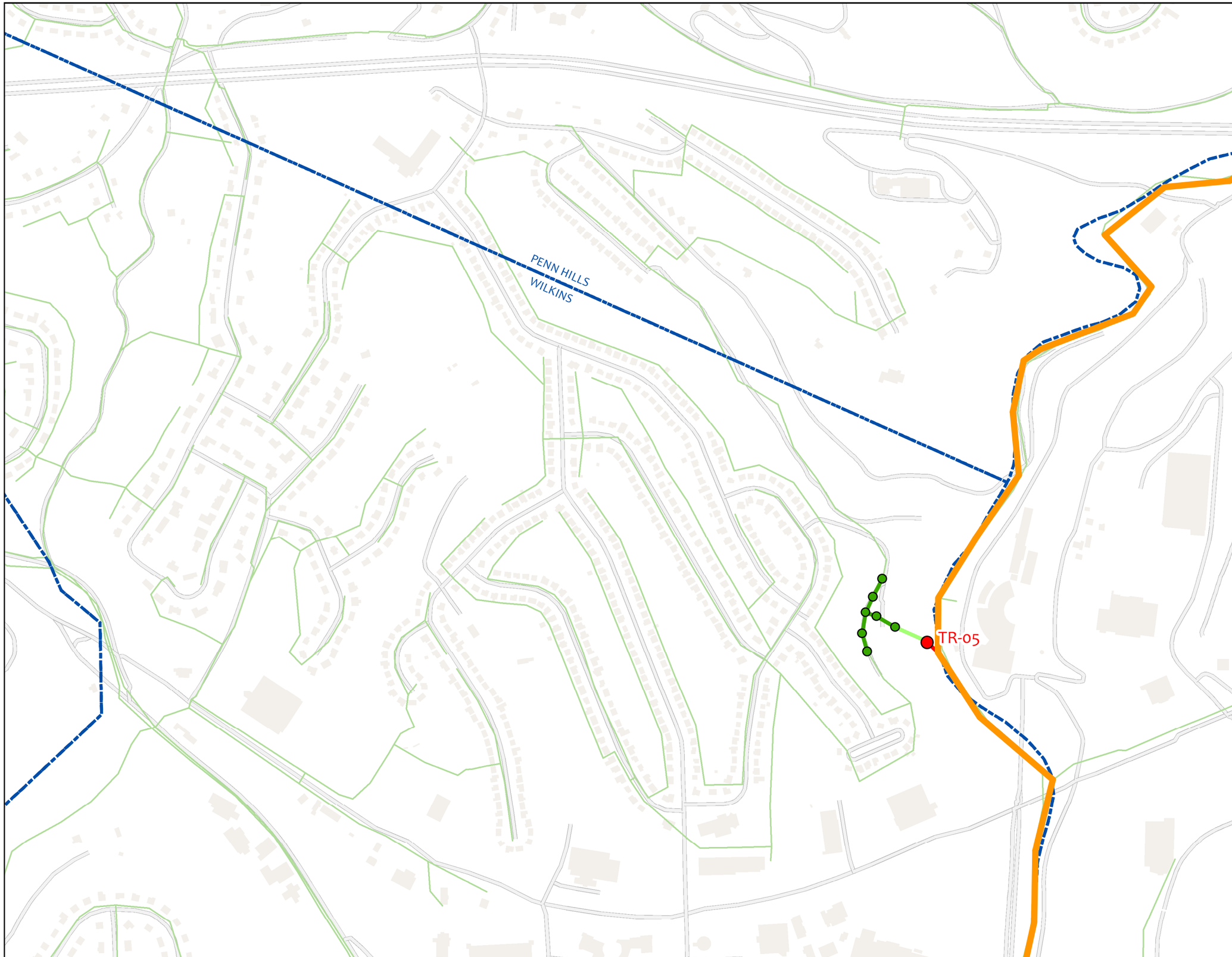
FIGURE 2-3

TR-05 DELANEY DRIVE PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

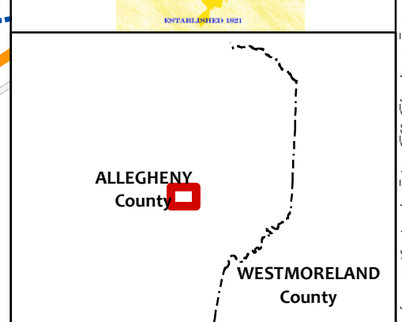




Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- ALCOSAN Interceptors
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:6,000

1 inch = 500 feet

0 250 500 1,000 Feet

Author: Peter Smith

Date: 7/1/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Wilkins_DelaneyDrive_2_4.mxd

FIGURE 2-5

TR-05 DELANEY DRIVE PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

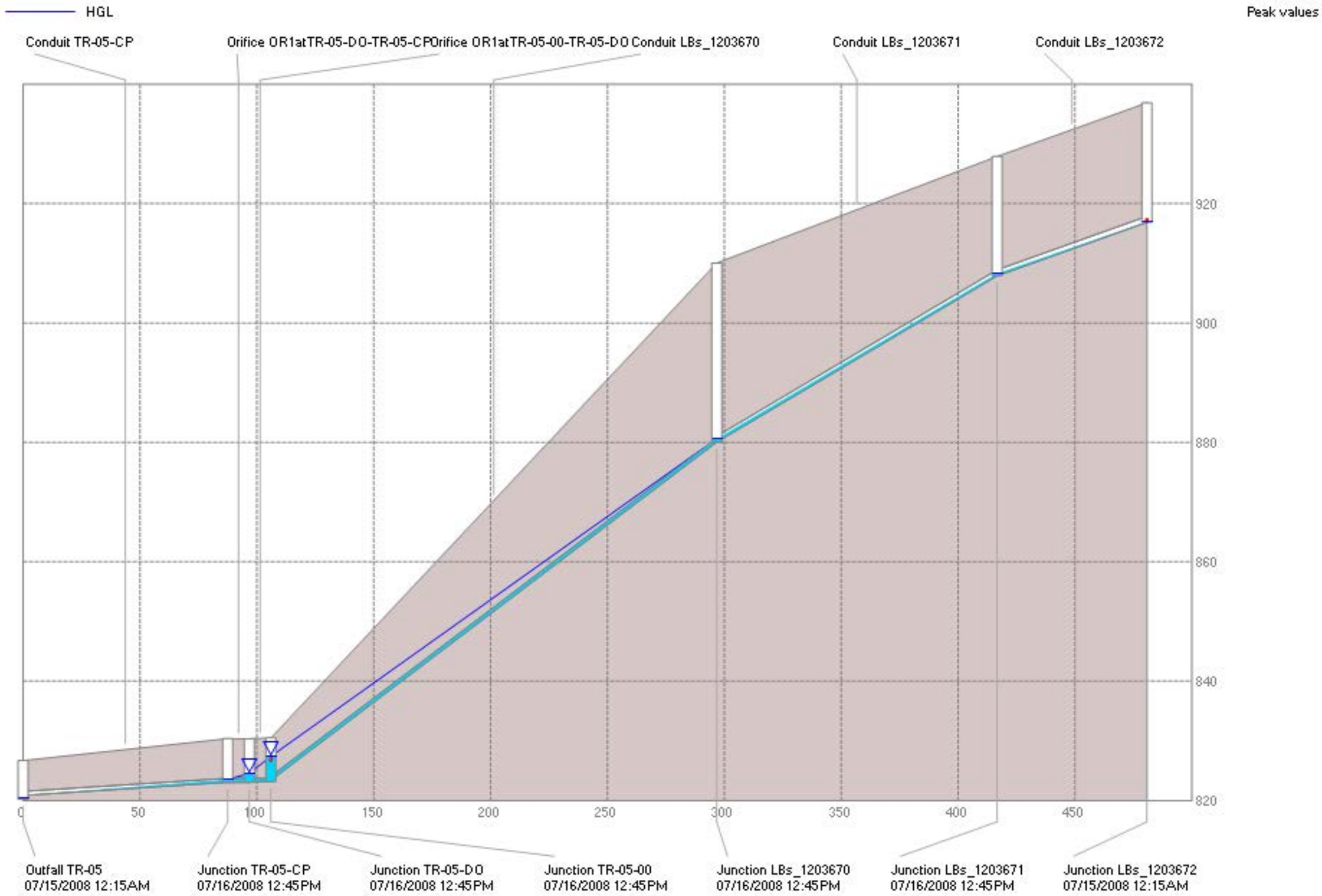


TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Penn Hills	0.25	0.28	0.33	0.37
Wilkins	1.25	1.42	1.64	1.83

Information for 24-hour volumes for the various Summer Design storm conditions for the tributary communities is listed in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Penn Hills	0.18	0.19	0.2	0.21
Wilkins	0.92	0.94	0.98	1.02

2.3 Overflow Frequency and Volume

The Delaney Drive sewershed has a separate sanitary sewer system. There are no tributary combined sewers. Pertinent data for CSOs and SSOs is reported in Tables 2-10 and 2-11.

TABLE 2-10: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR DELANEY DRIVE SEWERSHED

				Peak Rate (mgd)		
CSO Outfall	Owner	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
None	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 2-11: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR TR-05 DELANEY DRIVE SEWERSHED

SSO Outfall	Owner	2-yr Design Storm		10-yr Design Storm	
		Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
TR-05-00	Wilkins	0.67	0.04	1.15	0.08

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-05 Delaney Drive Sewershed is entirely served by separate sanitary sewers. As there are no CSOs, this section is not applicable.

3.1.2 SSO Control Level

The TR-05 Delaney Drive Sewershed is entirely served by separate sanitary sewers. Per the COA , all SSOs are illegal and are required to be controlled.

3.2 Recommendations for Control Level

SSO TR-05-00 in the Delaney Drive Sewershed is modeled to be active during 2 and 10 year summer design storm conditions. Since the COA requires all SSOs to be controlled, the recommendation for SSO control level is to provide for the most conservative level of control.

4.0 SEWERSHED ALTERNATIVE EVALUATION

4.1 Alternative Development

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.1 Control Technology Screening

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

There are several categories under which control technologies can be grouped based on the point in the system where overflows are controlled. These categories are described below.

Source Control technologies are designed to minimize flows and/or pollutants entering collection systems. For separate sanitary sewer systems, this would include I/I reduction projects. As the Municipality has diligently pursued programs of sewer system deficiency identification and correction, as well as identification and disconnection of downspouts and area drains from all tributary customers, further attempts at Source Control were not considered as applicable to providing the necessary amount of flow reduction to achieve the required level of SSO control.

Collection System Control technologies are introduced into existing sewer systems to enhance their conveyance and/or storage capabilities. Technologies in this category typically increase the system capacity by allowing full utilization of the collection system or allowing for construction of a parallel relief sewer pipe.

Storage technologies store excess wet weather flows until sufficient conveyance and treatment capacity is available in the system. Storage technologies are often divided into the following sub-categories: Conventional Tunnel and Tank Storage. For this sewershed, Tunnel storage was not considered as a viable alternative due to its excessive cost and O&M effort relative to tank storage.

Treatment technologies are designed to provide pollutant removals from wet weather flows prior to their discharge to receiving waters. Treatment technologies may utilize physical, biological, or chemical processes. Depending on specific treatment goals, these processes may also be combined to achieve the desired level of pollutant removal. Due to the relatively minor nature of the capacity restriction and proximity of the SSO to the Thompson Run Interceptor, SSO control were not considered as feasible alternatives for this sewershed.

4.1.1.1 Municipal Control Technologies Screening Criteria and Application

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.1.2 Municipal Control Technologies Screening Process

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.2 Best Management Practices – Green Technology Screening

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-05 Delaney Drive Sewershed is entirely served by separate sanitary sewers. Green technologies are primarily applicable to control of CSO or storm system flows. In theory, incorporating green technologies into the system in the tributary area upstream of the SSOs could result in sufficient reduction of I/I rates to control SSOs. However, this area of the sewershed consists of predominantly single family residential development. As current policy does not permit public funds to be spent on improvements to private property, any green technologies would be the responsibility of the homeowners in this area. Furthermore, as the Municipality has diligently pursued the identification and disconnection of downspouts and area drains from all

tributary customers, the overall additional effectiveness of incorporating green technologies is uncertain.

4.1.3 Site Screening

As the connection point to the Thompson Run interceptor is only 100 LF away from the overflow structure, SSO storage sites were not evaluated.

4.1.4 Formation of Control Alternatives

The Delaney Drive Sewershed has one active SSO which is illegal per the COA and must be eliminated from the system by 2026. To achieve compliance with the COA, two general categories of control alternative are available: Storage and Conveyance.

The alternatives that were developed for evaluation in the TR-05 Delaney Drive Sewershed are described below.

Storage alternatives were not evaluated for this sewershed due to the close proximity of the existing overflow location and its connection point to the Thompson Run Interceptor.

Conveyance alternatives include replacement of existing pipe and installation of parallel pipe. Replacement of existing pipe usually consists of removing the existing pipe and manholes and installing a larger diameter pipe and new manholes with improved sewer alignment and flow channel hydraulics. Sewer replacement tends to be a more expensive alternative than a parallel sewer due to the larger pipe diameters, increased number of manholes required, and additional by-pass pumping effort required during constriction. However, it may be more a more feasible alternative if the condition of the existing sewer is significantly degraded. Additionally, replacement becomes more feasible if it is desired to move the existing sewer out of a stream or if there is not enough space for a parallel sewer.

Parallel pipe installation is generally a lower cost alternative than pipe replacement due to smaller pipe diameter, fewer manholes and reduced requirements for by-pass pumping during construction. It tends to be more feasible when the condition of the existing facilities indicates a

reasonable remaining service life and there is sufficient space available for the installation of the parallel pipe.

4.2 Evaluation Criteria Development

As there are a limited number of feasible alternatives for this sewershed, a weighted criteria approach was determined to be unnecessary. The primary gauge of effectiveness for SSO sewersheds is compliance with the COA where SSOs are controlled to specified design storm conditions. The second criterion is cost. Finally, consideration is given to non-economic factors such as future operations and maintenance burden on the municipality and extent of disruption to the community that the project may cause during its lifespan.

4.3 Cost Estimates

Table 4-1 lists the alternatives evaluated for the TR-05 Delaney Drive Sewershed to meet a control level for 2 and 10-Year, 24-Hour summer design storms. Cost estimates were developed using the ALCOSAN ACT tool. The municipality independently developed total present worth cost estimates including operation and maintenance costs for 20 years. While the ACT tended to produce slightly higher costs, the results from the two costing methodologies were within 15%. Therefore, cost estimates from the ACT tool were used. Alternatives considered for the Delaney Drive sewershed are described below.

<u>Manhole Replacement</u>

This alternative would include the replacement of manholes where they are deteriorated, leaking through sides or covers, or have inefficient hydraulic flow channels. This alternative is not feasible for the Delaney Drive sewershed because it will not achieve compliance with the COA.

<u>Conveyance - Pipe Replacement – POC to Upstream SSO 2388A</u>

This alternative includes the replacement and upsizing of 100 LF of pipe from POC TR-05-02 to the existing overflow structure TR-05-00.

TABLE 4-1: LISTING OF ALTERNATIVES EVALUATED FOR TR-05 DELANEY DRIVE SEWERSHED

Alternative Name	System Type	Control Level	Description	ACT Total Present Worth Cost
Manhole Replacement	SSO	2-year, 24-hour summer design storm	N/A	N/A
Pipe Replacement POC TR-05-02 to regulator structure TR-05-00	SSO	2-year, 24-hour summer design storm	100 LF @ 12-inch	$53,000
		10-year, 24-hour summer design storm	100 LF @ 12-inch	$53,000
Parallel Pipe POC TR-05-02 to regulator structure TR-05-00	SSO	2-year, 24-hour summer design storm	120 LF @ 12-inch	$59,000
		10-year, 24-hour summer design storm	120 LF @ 12-inch	$59,000
Storage	SSO	2-year, 24-hour summer design storm	N/A	N/A
		10-year, 24-hour summer design storm	N/A	N/A

Conveyance - Parallel Pipe – POC to Upstream SSO 2388A

This alternative includes the installation of 120 LF of parallel pipe from POC TR-05-02 to the existing overflow structure TR-05-00. Note that an additional 20 LF of pipe is assumed for the parallel cross connections.

Storage and Replacement

Storage alternatives were not evaluated for this sewershed due to the close proximity of the existing overflow location and its connection point to the Thompson Run Interceptor.

4.4 Alternative Selection Process

Conveyance - Pipe Replacement has the lowest cost of the two alternatives. Note that a minimum 12-inch pipe diameter was assumed for conveyance replacement alternatives. Therefore the costing for the 2-Year and 10-Year summer design storms was calculated to be the same.

Conveyance - Parallel Pipe has the highest cost of the two alternatives. Note that a minimum 12-inch pipe diameter was assumed for conveyance replacement alternatives. Therefore the costing for the 2-Year and 10-Year summer design storms was calculated to be the same.

Storage – Storage alternatives were not evaluated for this sewershed due to the close proximity of the existing overflow location and its connection point to the Thompson Run Interceptor.

4.5 Alternative Evaluation Results

The Conveyance – Replacement Alternative for the 10-Year Summer Design Storm is selected as the preferred alternative for the Delaney Drive Sewershed tributary to Thompson Run Interceptor POC TR-05.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

The recommended alternative consists of 100 LF of 12-inch conveyance replacement pipe from POC TR-05 to regulator structure TR-05-00. Figure 5-1 provides a GIS map indicating the extent and pipe sizes of the recommended alternative. Figure 5-2 provides a hydraulic grade line profile at the time of peak flow during 10-Year Summer Design Storm conditions for the project area. Table 5-1 presents a summary of present worth costs for the recommended alternative.

TABLE 5-1: SUMMARY OF UNTREATED OVERFLOW VOLUME AND PRESENT WORTH COSTS FOR RECOMMENDED ALTERNATIVE – ALL CONTROL LEVELS

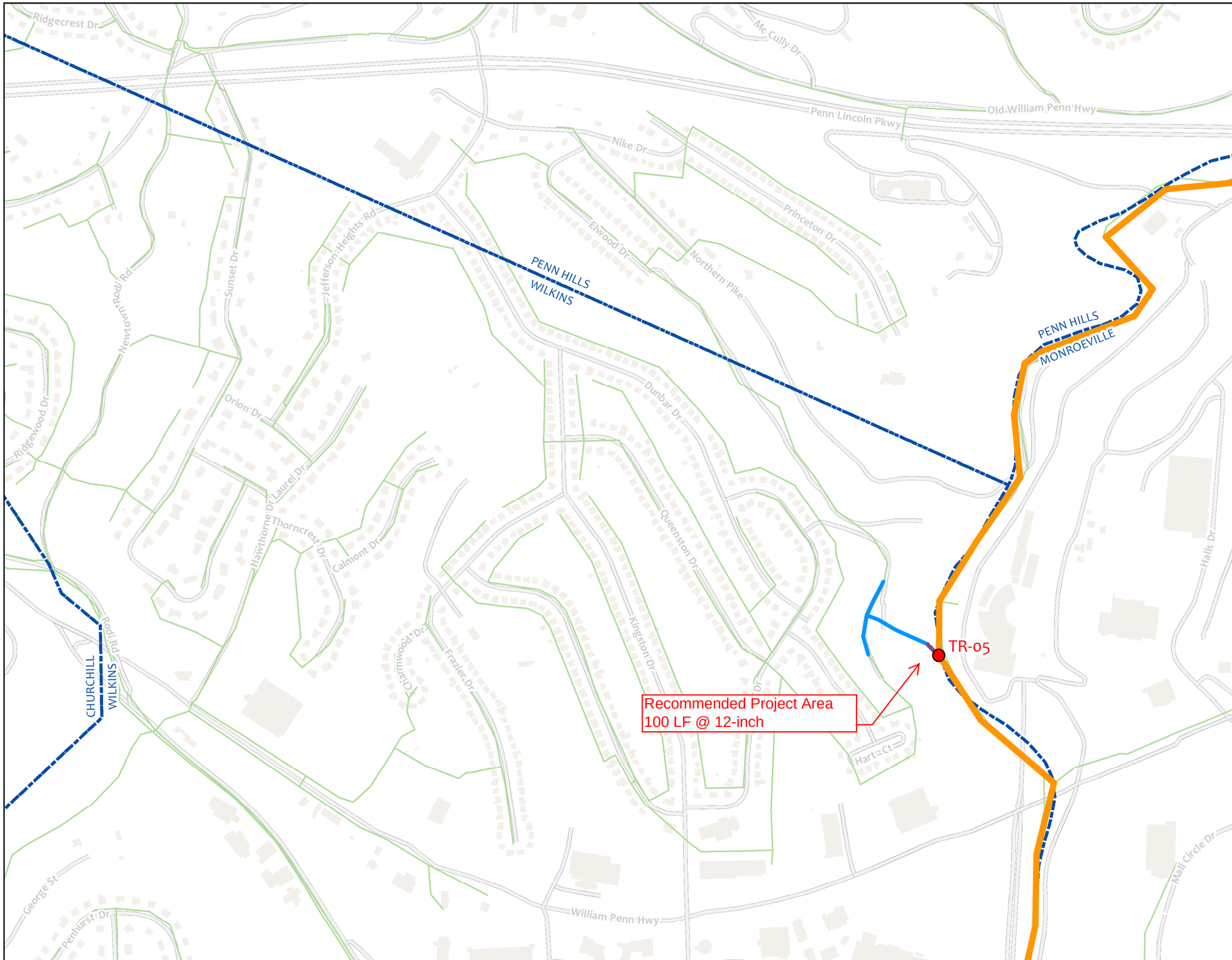
Alternative Name	CSO Control					
	Untreated CSO Volume (MG)	CSO Control Level	PW Capital Cost (1) ($ million)	PW O&M Cost ($ million)	PW R&R Cost ($ million)	TPW CSO Control ($ million)
N/A	N/A	10	N/A	N/A	N/A	N/A
N/A	N/A	4	N/A	N/A	N/A	N/A
N/A	N/A	0	N/A	N/A	N/A	N/A
Alternative Name	**SSO Control**					
	Untreated SSO Volume (MG)	**SSO Control Level**	**PW Capital Cost (1) ($ million)**	**PW O&M Cost ($ million)**	**PW R&R Cost ($ million)**	**TPW SSO Control ($ million)**
Pipe Replacement POC TR-05-02 to regulator structure TR-05-00	0	10-Year 24 Hour Design Storm	$0.050	$0.003	$0	$0.053
TPW CSO andSSO Control ($ million)						$0.053

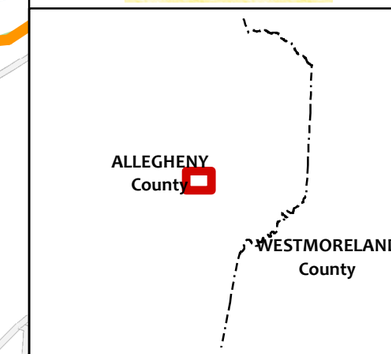
(1) Total Project Costs (Construction + Contingency + Soft Costs)

Sewershed Feasibility Study Report

TR-05 Delaney Drive Sewershed

Figure 5-1 Preferred Alternative





Legend

- Municipal POC
- Proposed Storage Tank
- ALCOSAN Interceptors
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Prefered Alternative

- Model Extent
- 12"

N

1:6,000

1 inch = 500 feet

0 250 500 1,000 Feet

Author: Patrick Moulden

Date: 7/1/2013

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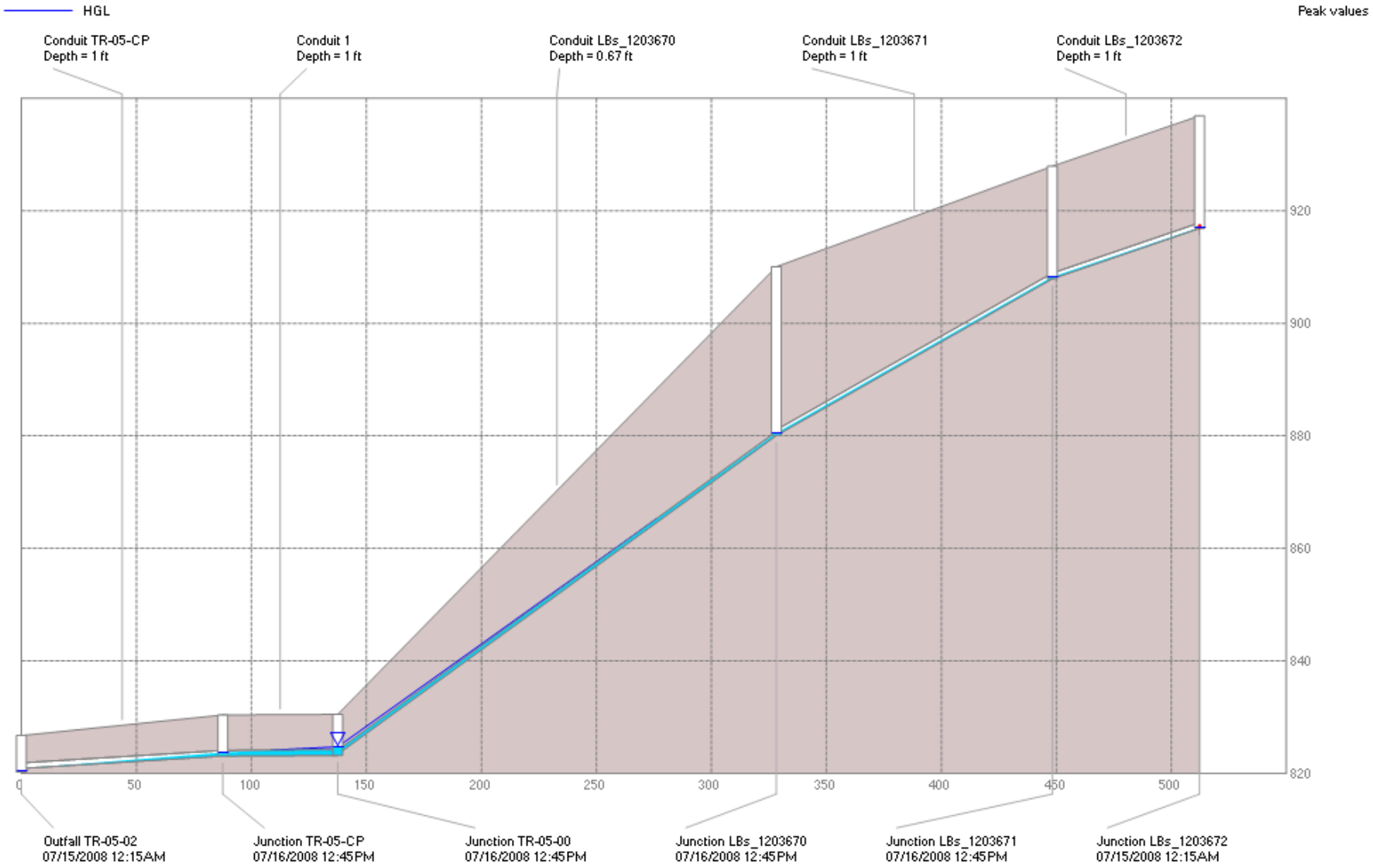
FIGURE 5-2

TR-05 DELANEY DRIVE PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE



5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous flow monitoring and data analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of critical sewers at least once every 7 years, and non-critical sewers at least once every 15 years.
3. System cleaning as necessary.
4. System maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-05 Delaney Drive sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Delaney Drive Sewershed is tributary to the Thompson Run Interceptor at POC TR-05, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-05 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between TR-05 and

M-29, any work done in the Delaney Drive Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-05 Delaney Drive Sewershed currently provides service to only customers within Wilkins Township and the Municipality of Penn Hills. However as Penn Hills intends to re-route its flows tributary to TR-05, their contribution to this sewershed will become 0%. For more information reference is made to the Penn Hills Feasibility Report.

The cost for the proposed Wilkins work in this sewershed is estimated to be approximately $53,000 for Wilkins. Neither the Municipality of Penn Hills nor Wilkins Township differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix B
TR-04-14 Home Depot Sewershed

FEASIBILITY STUDY REPORT

For

TR-04-14 HOME DEPOT SEWERSHED

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

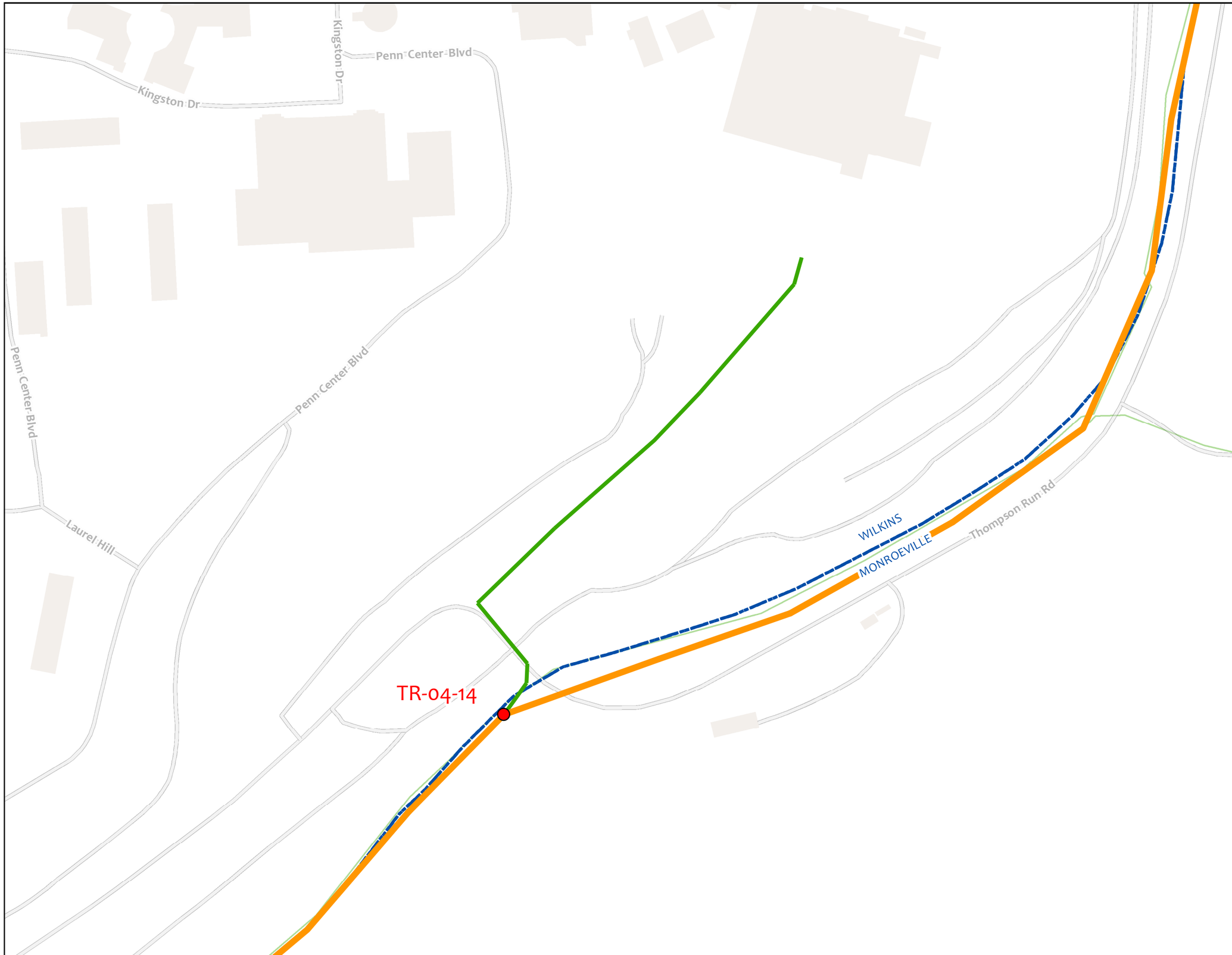
This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-04-14 Home Depot Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-04-14 Home Depot Sewershed is located in the eastern section of Wilkins Township and is comprised of entirely separate sewers. The service area is commercial. There is only one tributary residential structure shown to exist in the sewershed. A map of the TR-04-14 Home Depot Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows is this sewershed is presented in Figure 1-2.

All facilities upstream of Wilkins MH 1268 are privately owned.



Sewershed Feasibility Study Report

TR-04-14 Home Depot Sewershed

Figure 1-1 Sewershed Map

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Separate)

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Patrick Moulden

Date: 4/26/2013

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Figure 1-2: Sewershed Schematic

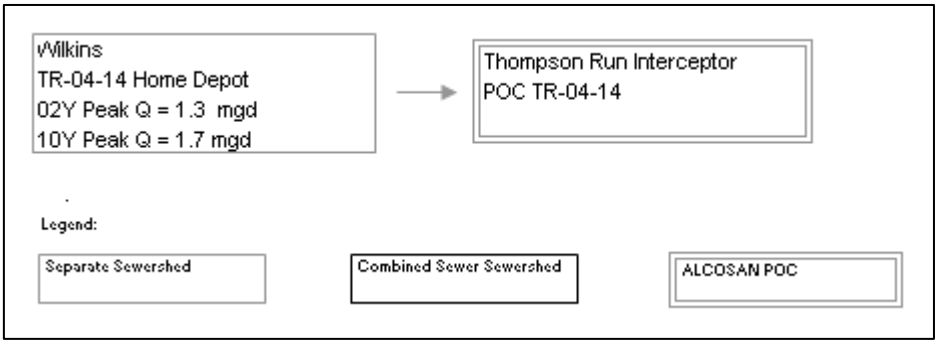


Table 1-1 lists information for the Home Depot Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the person per household figure of 2.14 for Wilkins Township from the 2010 US Census. The Home Depot Sewershed has a separate sanitary sewer system. There are no combined sewers. Information on the storm sewers in the Home Depot area is not available.

TABLE 1-1: TR-04-14 HOME DEPOT AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Wilkins	TR-04-14	160	1	2.14	3

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) 2010 US Census: Monroeville Population = EDUs x 2.14 PPH.

(3) Equivalent Dwelling Unit value based on building count of 1.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Home Depot Sewershed.

TABLE 1-2: TR-04-14 HOME DEPOT COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0	0	0

(1) There are no combined sewers in this sewershed.

TABLE 1-3: TR-04-14 HOME DEPOT SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	2.3	1,362	0.01

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-4: TR-04-14 HOME DEPOT STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-04-14 Home Depot Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-04-14 Home Depot Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

There are no reported constructed discharge or other overflow locations in the TR-04-14 Home Depot Sewershed.

1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the separate sanitary sewer system in the TR-04-14 Home Depot Sewershed.

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

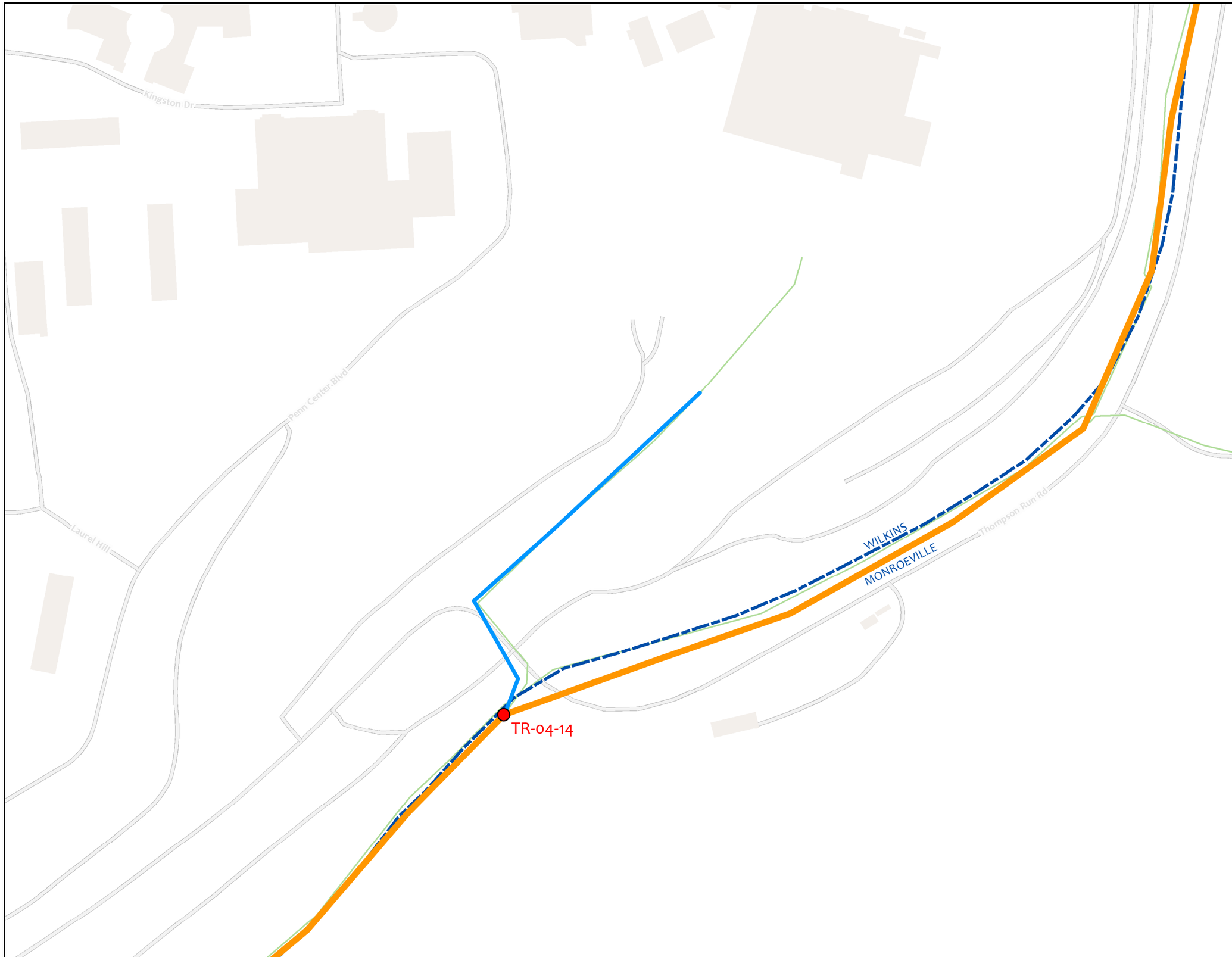
This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

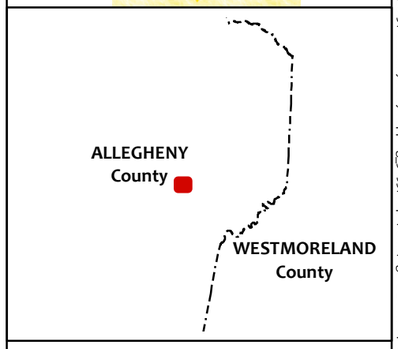
The original H&H model extent included 100 LF of sewer upstream from TR-04-14. No revisions to the model of this trunk sewer were made from the original H&H model. Figure 2-1 depicts the extent of the original H&H model.



Sewershed Feasibility Study Report

TR-04-14 Home Depot Sewershed

Figure 2-1 SWMM Model Extents



Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Peter Smith

Date: 7/2/2013

CHESTER ENGINEERS

Document Path: E:\Sync\Monroeville\b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-04-14 Home Depot.mxd

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This trunk sewer was monitored in 2007/2008. No additional flow monitoring was performed. Monitors that were installed in the TR-04-14 Sewershed are summarized in Table 2-1.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-04-14 SEWERSHED

Municipality	Monitor Name	Monitor Type (1)	Monitor Duration	Comments
Wilkins	TR-04-14-M2	POC	2007 to 2009	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township, and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-04-14 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-04-14 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference (2)
Wilkins	160	160	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed, which are both insignificant to the generation of sanitary sewer flows as the vast majority of this sewershed consists of commercial development.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-04-14 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	3	6.44%	25%	4

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-04-14 which were determined by downstream flow monitoring data at monitor TR-04-14-M2. Future BWWFs were extrapolated to year 2046 based on assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-04-14 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	160	0.275	0.36	30.9%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-04-14. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-04-14 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely in the township owned facilities in this sewershed. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration. Wilkins is also committed to working with the owners of the private facilities in the sewershed to ensure their continued operation and maintenance.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-04-14 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Wilkins	160	0.05	0.06	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-04-14 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-04-14 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and are committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely in the township owned facilities in this sewershed. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-04-14 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	160	0.98	0.98	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

There are no unmonitored areas in the TR-04-14 Sewershed.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed. Note that at this time there are no planned projects in the tributary area.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-04-14 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Wilkins	None	N/A	N/A	N/A

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

Reference is made to Peak Flow Estimates submitted to ALCOSAN on July 16, 2010.

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Home Depot trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

Under 2-Year Summer Design Storm conditions, the Home Depot trunk sewer is modeled with a significant surcharge at LBs_1204382. Therefore the model indicates that this sewer is slightly capacity deficient under these conditions.

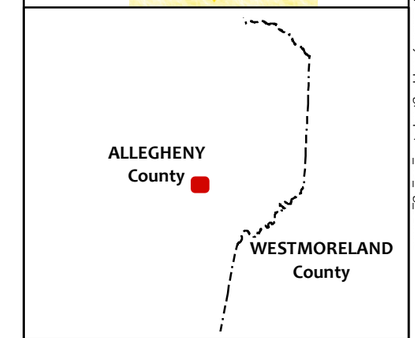
Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Home Depot trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

Under 10-Year Summer Design Storm conditions, the Home Depot trunk sewer is modeled with significant surcharge and bypassing upstream of LBs_1204382. Therefore the model indicates that this sewer is severely capacity deficient under these conditions. However, it is noted that overflowing manholes in the existing sewer system have not been reported in this sewershed.

Sewershed Feasibility Study Report

TR-04-14 Home Depot Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Peter Smith

Date: 7/2/2013

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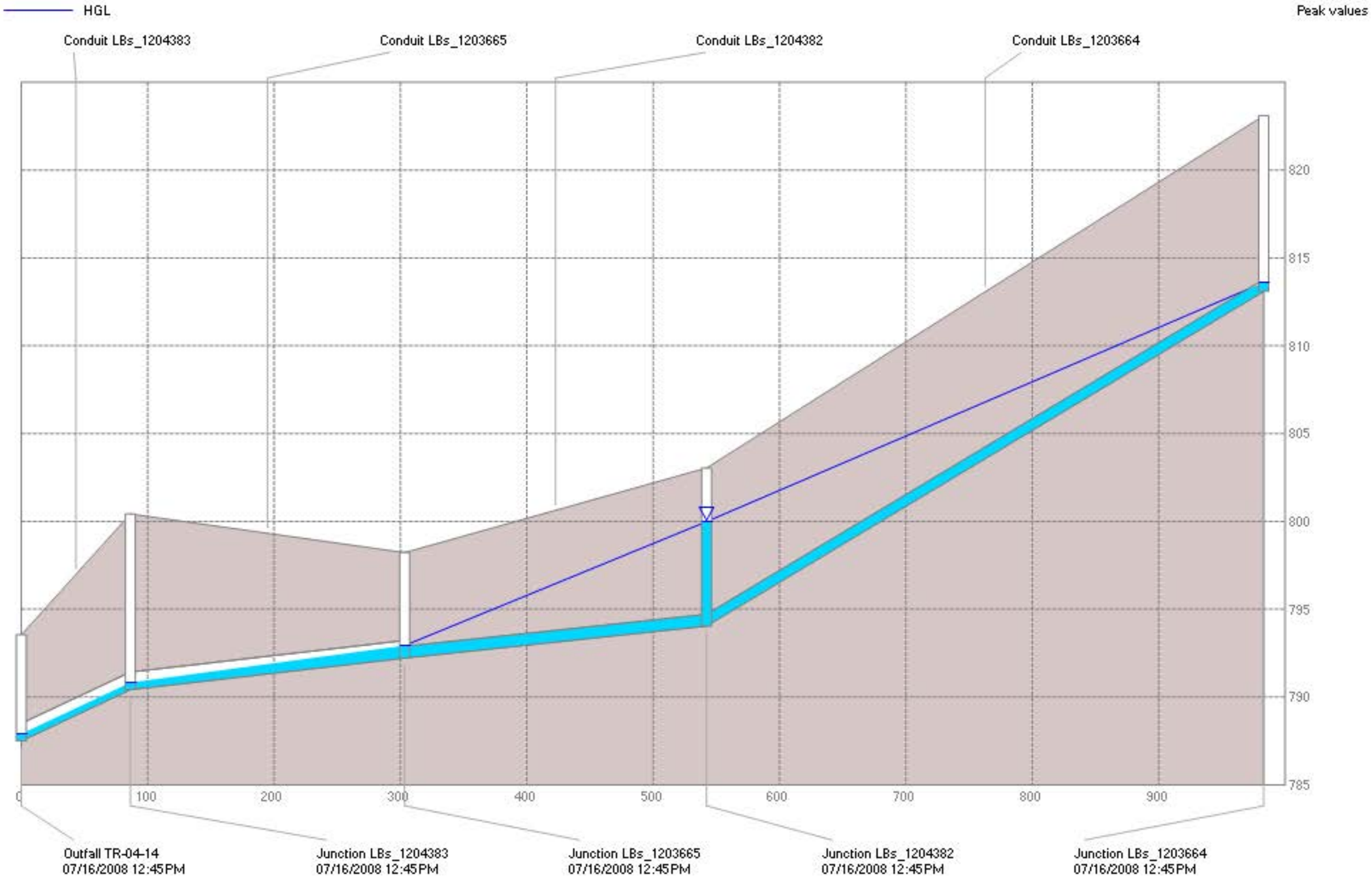
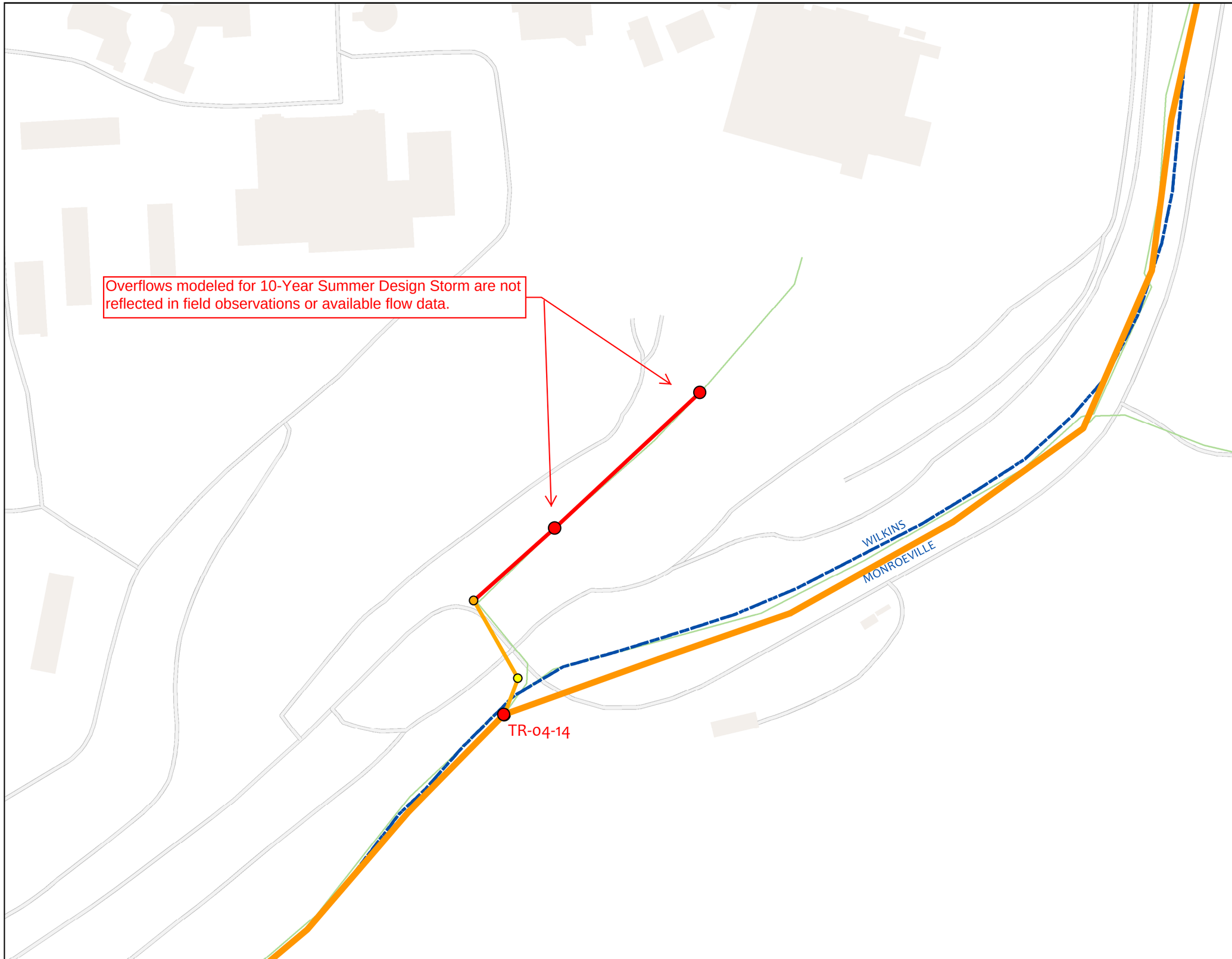
FIGURE 2-3

TR-04-14 HOME DEPOT TRUNK SEWER PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

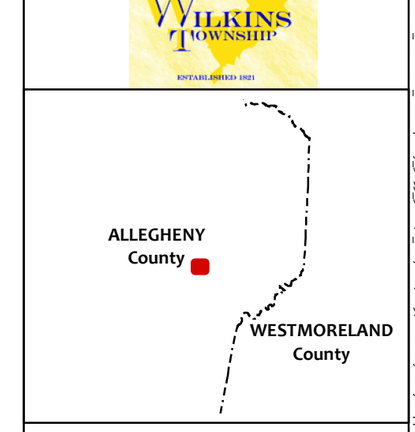




Sewershed Feasibility Study Report

TR-04-14 Home Depot Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Peter Smith

Date: 7/2/2013

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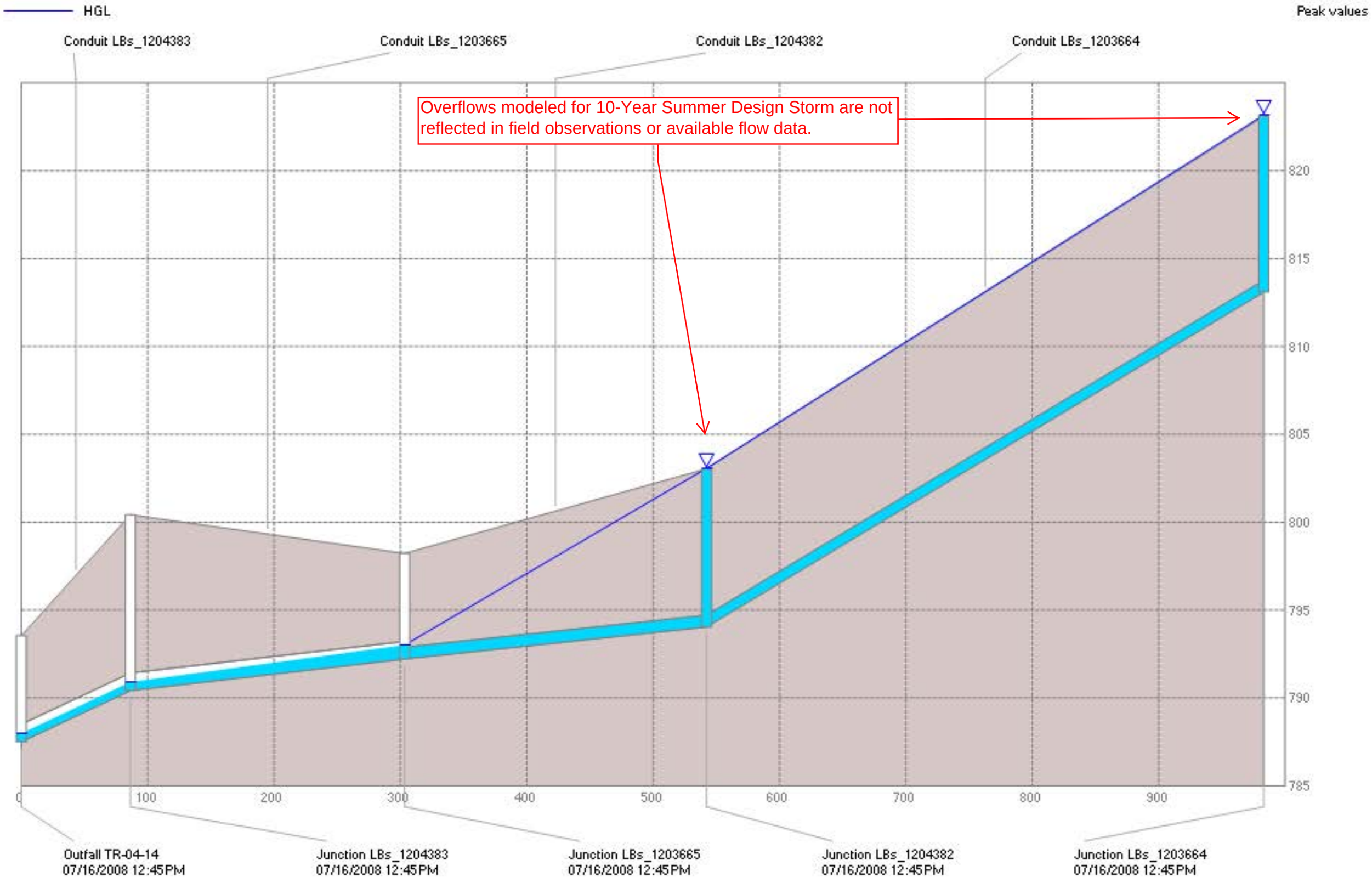
FIGURE 2-5

TR-04-14 HOME DEPOT TRUNK SEWER PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS



2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the TR-04-14 Home Depot Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

The trunk sewer receives no additional flow from sidelines. Therefore, the capacity requirements are constant and limited by the pipe segment with the shallowest slope. The peak flows for the tributary area are listed in Table 2-8.

TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	1.18	1.34	1.55	1.72

Information for 24-hour volumes for the various Summer Design storm conditions for the tributary area are listed in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	0.83	0.84	0.86	0.88

2.3 Overflow Frequency and Volume

The Home Depot Sewershed has a separate sanitary sewer system. There are no tributary combined sewers. Also, no sanitary sewer overflows have been reported.

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-04-14 Home Depot Sewershed is entirely served by separate sanitary sewers. As there are no reported combined sewer overflows, this section is not applicable.

3.1.2 SSO Control Level

The TR-04-14 Home Depot Sewershed is entirely served by separate sanitary sewers. As there are no reported separate sewer overflows, this section is not applicable.

3.2 Recommendations for Control Level

As there are no reported combined or separate sewer overflows this section is not applicable.

4.0 SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Although model results indicate capacity deficiencies for 2 Year Design Storm conditions, and manhole overflows for 10 Year Design Storm conditions, these deficiencies have not been observed in the field or confirmed by available flow data. As such, it is concluded that no alternatives are required in this sewershed for compliance with the COA. Therefore, this section is not applicable.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-04-14 Home Depot Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Home Depot Sewershed is tributary to the Thompson Run Interceptor at POC TR-04-14, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-06 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between TR-04-14 and M-29, any work done in the Home Depot Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-04-14 Home Depot Sewershed provides service to only customers within Wilkins Township, so 100% of the cost of any work performed in this sewershed would be the responsibility of Wilkins Township. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix C
TR-04 Rodi Road Sewershed

FEASIBILITY STUDY REPORT

For

TR-04 RODI ROAD SEWERSHED

Prepared for:

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-04 Rodi Road Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-04 Rodi Road Sewershed is located in the eastern section of Wilkins Township. The sewershed receives flows from both Churchill Borough and Wilkins Township which are comprised of entirely separate sewage facilities that serve primarily single family residential households, and a small number of commercial/industrial customers. A map of the TR-04 Rodi Road Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.

The municipal boundary between Penn Hills and Wilkins has been redelineated. However, an updated municipal boundary was not available at the time of printing. The sewer lines (as shown) indicate the correct ownership.

Additionally, the current understanding is that Penn Hills intends to route the flow from these lines into its own sewer system. Reference is made to the Penn Hills Feasibility Study Report.

Churchill separate sanitary sewer system tributary to TR-04 sewershed

PENN HILLS
WILKINS

WILKINS
CHURCHILL

CHURCHILL
WILKINS

WILKINS
MONROEVILLE

WILKINS
FOREST HILLS

TR-04

Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 1-1 Sewershed Map

WILKINS TOWNSHIP
ESTABLISHED 1821

ALLEGHENY County

WESTMORELAND County

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Churchill (Separate)
- Penn Hills (Separate)
- Wilkins (Separate)

N

1:12,000

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Author: Patrick Moulden

Date: 4/29/2013

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Figure 1-2: Sewershed Schematic

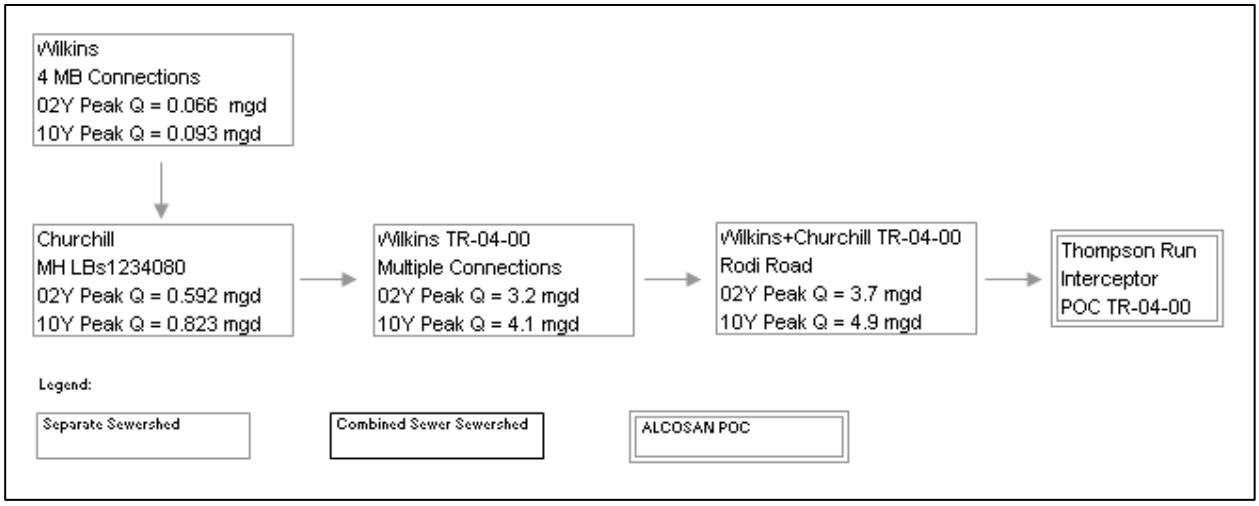


Table 1-1 lists information for the Rodi Road Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census. The Rodi Road Sewershed has a separate sanitary sewer system; there are no combined sewers. Information on the storm sewers in the Rodi Road area is not available.

TABLE 1-1: TR-04 RODI ROAD SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Churchill	TR-04	445	159	2.34	373
Wilkins	TR-04	604	619	2.14	1,325
Total: Wilkins + Churchill	TR-04	1049	778	N/A	1,698

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Rodi Road sewershed.

TABLE 1-2: TR-04 RODI ROAD SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	0	0	0
Wilkins	0	0	0
Total: Wilkins + Churchill	0	0	0

(1) Combined Sewer information obtained from 3RWW GIS Web Map. There are no combined sewers in this sewershed.

TABLE 1-3: TR-04 RODI ROAD SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	34.9	23,021	0.08
Wilkins	105.5	69,242	0.17
Total: Wilkins + Churchill	140.4	92,263	0.25

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-4: TR-04 RODI ROAD SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	N/A	N/A	N/A
Wilkins	N/A	N/A	N/A
Total: Wilkins + Churchill	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-04 Rodi Road Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-04 Rodi Road Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

Table 1-5 presents information about the single existing overflow including municipal regulatory ID, location, receiving waters and owner. Structure TR-04 is part of the Thompson Run Interceptor Facilities, which is owned by the four tributary communities and maintained by ALCOSAN forces under an agreement with ALCOSAN. Figure 1-3 shows the location of the discharge points in the TR-04 Rodi Road Sewershed.

TABLE 1-5: KNOWN CONSTRUCTED DISCHARGE LOCATIONS IN THE TR-04 RODI ROAD SEWERSHED

Municipal Regulatory ID	Location	Receiving Waters	Owner(s)
TR-04	Along bank of Thompson Run near intersection of Rodi Road and Thompson Run Road	Thompson Run	Wilkins, Monroeville, Churchill and Turtle Creek

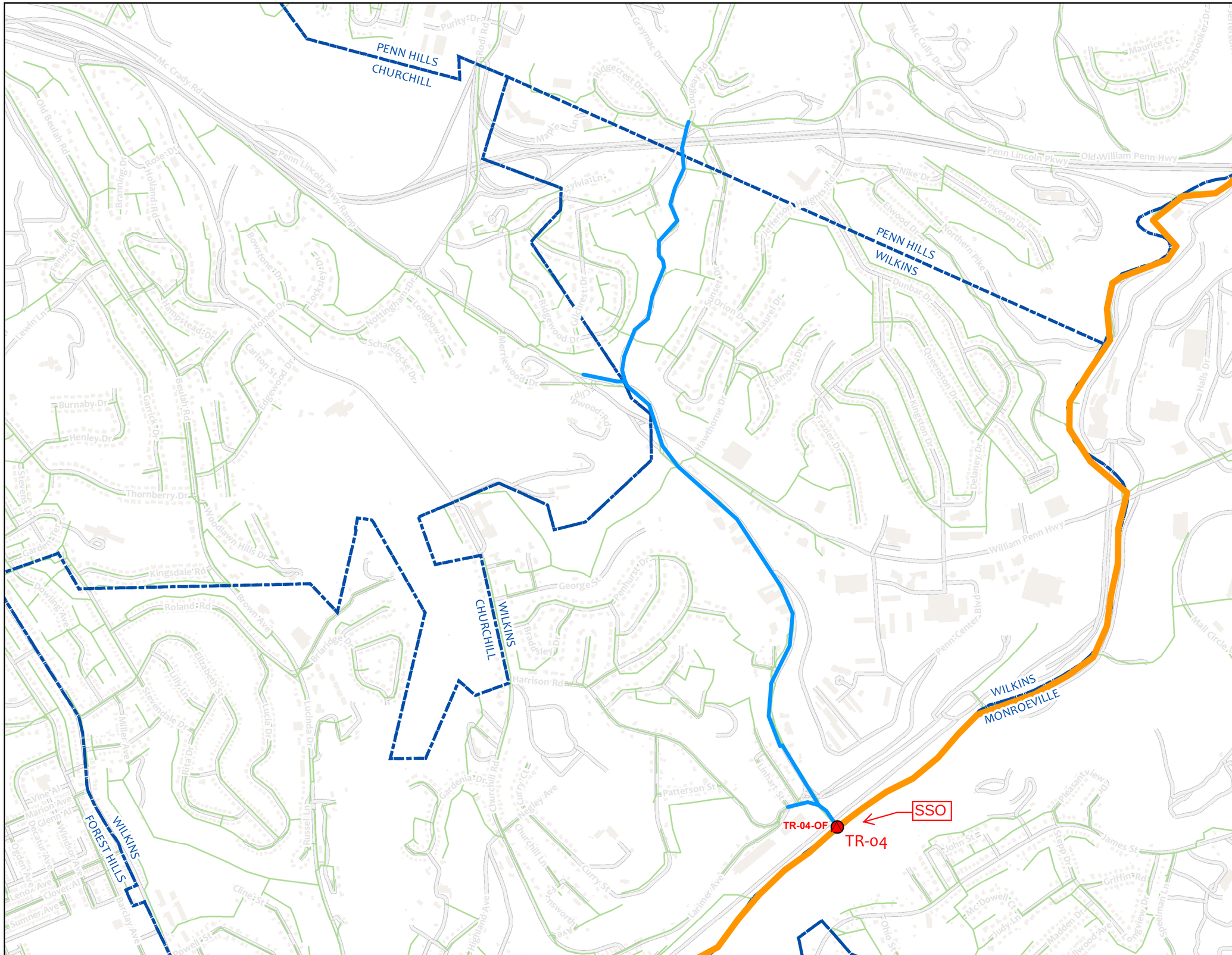
1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the separate sanitary sewer system in the TR-04 Rodi Road Sewershed.

Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 1- 3 Existing Overflow Locations and SWMM Model Extents



ALLEGHENY County

WESTMORELAND County

Legend

Outfall Type

- Constructed Outfall
- Overflowing Manhole
- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:12,000

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Author: Peter Smith

Date: 7/1/2013

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2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

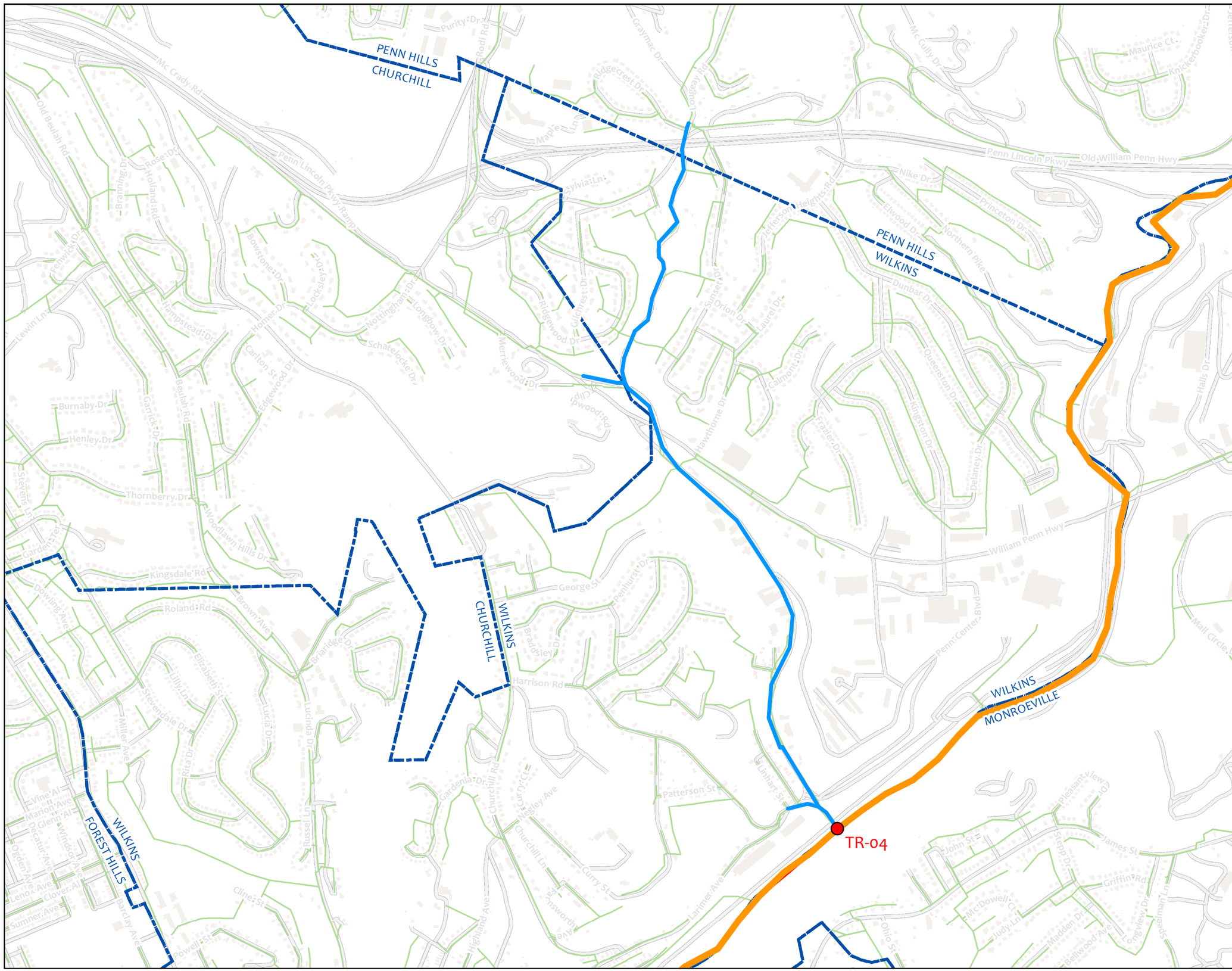
The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

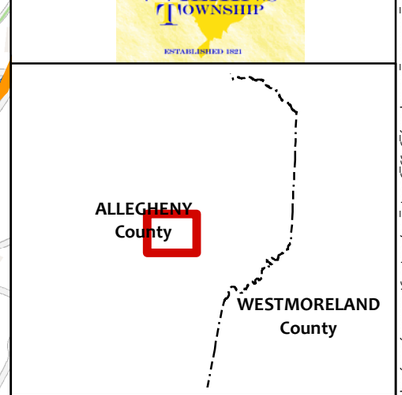
The original H&H model extent included 5,600 LF of trunk sewer upstream from TR-04 along Rodi Road to the Churchill municipal boundary. An additional 3,200 LF of upstream sewer along Lougeay Road from this point to the Penn Hills municipal boundary was modeled. Figure 2-1 depicts the extents of the original H&H model.

Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 2-1 SWMM Model Extents





Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

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1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Author: Peter Smith

Date: 7/1/2013

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Document Path: G:\CLIENT\Monroeville_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-04-02 Rodi Road.mxd

Flow loadings corresponding with flows from tributary sideline connections were aggregated to one downstream loading point in the original H&H model. Because this would tend to increase the downstream peak flows and surcharge while reducing upstream flows and minimize upstream surcharge, the model was revised to redistribute the aggregated flows to loading points corresponding with each sideline connection. Base sewage flows were distributed from the diurnal pattern at the downstream conduit LBs_1203442 to each sideline connection by tributary population. RDII flows were distributed by area.

After revisions to the model were made, verification of the original H&H 2008 calibration year model scenario was required. The 2008 precipitation data series was input into the revised model and a full year simulation was run. A summary of calibration results including a list of selected storms and monthly observed versus modeled scatter plots is provided in Appendix A. The results of this calibration check, specifically for the month of July, indicate that the original model calibration was still valid.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This trunk sewer was monitored in 2008/2009. No additional flow monitoring was performed.

Monitors that were installed in the TR-04 Rodi Road Sewershed are summarized in Table 2-1. The extent of the SWMM model and the flow monitor locations are shown on Figure 2-1.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-04 RODI ROAD SEWERSHED

Municipality	Monitor Name	Monitor Type(1)	Monitor Duration	Comments
Wilkins + Churchill	TR0400_-POC-L-01_	POC	2008-2009	
Wilkins + Churchill	TR-04-00-M1	POC	2004-2005	Historical
Wilkins	TR0400_-IM-S-02_	IM	2008	
Wilkins	TR0400_-IM-S-03_	IM	2008	
Wilkins	TR0400_-IM-S-04_	IM	2008	
Wilkins + Churchill	TR0400_-MB-L-05_	MB	2008	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.)

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

No additional monitoring has been performed since 2009.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-04 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a

significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-04 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Churchill	445	445	0%
Wilkins	604	604	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-04 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Churchill	373	3.4%	3.4%	386
Wilkins	1,325	6.44%	25.00%	1,657

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-04 which were determined by downstream flow monitoring data at monitor TR0400_-POC-L-01. Future BWWFs were extrapolated to year 2046 based on assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-04 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Churchill	445	0.19	0.24	26.2%
Wilkins	604	0.6	0.76	27.1%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-04. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-04 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins and Churchill have complied with ACO and COA requirements pertaining to removing significant sources of I/I from their sewerage facilities and are committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely.

However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-04 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Churchill	445	0.15	0.19	25%
Wilkins	604	0.45	0.56	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-04 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-04 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins and Churchill have complied with ACO requirements pertaining to removing significant sources of I/I from their sewerage facilities and are committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-04 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Churchill	445	0.36	0.36	0%
Wilkins	604	2.45	2.45	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

In the TR-04 Sewershed the four Wilkins / Churchill municipal boundary connections were not monitored due to insufficient flow present to allow for the suitable collection of flow monitor data. The estimation process of these areas is discussed in detail in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed. Note that at this time there are no planned projects in any of the tributary communities.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-04 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Churchill	None	N/A	N/A	N/A
Wilkins	None	N/A	N/A	N/A

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

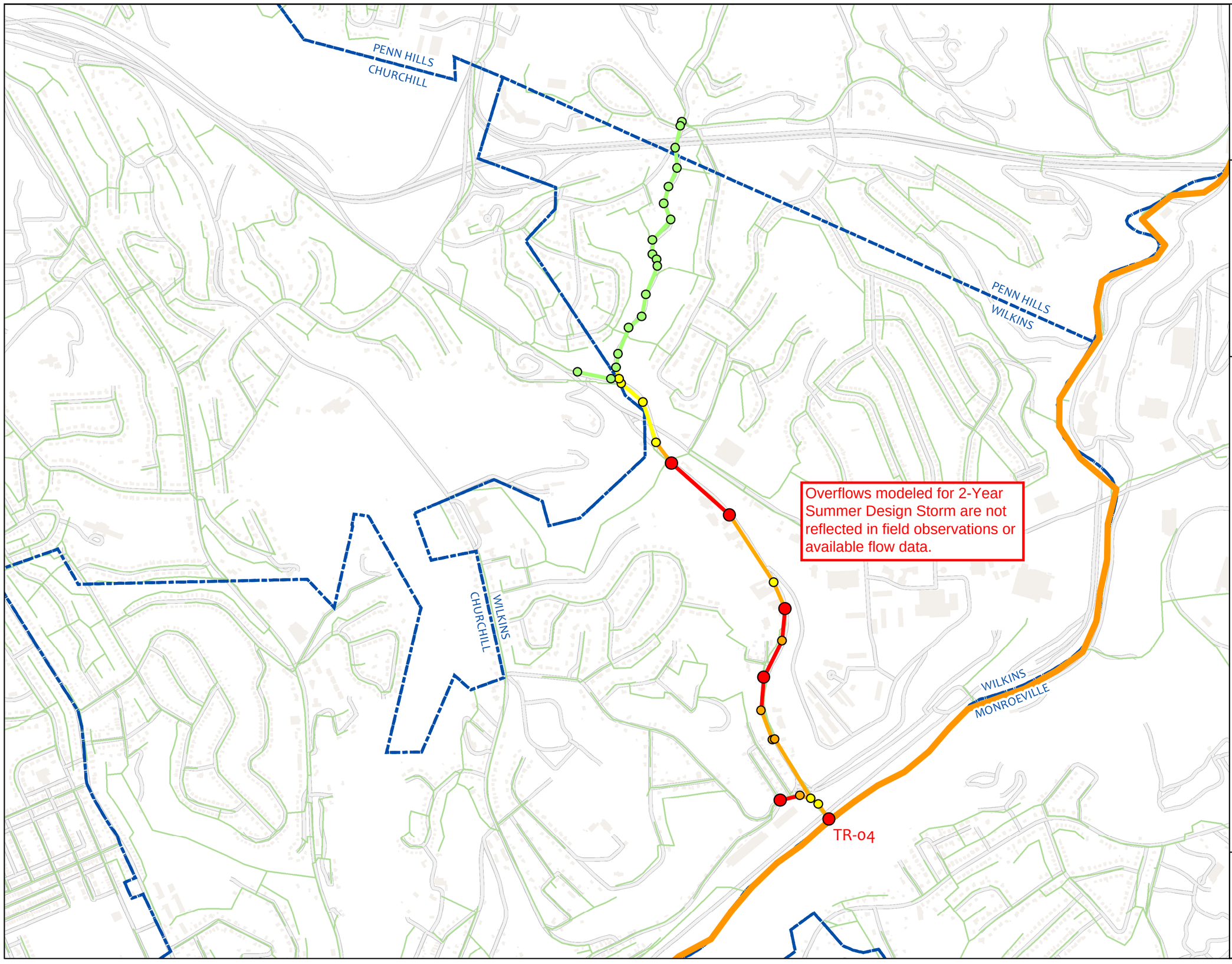
Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Rodi Road trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

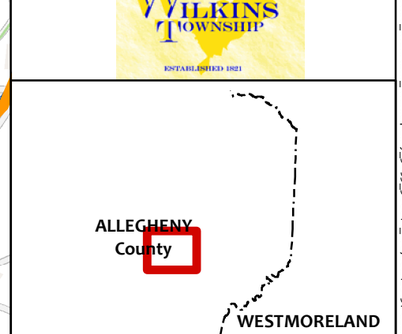
Under 2-Year Summer Design Storm conditions, the Rodi Road trunk sewer is shown to be severely capacity deficient along most of its entire length. The elevation of the modeled HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm. However, there have been no reports of surface overflows through manhole covers along the sewer.

Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions





Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:12,000

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Author: Peter Smith

Date: 7/1/2013

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FIGURE 2-3

TR-04 RODI ROAD PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

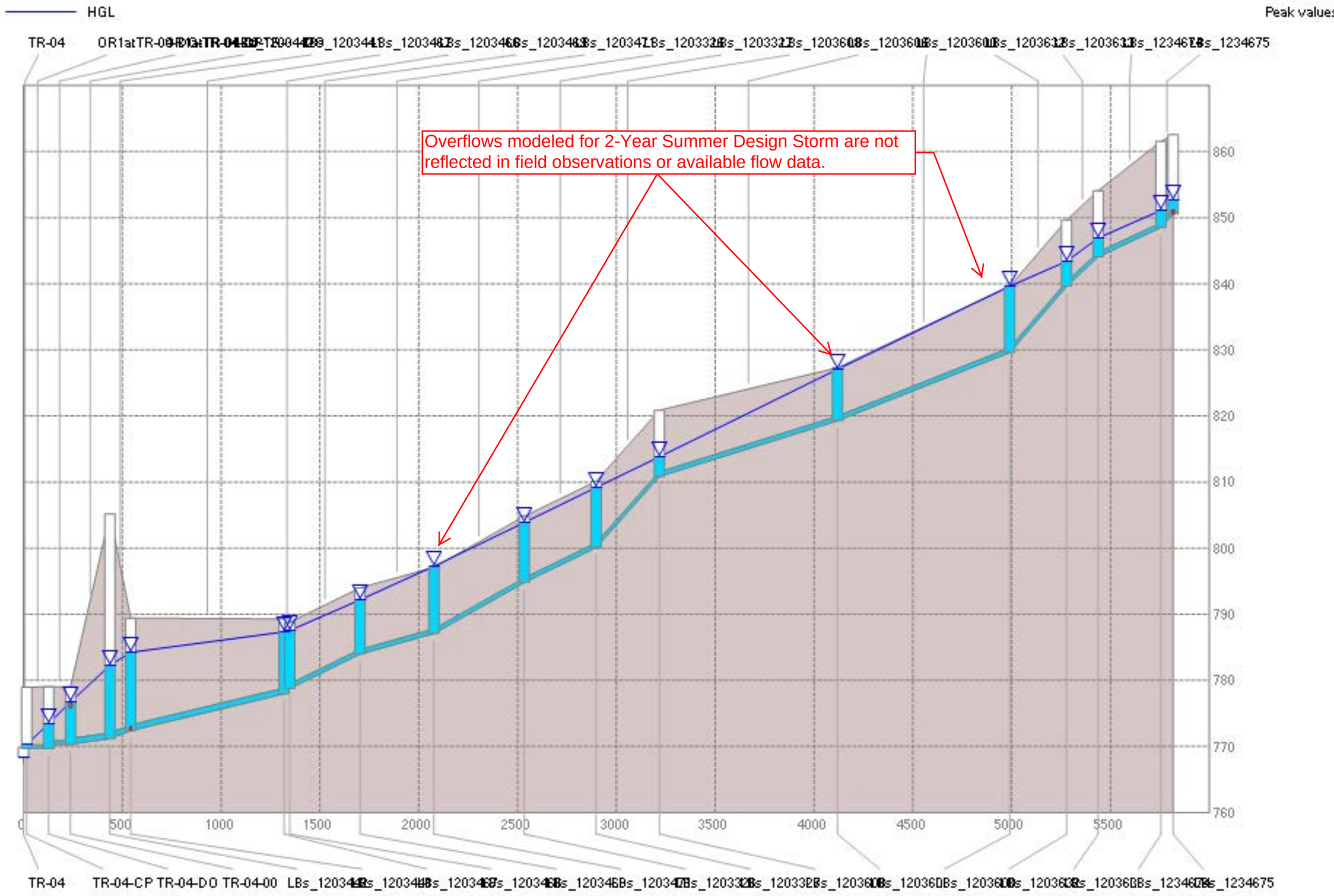


Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Rodi Road trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

Under 10-Year Summer Design Storm conditions, the Rodi Road trunk sewer is shown to be capacity deficient along most of its entire length. The elevation of the modeled HGL is over the invert of the overflow pipe. Therefore, a sanitary sewer overflow is indicated for this design storm. However, there have been no reports of surface overflows through manhole covers along the sewer.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Rodi Road sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

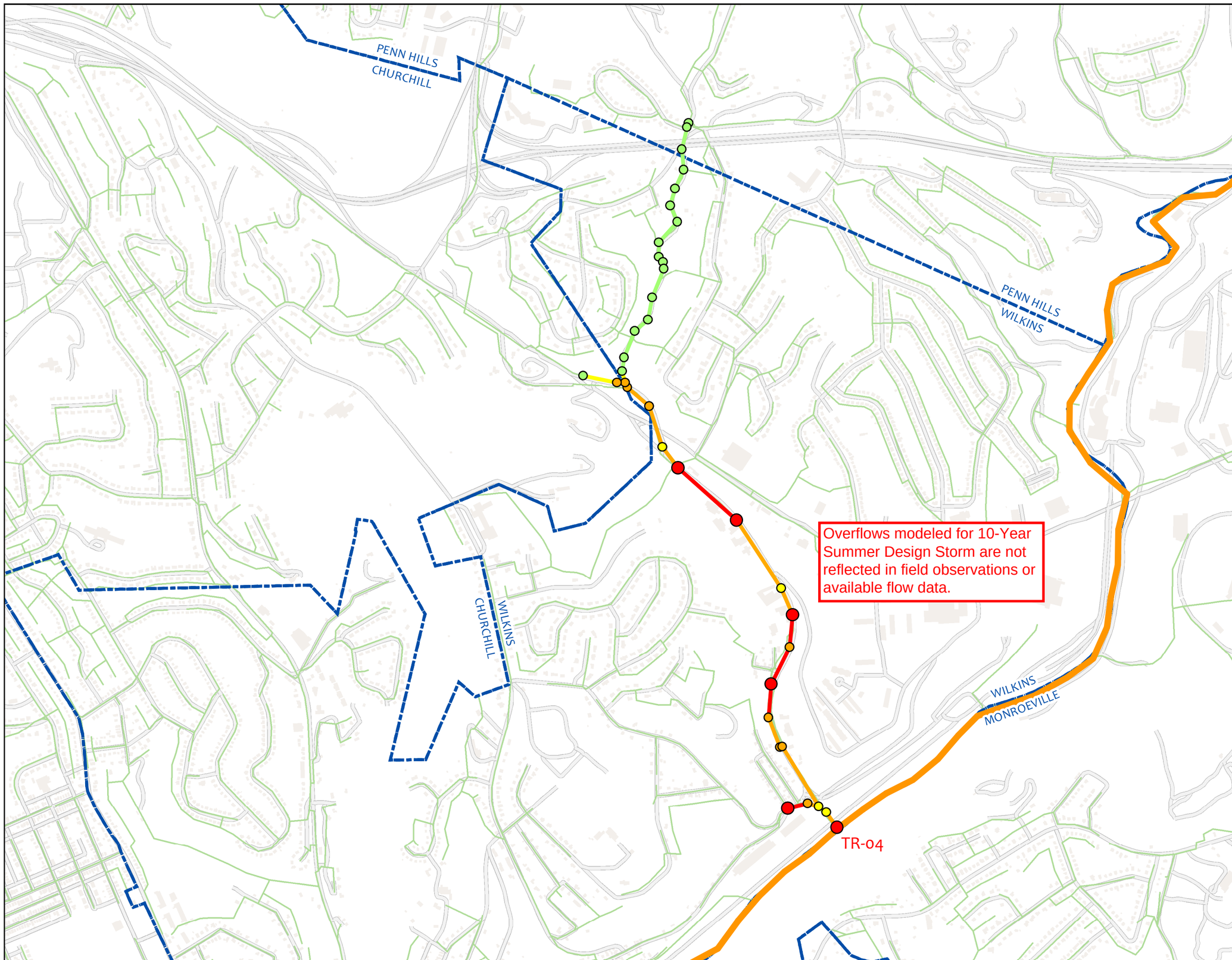
The trunk sewer receives no additional flow from sidelines downstream of Baker Street. Therefore, the capacity requirements are constant and limited by the pipe segment with the shallowest slope. The peak flows for the tributary communities are listed in Table 2-8.

TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Churchill (1)	0.52	0.59	0.7	0.82
Wilkins	2.54	3.22	3.16	4.11

(1) The 2 and 10-Year Peak Flow values for Churchill were provided by Gateway Engineers. The 1 and 5-Year values were interpolated from 2 and 10-Year data.

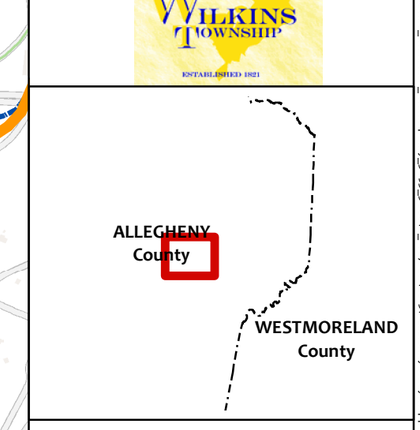
Information for 24-hour volumes for the various Summer Design storm conditions for the tributary communities is listed in Table 2-9.



Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

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1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Author: Peter Smith

Date: 7/1/2013

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FIGURE 2-5

TR-04 RODI ROAD PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

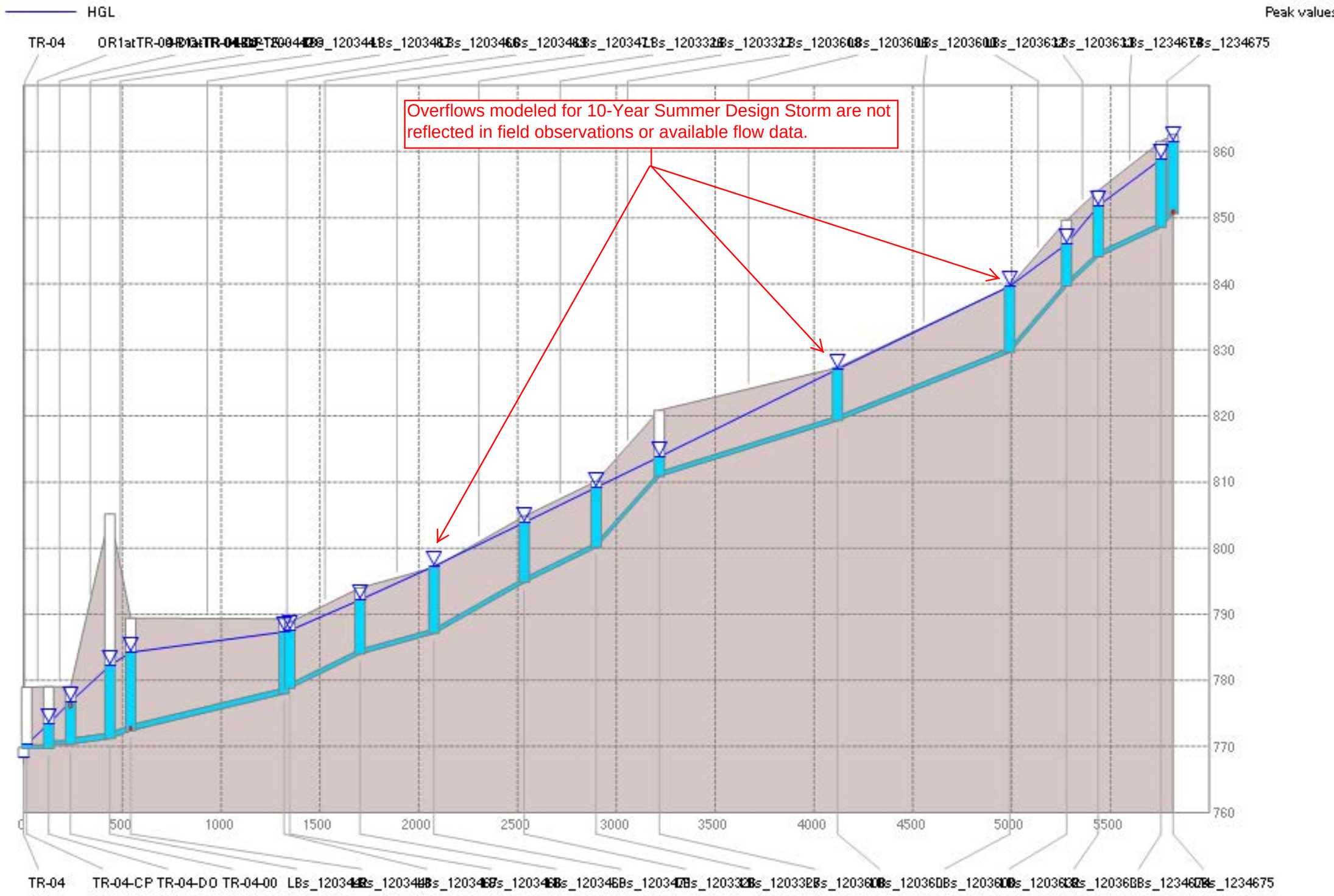


TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Churchill	0.48	0.49	0.54	0.55
Wilkins	2.34	2.67	2.44	2.77

2.3 Overflow Frequency and Volume

The Rodi Road sewershed has a separate sanitary sewer system. There are no tributary combined sewers. Pertinent data for CSOs and SSOs is reported in Tables 2-10 and 2-11.

TABLE 2-10: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR RODI ROAD SEWERSHED

				Peak Rate (mgd)		
CSO Outfall	Owner	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
None	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 2-11: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR TR-04 RODI ROAD SEWERSHED

SSO Outfall	Owner	2-yr Design Storm		10-yr Design Storm	
		Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
TR-04-00	Wilkins, Monroeville, Churchill and Turtle Creek	1.26	0.25	1.3	0.33

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-04 Rodi Road Sewershed is entirely served by separate sanitary sewers. As there are no CSOs, this section is not applicable.

3.1.2 SSO Control Level

The TR-04 Rodi Road Sewershed is entirely served by separate sanitary sewers. Per the COA, all SSOs are illegal and are required to be controlled.

3.2 Recommendations for Control Level

SSO TR-04-00 in the Rodi Road Sewershed is modeled to be active during 2 and 10 year summer design storm conditions. Since the COA requires all SSOs to be controlled, the recommendation for SSO control level is to provide for the most conservative level of control.

4.0 SEWERSHED ALTERNATIVE EVALUATION

4.1 Alternative Development

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.1 Control Technology Screening

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

There are several categories under which control technologies can be grouped based on the point in the system where overflows are controlled. These categories are described below.

Source Control technologies are designed to minimize flows and/or pollutants entering collection systems. For separate sanitary sewer systems, this would include I/I reduction projects. As the Municipality has diligently pursued programs of sewer system deficiency identification and correction, as well as identification and disconnection of downspouts and area drains from all tributary customers, further attempts at Source Control were not considered as applicable to providing the necessary amount of flow reduction to achieve the required level of SSO control.

Collection System Control technologies are introduced into existing sewer systems to enhance their conveyance and/or storage capabilities. Technologies in this category typically increase the system capacity by allowing full utilization of the collection system or allowing for construction of a parallel relief sewer pipe.

Storage technologies store excess wet weather flows until sufficient conveyance and treatment capacity is available in the system. Storage technologies are often divided into the following sub-categories: Conventional Tunnel and Tank Storage. For this sewershed, Tunnel storage was not considered as a viable alternative due to its excessive cost and O&M effort relative to tank storage.

Treatment technologies are designed to provide pollutant removals from wet weather flows prior to their discharge to receiving waters. Treatment technologies may utilize physical, biological, or chemical processes. Depending on specific treatment goals, these processes may also be combined to achieve the desired level of pollutant removal. Since the capacity restrictions begin upstream, an SSO treatment facility would be required to be located upstream. However, there is no available feasible site for a treatment facility. Therefore, treatment technologies for SSO control were not considered as feasible alternatives.

4.1.1.1 Municipal Control Technologies Screening Criteria and Application

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.1.2 Municipal Control Technologies Screening Process

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

4.1.2 Best Management Practices – Green Technology Screening

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-04 Rodi Road Sewershed is entirely served by separate sanitary sewers. Green technologies are primarily applicable to control of CSO or storm system flows. In theory, incorporating green technologies into the system in the tributary area upstream of the SSOs could result in sufficient reduction of I/I rates to control SSOs. However, this area of the sewershed consists of predominantly single family residential development. As current policy does not permit public funds to be spent on improvements to private property, any green technologies would be the responsibility of the homeowners in this area. Furthermore, as the Municipality has diligently pursued the identification and disconnection of downspouts and area drains from all

tributary customers, the overall additional effectiveness of incorporating green technologies is uncertain.

4.1.3 Site Screening

The Rodi Road Trunk Sewer runs along Rodi Road through a wide ravine bounded by a stream on one side and Rodi Road on the other. The limited amount of potentially usable flat land has been developed with commercial/industrial facilities, and therefore is not considered to be available. One potential location for a storage tank is located along Rodi Road approximately 1000 LF downstream of the William Penn Highway overpass. This site was considered in model runs for storage costing purposes. However, this location would require digging into a steep hillside to situate the tank between the creek and the hillside. Therefore, it has extremely limited feasibility as a potential site.

4.1.4 Formation of Control Alternatives

The Rodi Road Sewershed has one active SSO that is illegal per the COA and must be eliminated from the system by 2026. To achieve compliance with the COA, two general categories of control alternative are available: Storage and Conveyance.

The alternatives that were developed for evaluation in the TR-04 Rodi Road Sewershed are described below.

Storage alternatives include above or below ground storage tanks and tunnels that are designed to accept and hold excess flows from the system such that surcharging is minimized and bypassing is eliminated. For purposes of this analysis, only above ground storage with a pump-in and pump-out configuration was considered. This is due to three reasons. The first is that underground tanks and tunnels are considerably more expensive to install and maintain than above ground tanks. Secondly, the geography of the system and the use of above ground tanks require a pump-in configuration. Thirdly, the pump out configuration is intended to provide maximum control of returning flow back to the system after the storm event flows have subsided.

Storage was modeled at the only potential site which is located upstream at MH LBs_1203600 near the intersection of Hawthorne Dive and Rodi Road. It was determined to be ineffective to reduce downstream surcharging and overflows at TR-04 for both the 2 and 10-Year Design Storm Conditions. Even with the storage facilities, additional downstream conveyance facilities would still have been required.

Conveyance alternatives include replacement of existing pipe and installation of parallel pipe. Replacement of existing pipe usually consists of removing the existing pipe and manholes and installing a larger diameter pipe and new manholes with improved sewer alignment and flow channel hydraulics. Sewer replacement tends to be a more expensive alternative than a parallel sewer due to the larger pipe diameters, increased number of manholes required and additional by-pass pumping effort required during construction. However, it may be more a more feasible alternative if the condition of the existing sewer is significantly degraded. Additionally, replacement becomes more feasible if it is desired to move the existing sewer out of a stream or if there is not enough space for a parallel sewer.

Parallel pipe installation is generally a lower cost alternative than pipe replacement due to smaller pipe diameter, fewer manholes and reduced requirements for by-pass pumping during construction. It tends to be more feasible when the condition of the existing indicates a reasonable remaining service life and there is sufficient space available for the installation of the parallel pipe.

4.2 Evaluation Criteria Development

As there are a limited number of feasible alternatives for this sewershed, a weighted criteria approach was determined to be unnecessary. The primary gauge of effectiveness for SSO sewersheds is compliance with the COA where SSOs are controlled to specified design storm conditions. The second criterion is cost. Finally, consideration is given to non-economic factors such as future operations and maintenance burden on the municipality and extent of disruption to the community that the project may cause during its lifespan.

4.3 Cost Estimates

Table 4-1 lists the alternatives evaluated for the TR-04 Rodi Road Sewershed to meet a control level for 2 and 10-Year, 24-Hour summer design storms. Cost estimates were developed using the ALCOSAN ACT tool. The municipality independently developed total present worth cost estimates including operation and maintenance costs for 20 years. While the ACT tended to produce slightly higher costs, the results from the two costing methodologies were within 15%. Therefore, cost estimates from the ACT tool were used. Alternatives considered for the Rodi Road sewershed are described below.

Manhole Replacement

This alternative would include the replacement of manholes where they are deteriorated, leaking through sides or covers, or have inefficient hydraulic flow channels. This alternative is not feasible for the Rodi Road sewershed because it will not achieve compliance with the COA.

Conveyance - Pipe Replacement – POC to Churchill/Wilkins Municipal Boundary

This alternative includes the replacement and upsizing of 5,610 LF of pipe from POC TR-04-02 to manhole LBs_1234675 at the Churchill / Wilkins municipal boundary. The downstream portion requires a 320 LF boring below a 30 LF deep track of land which is owned by the railroad where an active rail line is still present. Per the ACT this boring would cost $586,000.

Conveyance – Parallel Pipe

This alternative was not evaluated as there are the existing two trunk sewers from Churchill/Wilkins and Penn Hills, which leaves limited space along Rodi Road for an additional sewer line.

TABLE 4-1: LISTING OF ALTERNATIVES EVALUATED FOR TR-04 RODI ROAD SEWERSHED

Alternative Name	System Type	Control Level	Description	ACT Total Present Worth Cost
Manhole Replacement	SSO	2-year, 24-hour summer design storm	N/A	N/A
Pipe Replacement TR-04 to LBs_1234675 Churchill MB Includes 320 LF Boring	SSO	2-year, 24-hour summer design storm	1,860 LF @ 15-inch 3,750 LF @ 12-inch Boring - 320 LF @ 24-inch	$6,941,000
		10-year, 24-hour summer design storm	1,540 LF @ 18-inch 2,920 LF @ 15-inch 830 LF @ 12-inch Boring - 320 LF @ 24-inch	$7,036,000
Crossover Connections to Penn Hills Trunk Sewer	SSO	2-year, 24-hour summer design storm	400 LF @ 12-inch	$1,728,000
		10-year, 24-hour summer design storm	500 LF @ 15-inch	$1,827,100
Storage	SSO	2-year, 24-hour summer design storm	0.25 MG Storage 780 LF @ 12-inch Boring - 320 LF @ 24-inch	$6,574,000
		10-year, 24-hour summer design storm	0.3 MG Storage 2,340 LF @ 12-inch Boring - 320 LF @ 24-inch	$7,781,000

<u>Conveyance – Cross Connection – Rodi Road Cross Connections to Penn Hills Trunk Sewer</u>

This alternative includes the installation of multiple cross connections to divert all flows from the shared Wilkins/Churchill Trunk Sewer into the Penn Hills Trunk Sewer. This would result in the complete removal of Wilkins and Churchill flows tributary to TR-04, and would free up an equal amount of capacity along the Thompson Run Interceptor. Based on the existing H&H model, the 2-Year Design Storm condition required 4 relief connections. The 10-Year required 5

connections. Each relief connection was assumed to be 100 LF for conservative purposes. This alternative also includes tap-in fees for Wilkins and Churchill as required by Penn Hills.

Storage and Replacement

Storage alternatives included a 0.25 MG tank and 0.3 MG tank for the 2 and 10 Year Design Storm conditions. The location of the tank is at MH LBs_1203600 which is along Rodi Road approximately 1,000 LF downstream of the William Penn Highway overpass. For 2-Year Storm conditions the tank was sufficient to eliminate surcharging along the central portion of the trunk sewer. However, downstream surcharge caused by additional flows resulted in overflowing at the SSO TR-04. This required an additional 780 LF of pipe replacement. Additionally, the 320 LF boring was still required. The 10-Year storm required an additional 1,200 LF of upstream conveyance increase to convey flows from the Churchill Municipal Boundary to the site of the storage tank.

4.4 Alternative Selection Process

Conveyance - The Conveyance Cross Connection Alternative is by far the least expensive alternative. Note that a minimum 12-inch pipe diameter was assumed for conveyance replacement alternatives. Also, the Conveyance Replacement alternatives included the 320 LF boring under railroad property near TR-04. The Conveyance Cross Connection alternative did not require this boring.

Storage – Storage alternatives were the 2nd lowest cost of the alternatives. However, Storage was only slightly less expensive than the Conveyance Replacement Alternatives. As Storage alternatives include significantly increased long term maintenance effort than underground pipes, at a similar cost preference would tend to be given to Conveyance Replacement. Additionally, Storage alternatives still required additional conveyance increases, and also the 320 LF downstream boring to be constructed.

4.5 Alternative Evaluation Results

The Conveyance – Crossover Alternative for the 10-Year Summer Design Storm is the most cost-effective alternative for the Rodi Road Sewershed tributary to Thompson Run Interceptor POC TR-04. However, as of the date of this report, no agreement exists among the municipalities of Wilkins, Churchill and Penn Hills to facilitate this project. The development and execution of such an agreement will be pursued. If such an agreement cannot be reached by the time that the alternative for eliminating the upstream surcharging and downstream overflow in this sewershed must be designed and constructed, the Conveyance – Replacement project will be undertaken.

5.0 COST-EFFECTIVE ALTERNATIVE

5.1 Cost-Effective Alternative Description

The cost-effective alternative consists of a conservative allowance of five crossover connections, each assumed to be 100 LF long and 15-inches in diameter, from the Churchill/Wilkins municipal boundary downstream to TR-04. Churchill is allocated one cross connection at the Wilkins / Churchill municipal boundary, and four cross connections for Wilkins. The actual number of required crossover connections will be determined at the time of final design. Figure 5-1 provides a GIS map of the Churchill/Wilkins, and Penn Hills trunk sewers with the crossover points highlighted. Figure 5-2A provides a hydraulic grade line profile at the time of peak flow during 10-Year Summer Design Storm conditions for the Churchill/Wilkins trunk sewer tributary to TR-04. Figure 5-2B provides the same for the Penn Hills Trunk sewer tributary to its POC at LBs_1291861. Table 5-1 presents a summary of present worth costs for this alternative.

TABLE 5-1: SUMMARY OF UNTREATED OVERFLOW VOLUME AND PRESENT WORTH COSTS FOR COST-EFFECTIVE ALTERNATIVE – ALL CONTROL LEVELS

Alternative Name	CSO Control					
	Untreated CSO Volume (MG)	CSO Control Level	PW Capital Cost (1) ($ million)	PW O&M Cost ($ million)	PW R&R Cost ($ million)	TPW CSO Control ($ million)
N/A	N/A	10	N/A	N/A	N/A	N/A
N/A	N/A	4	N/A	N/A	N/A	N/A
N/A	N/A	0	N/A	N/A	N/A	N/A
Alternative Name	**SSO Control**					
	Untreated SSO Volume (MG)	**SSO Control Level**	**PW Capital Cost (1) ($ million)**	**PW O&M Cost ($ million)**	**PW R&R Cost ($ million)**	**TPW SSO Control ($ million)**
Crossover Connections to Penn Hills Trunk Sewer	0	10-Year 24 Hour Design Storm	$0.457	$0.012	$0	$0.468
					TPW Cost To Wilkins + Churchill: (2)	$0.457
					Wilkins Tap In Fee Assessed by Penn Hills:	$0.75
					Churchill Tap In Fee Assessed by Penn Hills:	$0.621
					TPW CSO and SSO Control ($ million):	$1.838

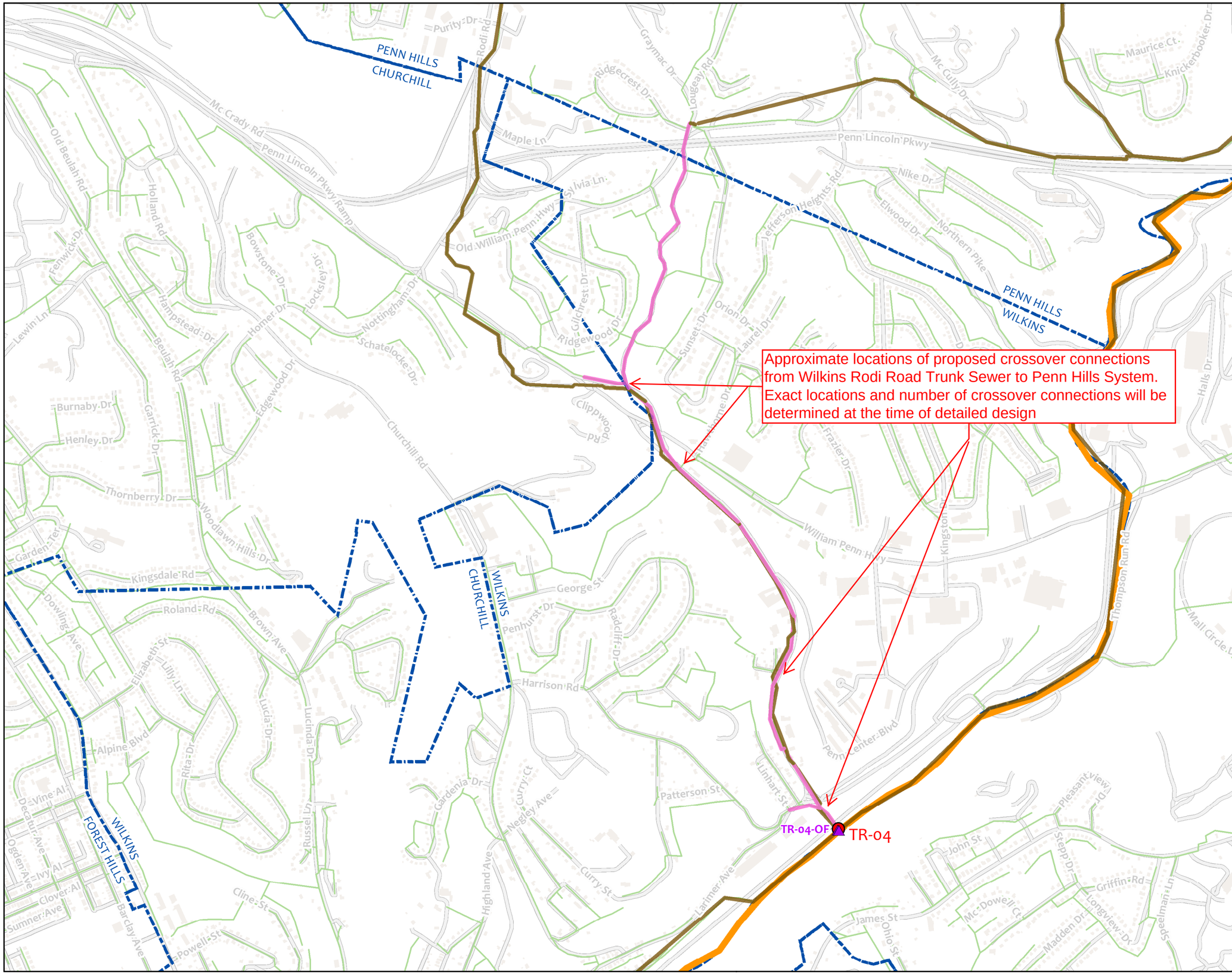
(1) Total Project Costs (Construction + Contingency + Soft Costs)

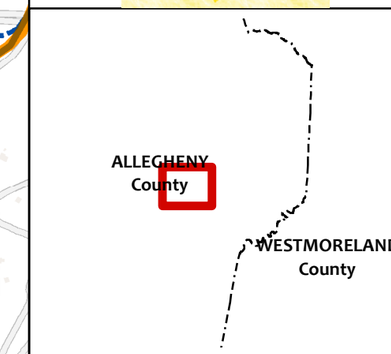
(2) Cost distributions based on allocation of one crossover connection to Churchill and four to Wilkins.

Sewershed Feasibility Study Report

TR-04 Rodi Road Sewershed

Figure 5-1 Prefered Alternative





Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Prefered Alternative

- Penn Hills (Separate)
- Wilkins+Churchill (Separate)

N

1:11,989

1 inch = 999.052665 feet

0 500 1,000 2,000 Feet

Author: Patrick Moulden

Date: 7/1/2013

CHESTER ENGINEERS

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FIGURE 5-2A

TR-04 WILKINS RODI ROAD TRUNK SEWER PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE

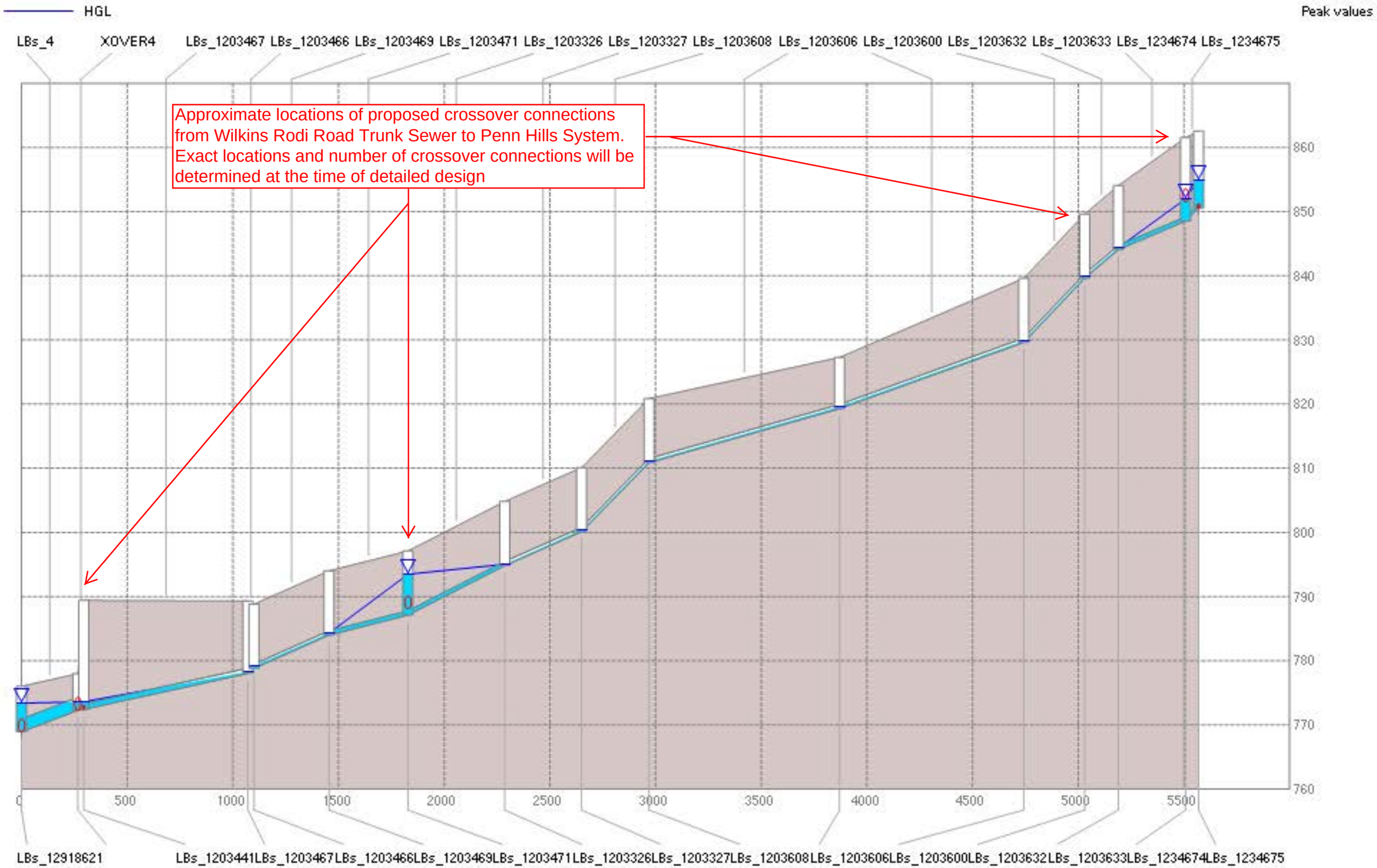
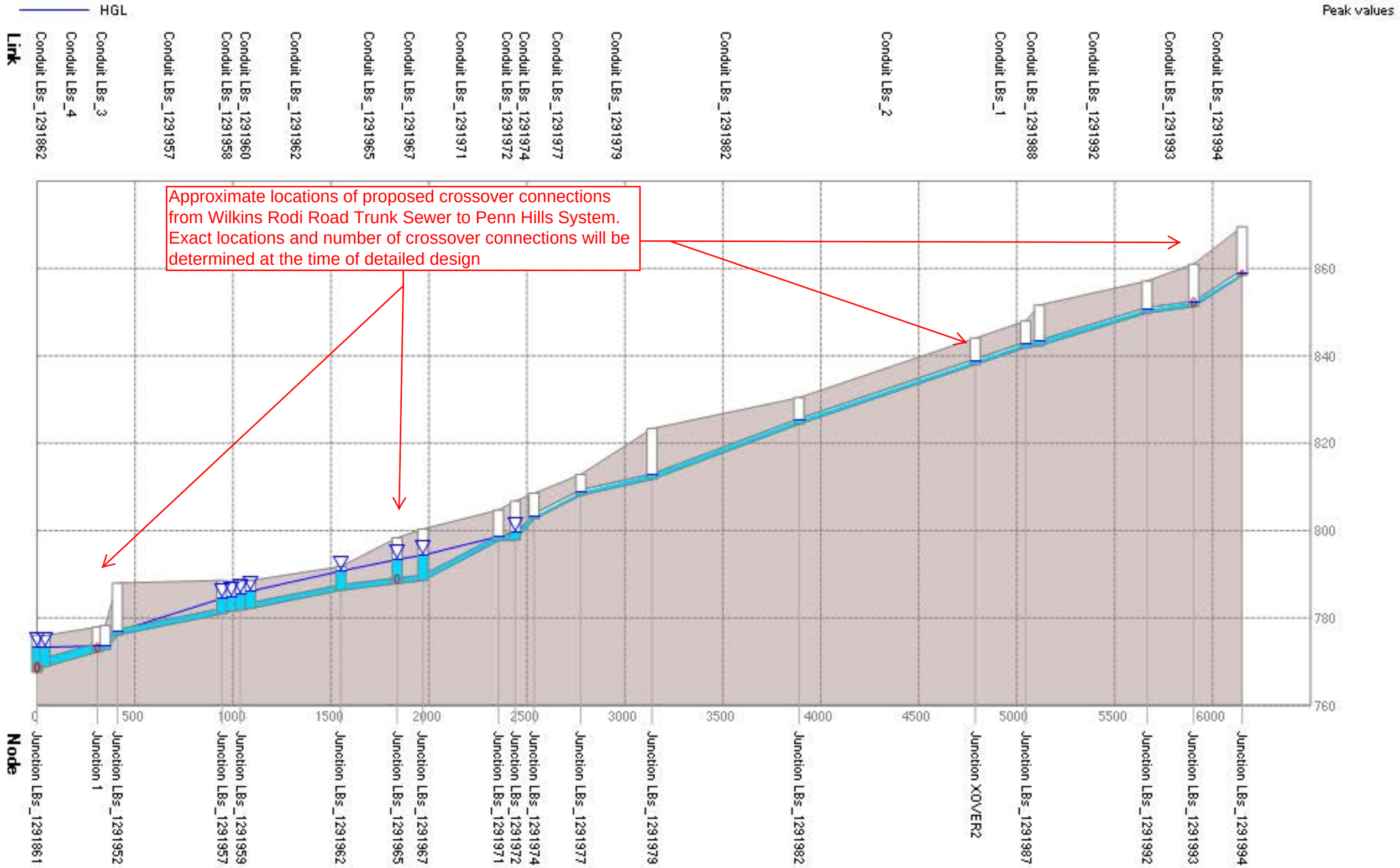


FIGURE 5-2B

PENN HILL RODI ROAD TRUNK SEWER PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE



5.2 Cost-Effective Alternative Operation and Maintenance

Wilkins Township, Churchill Borough, and Penn Hills will pursue a practice of continuous proactive system of inspection and maintenance. The cost-effective alternative operation and maintenance will include the following.

1. Continuous flow monitoring and data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of critical sewers at least once every 7 years, and non-critical sewers at least once every 15 years.
3. System cleaning as necessary.
4. System maintenance as necessary.

Note that implementation of the cost-effective alternative will result in Churchill flows no longer being tributary to any portion of the Rodi Road Trunk Sewer. For specific information pertaining to operations and maintenance for Churchill reference is made to the Churchill Feasibility Study Report.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-04 Rodi Road sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Rodi Road Sewershed is tributary to the Thompson Run Interceptor at POC TR-04, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital

improvements to convey flows from POC TR-04 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61.

Under the cost-effective alternative the flows from the Rodi Road Sewershed would be routed to the Penn Hills Interceptor which ties into the ALCOSAN system at T-04-02 approximately 11,500 LF downstream. From T-04-02 flows travel to ALCOSAN Structure M-61, and as described above to the ALCOSAN Structure M-29.

As there are many overflow structures and tributary downstream communities between the TR-04 sewershed and M-29, any work done in the Rodi Road Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-04 Rodi Road Sewershed provides service to customers within Wilkins Township and Churchill Borough. Neither Churchill Borough nor Wilkins Township differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. Additionally, appropriate inter-municipal agreements will require execution prior to the design and construction of the final selected alternative.

Cost distributions shown for the Cost Effective Alternative were based on the assumption that Churchill will be allocated one cross connection, and Wilkins allocated four cross connections Based on the ACT cost estimates the total present worth costs are estimated to be approximately $95,000 for Churchill and $362,000 for Wilkins. The tap-in fees requested by Penn Hills are $620,100 for Churchill and $750,000 for Wilkins. The cost distributions are considered as preliminary and subject to change in the future. The involved communities retain their right to arrive at their own cost distribution methodology which will occur by formal inter-municipal agreement prior to the time of project design.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Rodi Road

Appendix A
Summary of Model Calibration Verification

TR-04 Rodi Road Sewershed

Model Revision

Summary of Monthly Calibration Scatterplots (Observed X-Axis vs. Modeled Y-Axis)

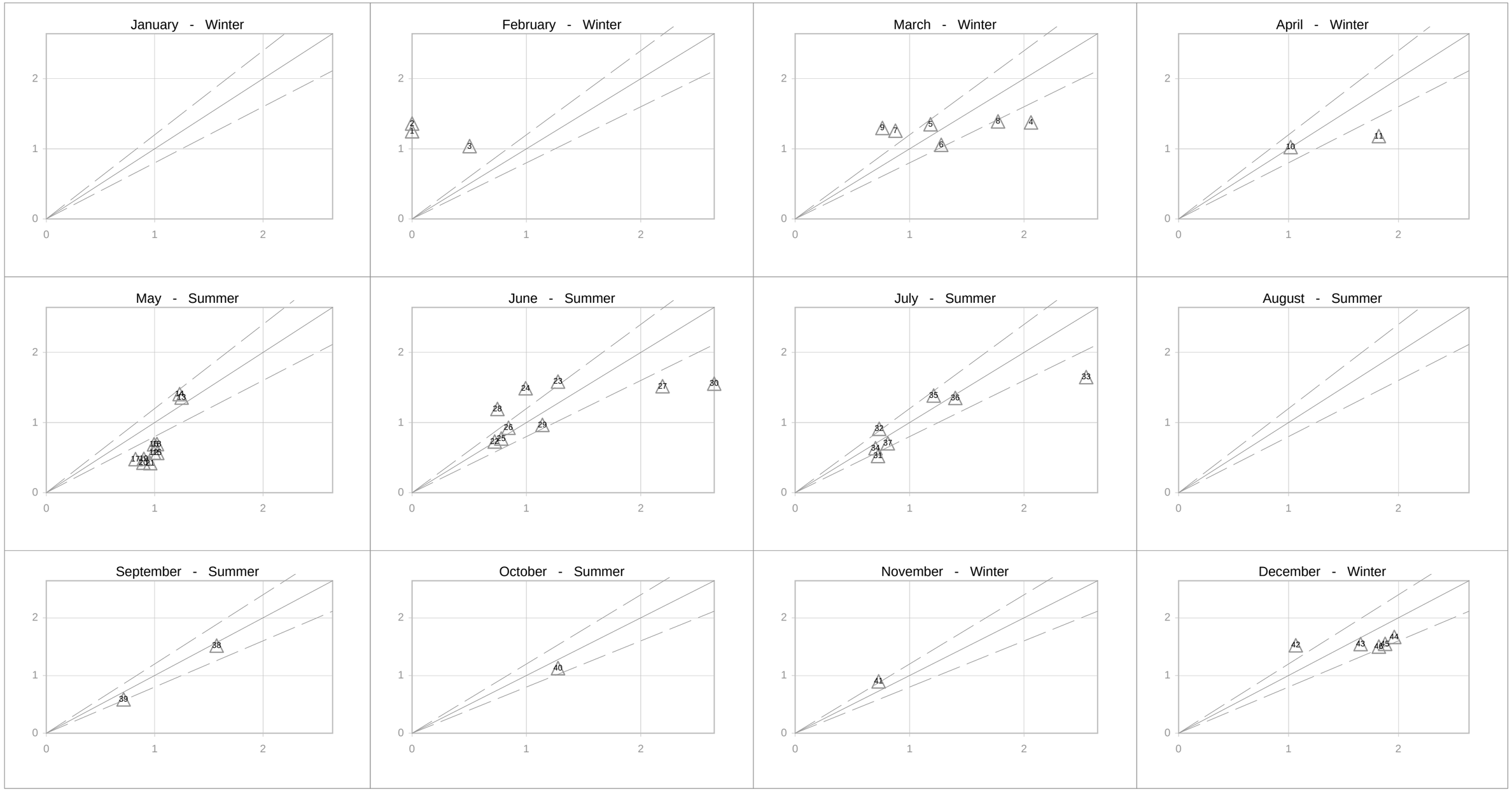
Peak Flow (mgd)

TR0400_POC_L_01

Observed							Modeled					
Event summary for LBs_1203442(Q_obs) Flow (mgd) (46 events)							Event summary for LBs_1203441 Flow (mgd) (46 events)					
Event	Date	Duration (h)	Maximum Flow (mgd)	Mean Flow (mgd)	Total Flow (MG)		Event	Date	Duration (h)	Maximum Flow (mgd)	Mean Flow (mgd)	Total Flow (MG)
January												
February												
1	02/05/2008 4:25	15.67	0	0	0		1	02/05/2008 4:25	15.67	1.25	0.6743	0.4402
2	02/06/2008 13:10	15.5	0	0	0		2	02/06/2008 13:10	15.5	1.361	0.7777	0.5023
3	02/29/2008 18:25	14.75	0.503	0.4071	0.2502		3	02/29/2008 18:25	14.75	1.039	0.8398	0.5162
March												
4	03/04/2008 1:15	32	2.06	1.65	2.201		4	03/04/2008 1:15	32	1.377	0.9878	1.317
5	03/07/2008 8:05	21.67	1.183	0.8476	0.7652		5	03/07/2008 8:05	21.67	1.35	0.9641	0.8703
6	03/08/2008 1:10	21.42	1.276	1.064	0.9493		6	03/08/2008 1:10	21.42	1.057	0.9009	0.8039
7	03/14/2008 10:55	21.5	0.876	0.5642	0.5054		7	03/14/2008 10:55	21.5	1.259	0.9426	0.8444
8	03/18/2008 22:20	35.5	1.772	0.9753	1.443		8	03/18/2008 22:20	35.5	1.392	0.9901	1.464
9	03/27/2008 17:35	26	0.762	0.4415	0.4783		9	03/27/2008 17:35	26	1.298	0.9278	1.005
April												
10	04/20/2008 1:40	17.83	1.019	0.4947	0.3676		10	04/20/2008 1:40	17.83	1.025	0.6666	0.4953
11	04/27/2008 22:55	24.25	1.822	0.7023	0.7096		11	04/27/2008 22:55	24.25	1.182	0.7412	0.7489
May												
12	05/03/2008 11:15	15.92	0.993	0.4111	0.2726		12	05/03/2008 11:15	15.92	0.5703	0.4177	0.277
13	05/08/2008 2:05	15.75	1.249	0.4825	0.3167		13	05/08/2008 2:05	15.75	1.357	0.5646	0.3705
14	05/09/2008 20:40	35.08	1.23	0.6409	0.9369		14	05/09/2008 20:40	35.08	1.406	0.5414	0.7915
15	05/14/2008 13:00	17.08	1.024	0.4999	0.3558		15	05/14/2008 13:00	17.08	0.5676	0.389	0.2769
16	05/16/2008 5:05	15.92	0.994	0.492	0.3263		16	05/16/2008 5:05	15.92	0.6902	0.5175	0.3432
17	05/16/2008 21:10	14.17	0.823	0.4582	0.2705		17	05/16/2008 21:10	14.17	0.4785	0.4107	0.2424
18	05/17/2008 8:25	30.67	1.021	0.4423	0.5651		18	05/17/2008 8:25	30.67	0.6932	0.4263	0.5447
19	05/19/2008 3:10	51.42	0.9	0.4597	0.9847		19	05/19/2008 3:10	51.42	0.482	0.361	0.7734
20	05/21/2008 13:55	16.67	0.896	0.3751	0.2605		20	05/21/2008 13:55	16.67	0.427	0.3613	0.2509
21	05/22/2008 7:20	14.25	0.959	0.4485	0.2663		21	05/22/2008 7:20	14.25	0.4212	0.3789	0.225
June												
22	06/04/2008 4:00	14	0.722	0.4724	0.2756		22	06/04/2008 4:00	14	0.7294	0.4846	0.2827
23	06/13/2008 6:50	15.67	1.276	0.4814	0.3142		23	06/13/2008 6:50	15.67	1.585	0.6316	0.4123
24	06/13/2008 17:00	17	0.993	0.5068	0.359		24	06/13/2008 17:00	17	1.489	0.618	0.4378
25	06/14/2008 10:00	16.58	0.78	0.5025	0.3472		25	06/14/2008 10:00	16.58	0.772	0.5622	0.3884
26	06/26/2008 0:40	15.25	0.843	0.4083	0.2594		26	06/26/2008 0:40	15.25	0.9262	0.5767	0.3664
27	06/26/2008 14:25	27.08	2.19	0.5743	0.648		27	06/26/2008 14:25	27.08	1.518	0.5862	0.6615
28	06/28/2008 13:30	14.25	0.746	0.3925	0.2331		28	06/28/2008 13:30	14.25	1.194	0.5423	0.322
29	06/29/2008 12:00	18.67	1.14	0.5045	0.3924		29	06/29/2008 12:00	18.67	0.967	0.4767	0.3708
30	06/30/2008 9:50	41.75	2.642	0.8424	1.465		30	06/30/2008 9:50	41.75	1.555	0.5551	0.9656
July												
31	07/02/2008 2:30	14.33	0.724	0.376	0.2245		31	07/02/2008 2:30	14.33	0.5234	0.4609	0.2753
32	07/03/2008 10:40	14.25	0.734	0.3435	0.204		32	07/03/2008 10:40	14.25	0.9106	0.5785	0.3435
33	07/08/2008 14:40	19.17	2.542	0.6015	0.4804		33	07/08/2008 14:40	19.17	1.649	0.6011	0.4801
34	07/22/2008 3:15	14	0.702	0.4546	0.2652		34	07/22/2008 3:15	14	0.6351	0.4597	0.2682
35	07/23/2008 6:40	15.67	1.21	0.5073	0.3312		35	07/23/2008 6:40	15.67	1.385	0.6015	0.3926
36	07/30/2008 11:20	15.17	1.399	0.4894	0.3093		36	07/30/2008 11:20	15.17	1.351	0.5814	0.3674
37	07/31/2008 13:40	14.58	0.809	0.4368	0.2654		37	07/31/2008 13:40	14.58	0.7042	0.4894	0.2974
August												
September												
38	09/12/2008 1:50	29.25	1.572	0.6194	0.7549		38	09/12/2008 1:50	29.25	1.518	0.6227	0.7589
39	09/13/2008 12:40	14.17	0.713	0.4164	0.2458		39	09/13/2008 12:40	14.17	0.5865	0.4209	0.2485
October												
40	10/25/2008 0:25	21.5	1.276	0.6069	0.5437		40	10/25/2008 0:25	21.5	1.128	0.6297	0.5641
November												
41	11/15/2008 0:15	14.08	0.729	0.4318	0.2534		41	11/15/2008 0:15	14.08	0.8986	0.5786	0.3395
December												
42	12/09/2008 23:10	21.83	1.066	0.5997	0.5456		42	12/09/2008 23:10	21.83	1.523	1.155	1.051
43	12/11/2008 8:55	41.92	1.656	0.809	1.413		43	12/11/2008 8:55	41.92	1.545	1.051	1.835
44	12/19/2008 1:50	40.75	1.962	0.957	1.625		44	12/19/2008 1:50	40.75	1.669	1.031	1.75
45	12/23/2008 23:50	49	1.879	1.017	2.076		45	12/23/2008 23:50	49	1.549	1.03	2.104
46	12/26/2008 2:00	67.33	1.822	0.8364	2.347		46	12/26/2008 2:00	67.33	1.502	0.7776	2.182

TR-04 Rodi Road Sewershed
Model Revision
Summary of Monthly Calibration Scatterplots (Observed X-Axis vs. Modeled Y-Axis)
Peak Flow (mgd)

TR0400_POC_L_01



Appendix D
TR-03-08 Churchill Road Sewershed

FEASIBILITY STUDY REPORT

For

TR-03-08 CHURCHILL ROAD

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

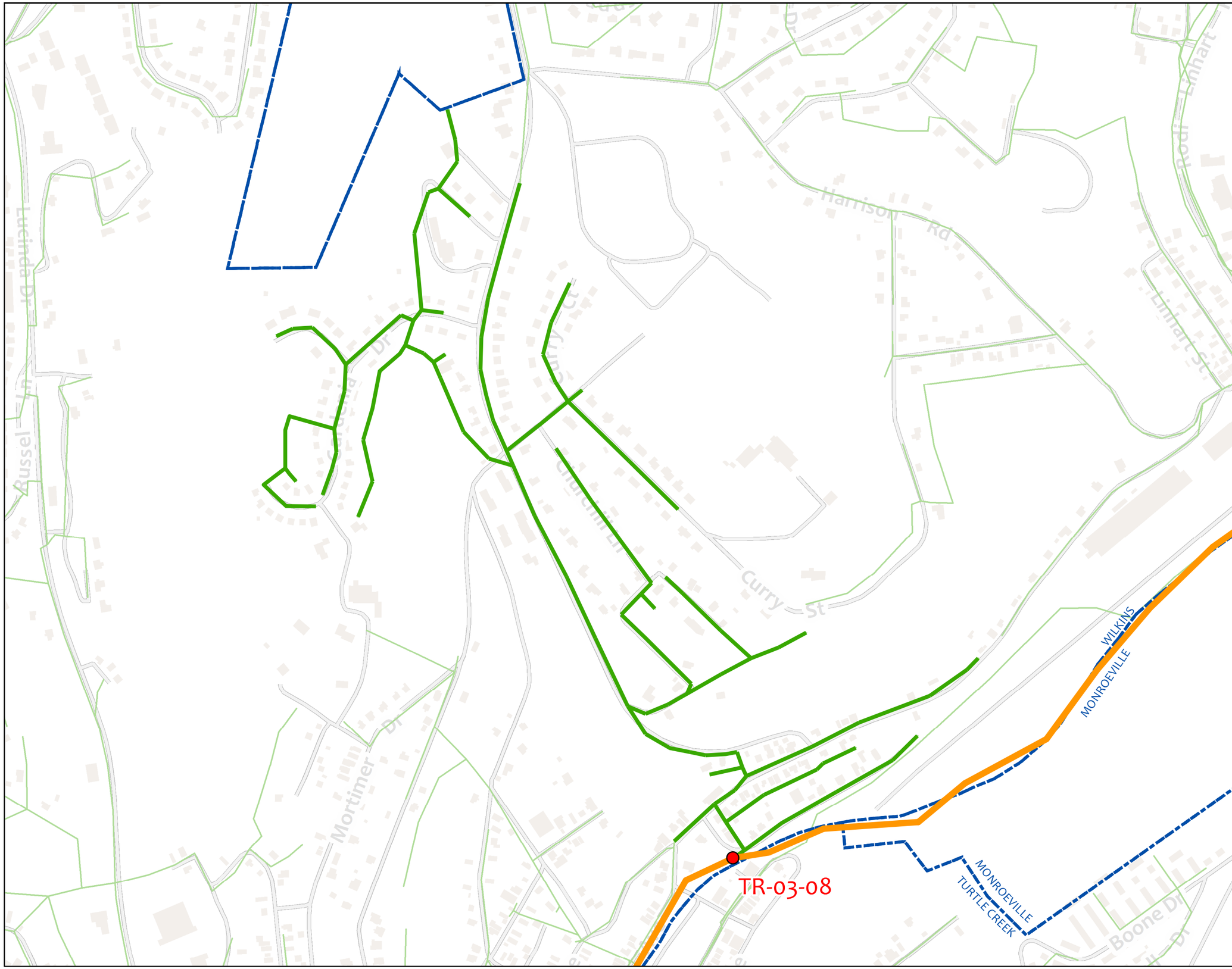
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-03-08 Churchill Road Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

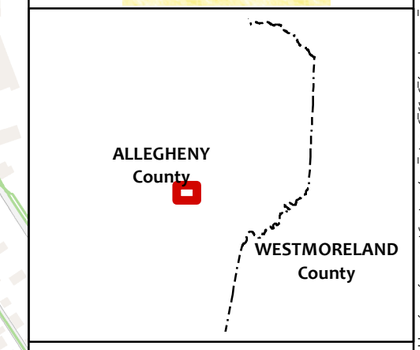
The TR-03-08 Churchill Road Sewershed is located in the southeastern section of Wilkins Township. The sewershed is comprised of entirely separate sewers which provide service to single family residential and a small number of residential apartment buildings. A map of the TR-03-08 Churchill Road Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows is this sewershed is presented in Figure 1-2.



Sewershed Feasibility Study Report

TR-03-08 Churchill Road Sewershed

Figure 1-1 Sewershed Map



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Separate)

N

1:4,800

1 inch = 400 feet

0 200 400 800 Feet

Author: Patrick Moulden

Date: 4/26/2013

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Figure 1-2: Sewershed Schematic

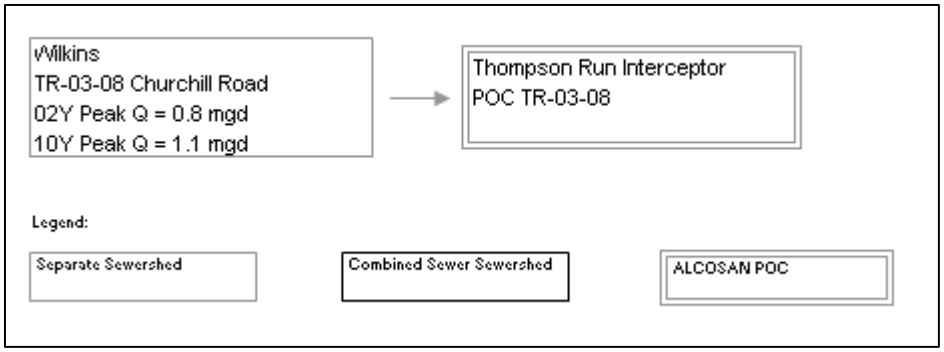


Table 1-1 lists information for the Churchill Road Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the person per household figure of 2.14 for Wilkins Township from the 2010 US Census. The Churchill Road Sewershed has a separate sanitary sewer system. There are no combined sewers. Information on the storm sewers in the Churchill Road area is not available.

TABLE 1-1: TR-03-08 CHURCHILL ROAD AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Wilkins	TR-03-08	54	218	2.14	467

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Churchill Road Sewershed.

TABLE 1-2: TR-03-08 CHURCHILL ROAD COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0	0	0

(1) Combined Sewer information obtained from 3RWW GIS Web Map. There are no combined sewers in this sewershed.

TABLE 1-3: TR-03-08 CHURCHILL ROAD SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	28.4	18,654	0.53

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-4: TR-03-08 CHURCHILL ROAD STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-03-08 Churchill Road Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-03-08 Churchill Road Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

There are no reported constructed discharge or other overflow locations in the TR-03-08 Churchill Road Sewershed.

1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the separate sanitary sewer system in the TR-03-08 Churchill Road Sewershed.

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

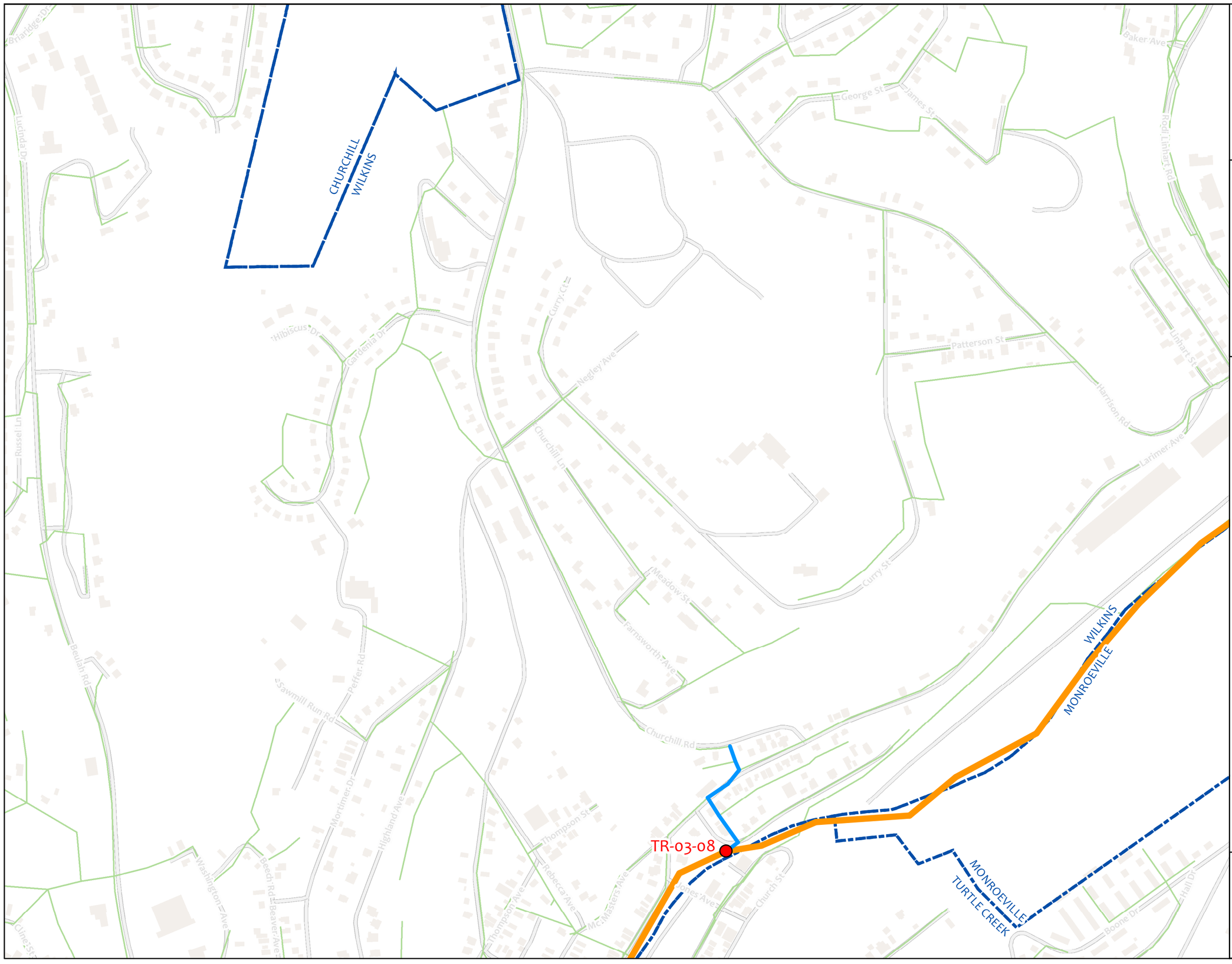
The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

The original H&H model extent included 620 LF of sewer upstream from TR-03-08. No revisions to the model of this trunk sewer were made from the original H&H model. Figure 2-1 depicts the extent of the original H&H model.

Sewershed Feasibility Study Report

TR-03-08 Churchill Road Sewershed

Figure 2-1 SWMM Model Extents



Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:4,800

1 inch = 400 feet

0 200 400 800 Feet

Author: Peter Smith

Date: 7/1/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-03-08 Churchill Road.mxd

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This trunk sewer was not monitored in 2008/2009. No additional monitoring has been performed.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-03-08 SEWERSHED

Municipality	Monitor Name	Monitor Type	Monitor Duration	Comments
N/A	N/A	N/A	N/A	

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

No flow monitoring was conducted for this sewershed.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township, and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-03-08 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-03-08 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Wilkins	54	54	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-03-08 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	467	6.44%	25%	584

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-03-08. According to the Turtle Creek / Thompson Run Bain H&H Model Validation and Characterization Report the flow values for this sewershed were "…initially obtained from the ALCOSAN preliminary model for TT (SWMM Model file: TTRC-SW5-2005-FebOFUpdate.inp), then disaggregated consistently to reflect greater detail in the municipal systems." Future BWWFs were extrapolated to year 2046 based on the assumed population changes as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-03-08 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	54	0.178	0.23	29.2%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-03-08. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-03-08 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-03-08 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Wilkins	54	0.08	0.1	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-03-08 during 2-Year

Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-03-08 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-03-08 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	54	0.56	0.56	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

The TR-03-08 Sewershed was not monitored. The estimation process for flows in this sewershed is discussed in detail in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-03-08 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Wilkins	None	N/A	N/A	N/A

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

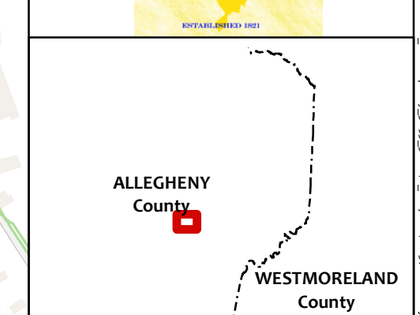
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Churchill Road trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

Sewershed Feasibility Study Report

TR-03-08 Churchill Road Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:4,800

1 inch = 400 feet

0 200 400 800 Feet

Author: Peter Smith

Date: 7/1/2013

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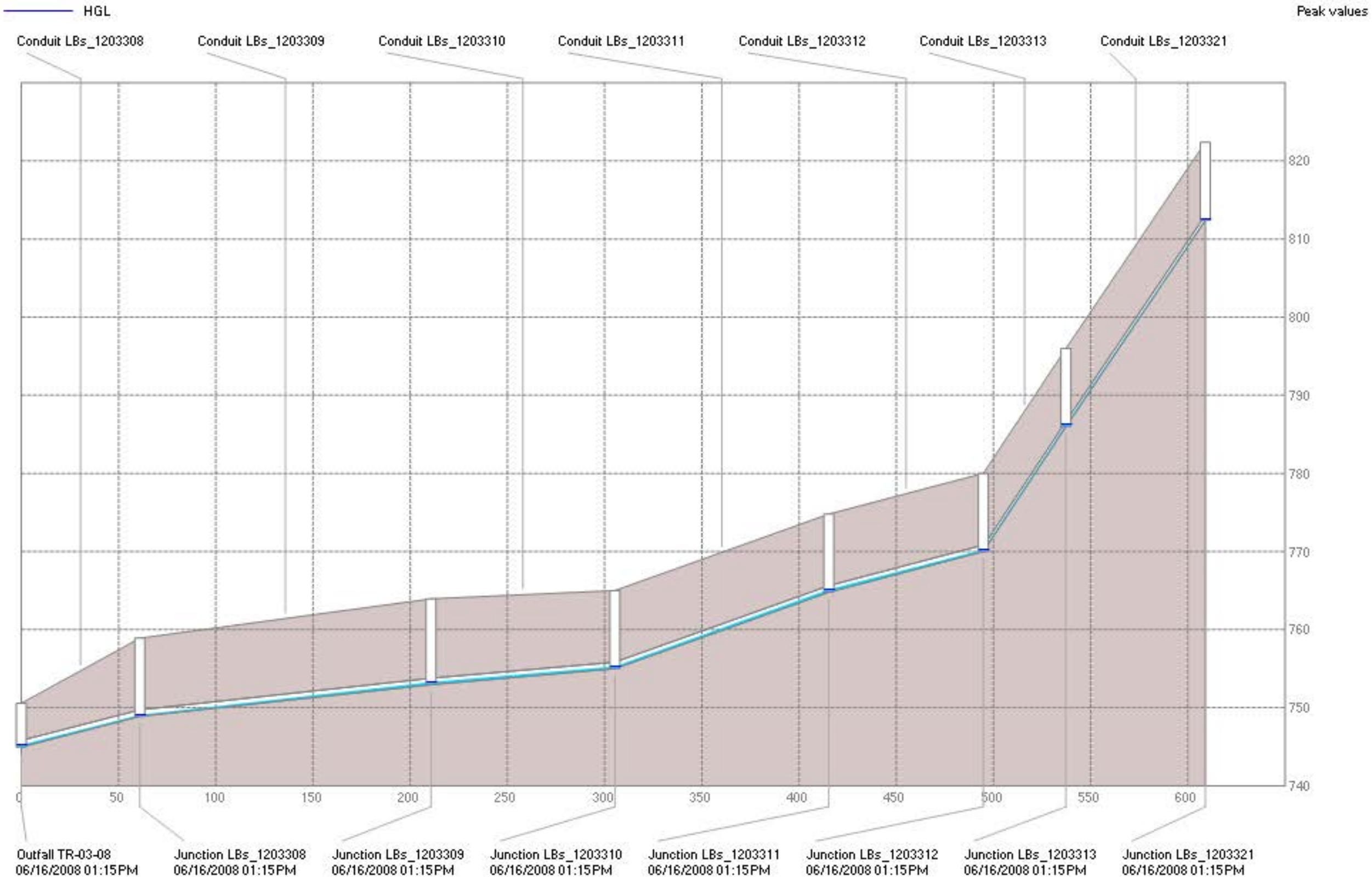
FIGURE 2-3

TR-03-08 CHURCHILL ROAD TRUNK SEWER PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS



Under 2-Year Summer Design Storm conditions, the Churchill Road trunk sewer is modeled with no surcharge. Therefore the model indicates that it is not capacity deficient under these conditions.

Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Churchill Road trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

Under 10-Year Summer Design Storm conditions, the Churchill Road trunk sewer is modeled with no surcharge. Therefore the model indicates that it is not capacity deficient under these conditions.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the TR-03-08 Churchill Road Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

The trunk sewer receives no additional flow from sidelines. Therefore, the capacity requirements are constant and limited by the pipe segment with the shallowest slope. The peak flows are listed in Table 2-8.

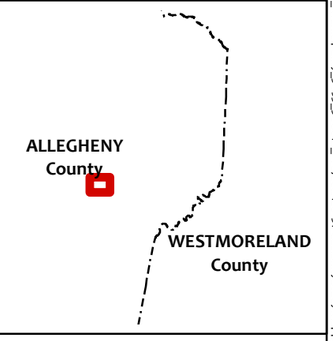
TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	0.69	0.79	0.94	1.07

Sewershed Feasibility Study Report

TR-03-08 Churchill Road Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:4,800

1 inch = 400 feet

0 200 400 800 Feet

Author: Peter Smith

Date: 7/1/2013

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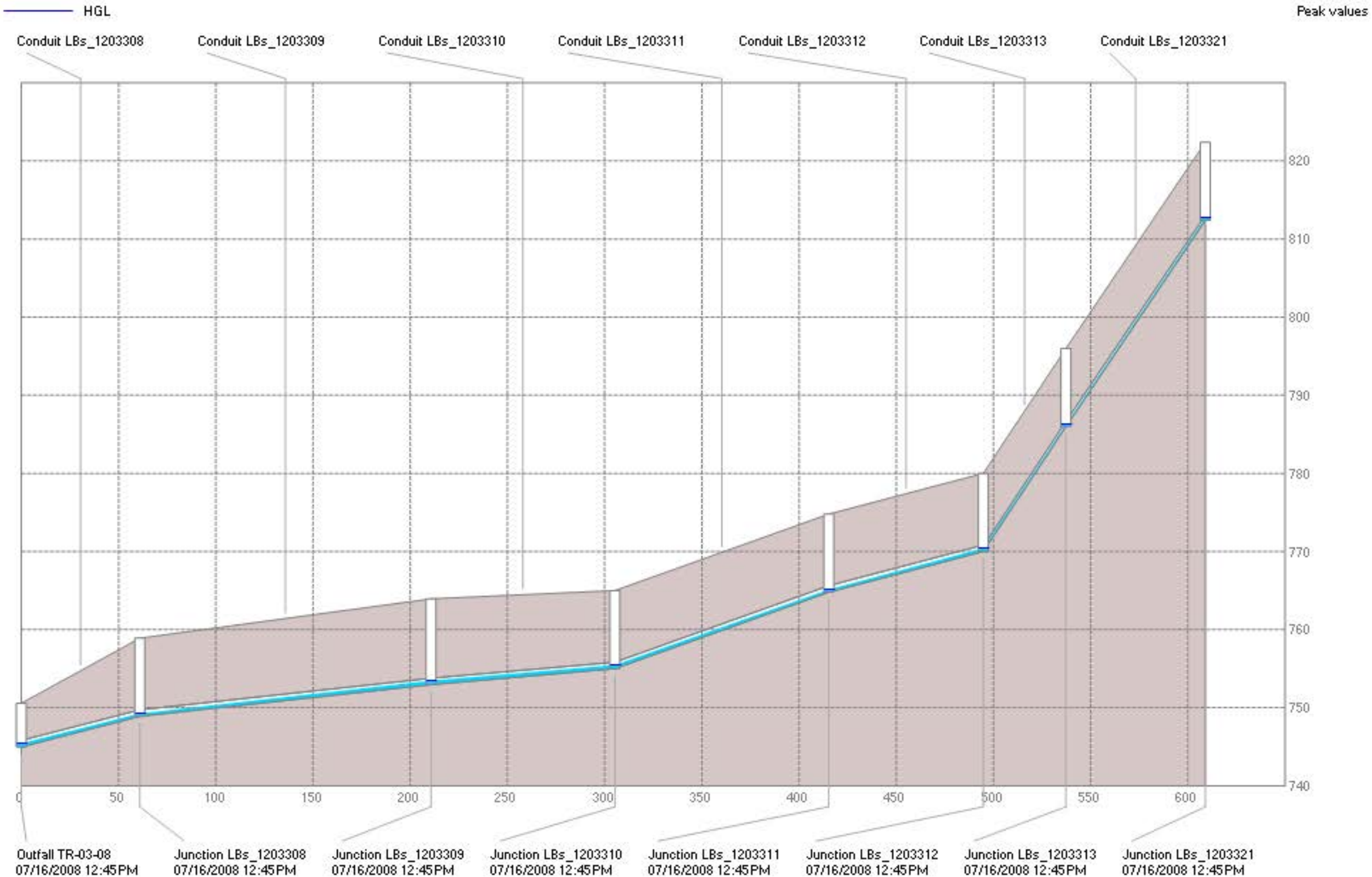
FIGURE 2-5

TR-03-08 CHURCHILL ROAD TRUNK SEWER PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS



Information for 24-hour volumes for the various Summer Design storm conditions for the tributary communities is listed in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	0.386	0.395	0.425	0.444

2.3 Overflow Frequency and Volume

The Churchill Road Sewershed has a separate sanitary sewer system. There are no tributary combined sewers. Also, no sanitary sewer overflows have been reported.

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-03-08 Churchill Road Sewershed is entirely served by separate sanitary sewers. As there are no reported combined sewer overflows, this section is not applicable.

3.1.2 SSO Control Level

The TR-03-08 Churchill Road Sewershed is entirely served by separate sanitary sewers. As there are no reported separate sewer overflows, this section is not applicable.

3.2 Recommendations for Control Level

As there are no reported combined or separate sewer overflows this section is not applicable.

4.0 MUNICIPAL SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-03-08 Churchill Road Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Churchill Road Sewershed is tributary to the Thompson Run Interceptor at POC TR-03-08, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-06 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between TR-03-08 and M-29, any work done in the Churchill Road Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-03-08 Churchill Road Sewershed provides service to only customers within Wilkins Township, so 100% of the cost of any work performed in this sewershed would be the responsibility of Wilkins Township. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix E
TR-03 Semmens Street Sewershed

FEASIBILITY STUDY REPORT

For

TR-03 SEMMENS STREET SEWERSHED

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

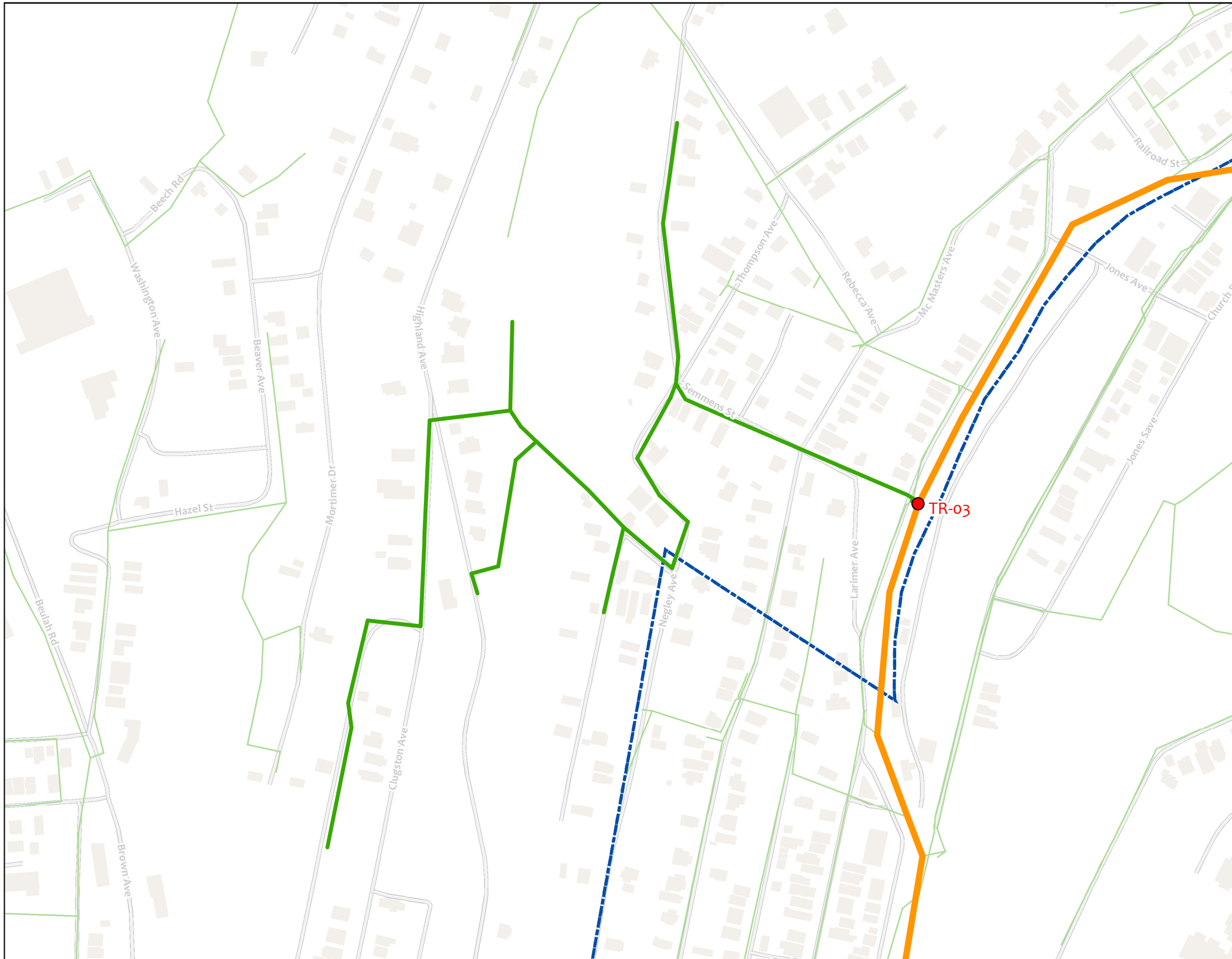
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-03 Semmens Street Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

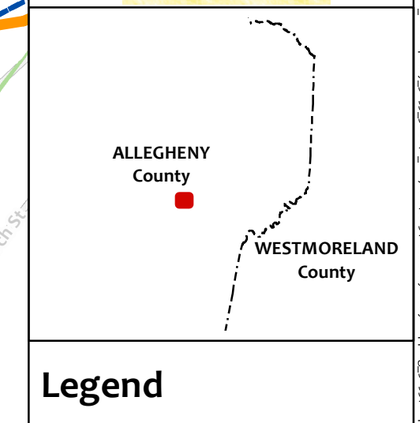
The TR-03 Semmens Street Sewershed is located in the eastern section of Wilkins Township. The sewershed is served by a combined system. Service is provided to single family residential households, some small apartment buildings and a small number of commercial/industrial customers. A map of the TR-03 Semmens Street Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.



Sewershed Feasibility Report

TR-03 Semmens Street Sewershed

Figure 1-1 Sewershed Map



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Separate)

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Patrick Moulden

Date: 5/14/2013

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Figure 1-2: Sewershed Schematic

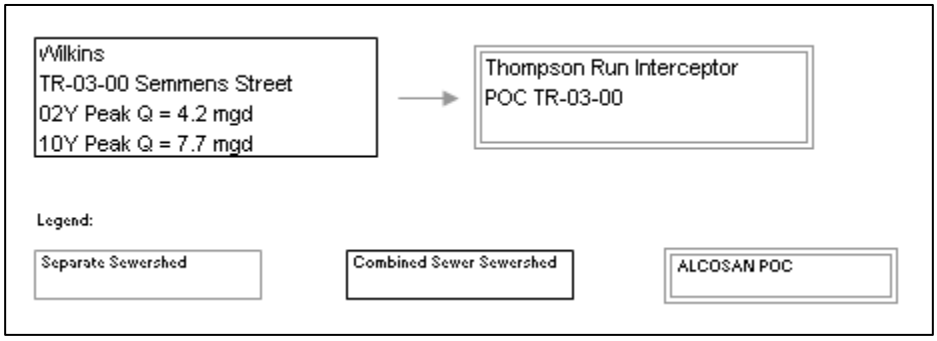


Table 1-1 lists information for the Semmens Street Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census.

The Semmens Street Sewershed currently a combined sewer system. Information on the storm sewers in the Semmens Street area is not available.

TABLE 1-1: TR-03 SEMMENS STREET SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Wilkins	TR-03	17	79	2.14	135

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Semmens Street sewershed.

TABLE 1-2: TR-03 SEMMENS STREET SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	7.5	4218.72	0.44

(1) Combined Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-3: TR-03 SEMMENS STREET SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0	0	0

(1) Separate Sewer information obtained from 3RWW GIS Web Map. There are no separate sewers in this sewershed.

TABLE 1-4: TR-03 SEMMENS STREET SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-03 Semmens Street Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-03 Semmens Street Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

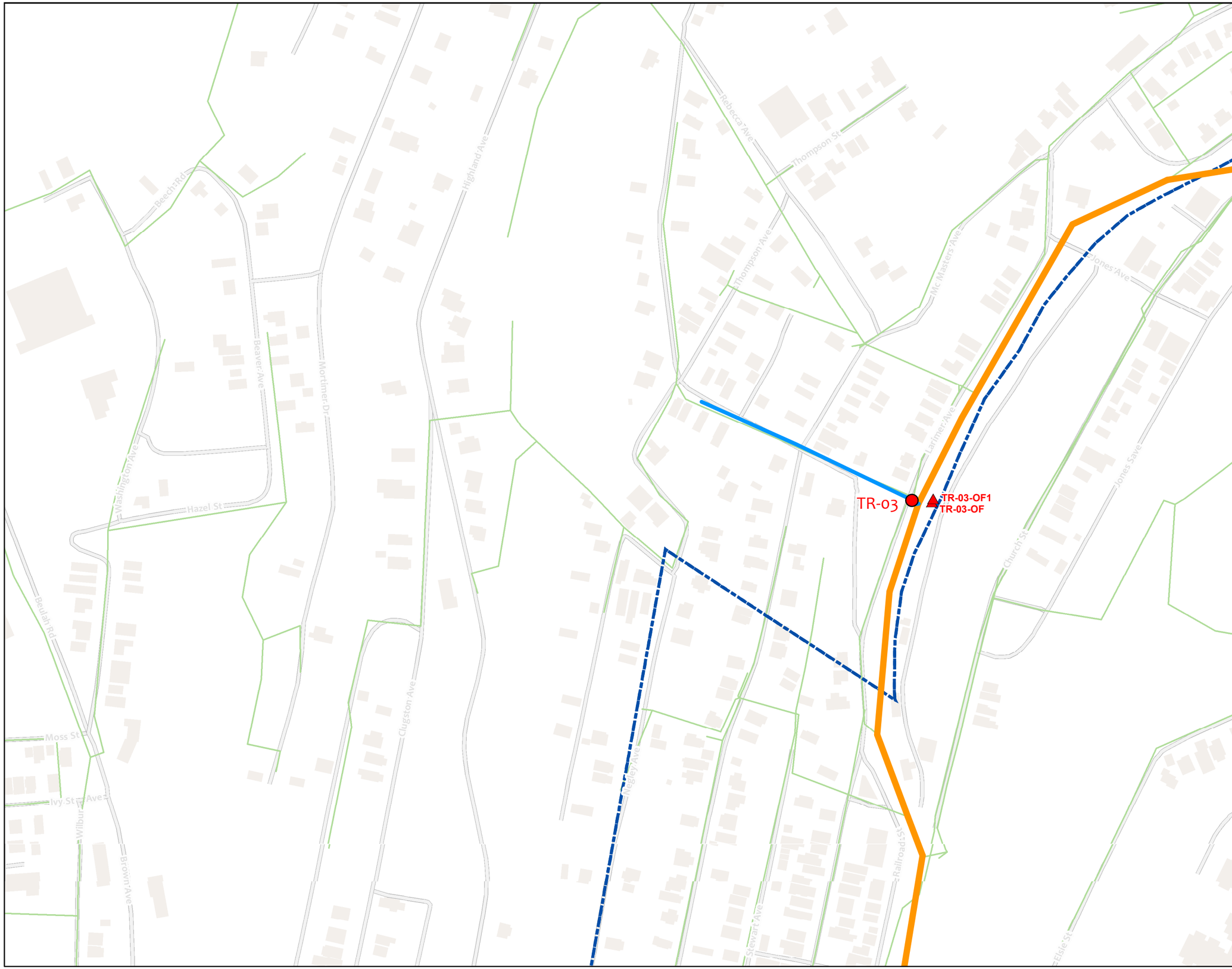
Table 1-5 presents information about single existing overflow including municipal regulatory ID, location, receiving waters and owner. Figure 1-3 shows the location of the discharge point in the TR-03 Semmens Street Sewershed.

TABLE 1-5: KNOWN CONSTRUCTED DISCHARGE LOCATIONS IN THETR-03 SEMMENS STREET SEWERSHED

Municipal Regulatory ID	Location	Receiving Waters	Owner(s)
TR-03	Along bank of Thompson Run near intersection of Semmens Street and Thompson Run Road	Thompson Run	Wilkins

1.2.4 Direct Stream Inflows

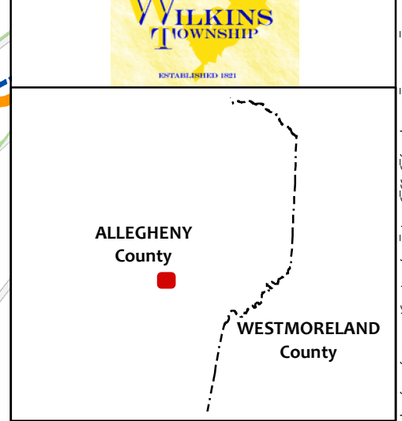
There are no known direct stream inflows into the sewer system in the TR-03 Semmens Street Sewershed.



Sewershed Feasibility Study Report

TR-03 Semmens Street Sewershed

Figure 1- 3 Existing Overflow Locations and SWMM Model Extents



Legend

Outfall Type

- Constructed Outfall
- Overflowing Manhole
- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Patrick Moulden

Date: 7/1/2013

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Figure 1-3

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

The original H&H model extent included 550 LF of 24-inch combined system trunk sewer upstream from TR-03 along Larimer Avenue to McMaster Avenue. An additional 360 LF of 8-inch sanitary sewer was also modeled.

Based on field investigations that were conducted after the development of the original H&H model it was determined that a significant revision to the model for this sewershed was required.

The original model assumed a connection from JCT LBs_1204588 to POC TR-03-00. In the field it was determined that this connection does not exist. Instead, flows from JCT LBs_1204588 run past the POC to JCT LBs_1203922 which is part of the TR-02-04 Larimer Road Sewershed. Therefore, the 28 acres of upstream area tributary to this junction was reassigned from TR-03 to TR-02-04. The TR-03 sewershed was reduced to 17 acres tributary to TR-03 via a single trunk sewer that runs down Semmens Street. The size of the TR-02-04 sewershed was increased by from the original model by 28 acres. The re-assignment of model flows is discussed in Section 2.

Figure 2-1 depicts the extents of the revised H&H model.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

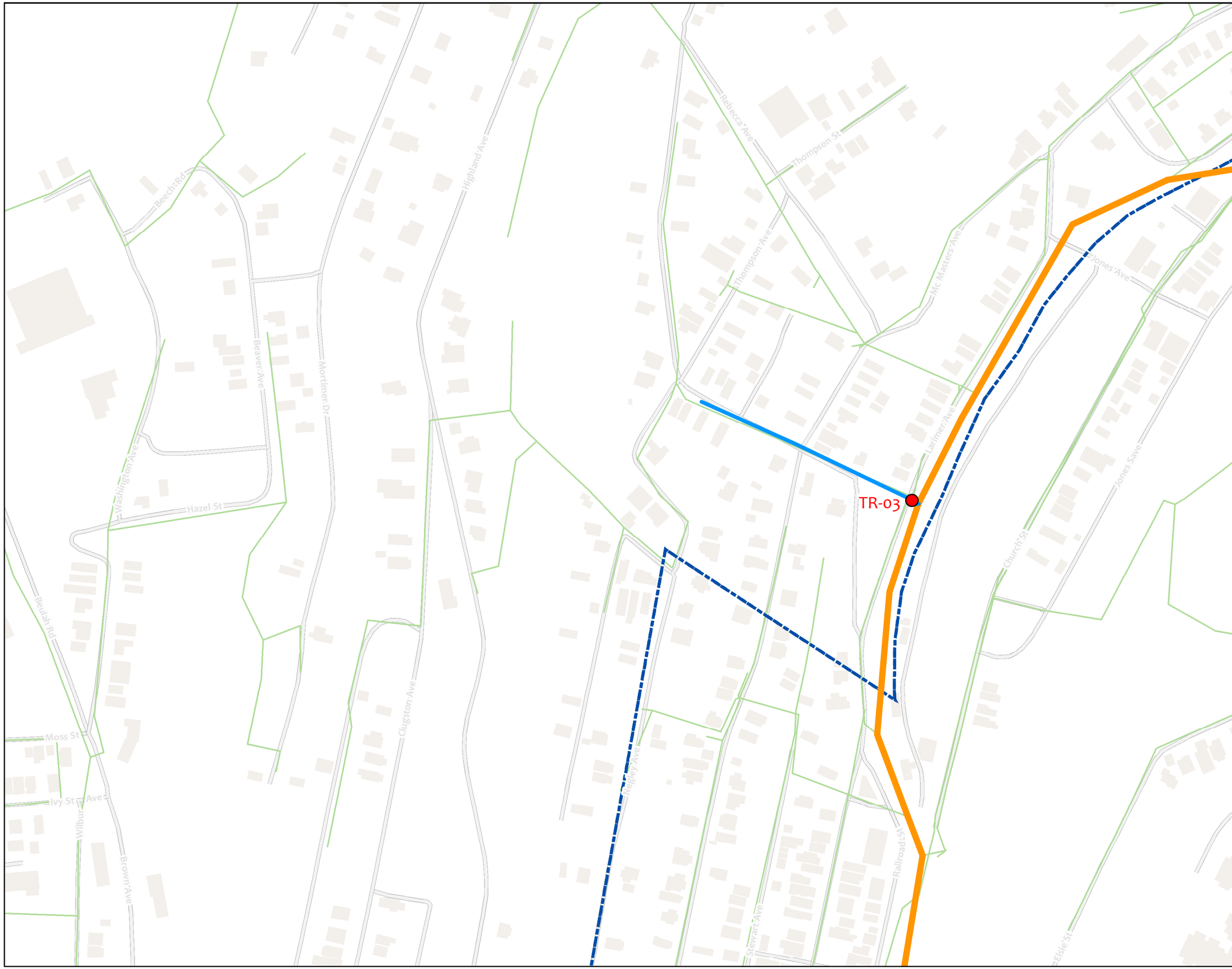
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This trunk sewer was monitored in 2008. No additional flow monitoring was performed. Monitors that were installed in the TR-03 Sewershed are summarized in Table 2-1.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-03 SEWERSHED

Municipality	Monitor Name	Monitor Type(1)	Monitor Duration	Comments
Wilkins	TR0200_-OSC-M-03_	OSC	2008	
Wilkins	TR0200_-OSC-M-03O_	OSC	2008	

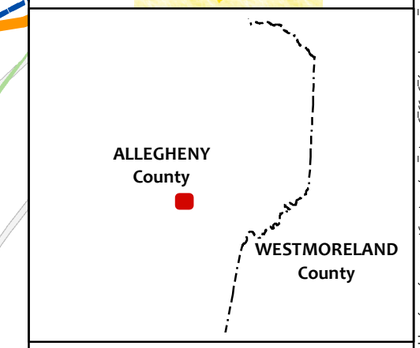
(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).



Sewershed Feasibility Study Report

TR-03 Semmens Street Sewershed

Figure 2-1 SWMM Model Extents



Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Peter Smith

Date: 7/1/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-03-00 Semmens Street.mxd

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

No additional monitoring has been performed since 2009.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-03 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-03 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Wilkins	17	17	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-03 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	135	6.44%	25%	169

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-03 which were determined by downstream flow monitoring data at monitor TR0200_-OSC-M-03_. Future BWWFs were extrapolated to year 2046 based on assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-03 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	17	0.058	0.075	29.3%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-03. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-03 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-03 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Wilkins	17	0.02	0.025	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-03 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-03 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-03 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	17	4.1	4.1	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

There are no unmonitored areas in the TR-03 Sewershed.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed. Note that at this time Wilkins Township is currently in the design phase of a complete sewer separation project for this sewershed. As this is a relatively small sewershed, for conservative purposes in the development of project alternatives along the Thompson Run Interceptor, the original combined flows were kept in that model.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-03 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Wilkins	Storm Sewer Separation	Design Phase – 07/2013	Municipality	2015

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

Reference is made to Peak Flow Estimates submitted to ALCOSAN on July 16, 2010.

PFE calculations for this sewershed relied on the SWMM models submitted as part of the May, 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain

surcharge to below the crown of the pipe. Values BWWF and GWI were increased by 25 percent in accordance with the 24.3 percent population increase indicated by the SPC study.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Semmens Street trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

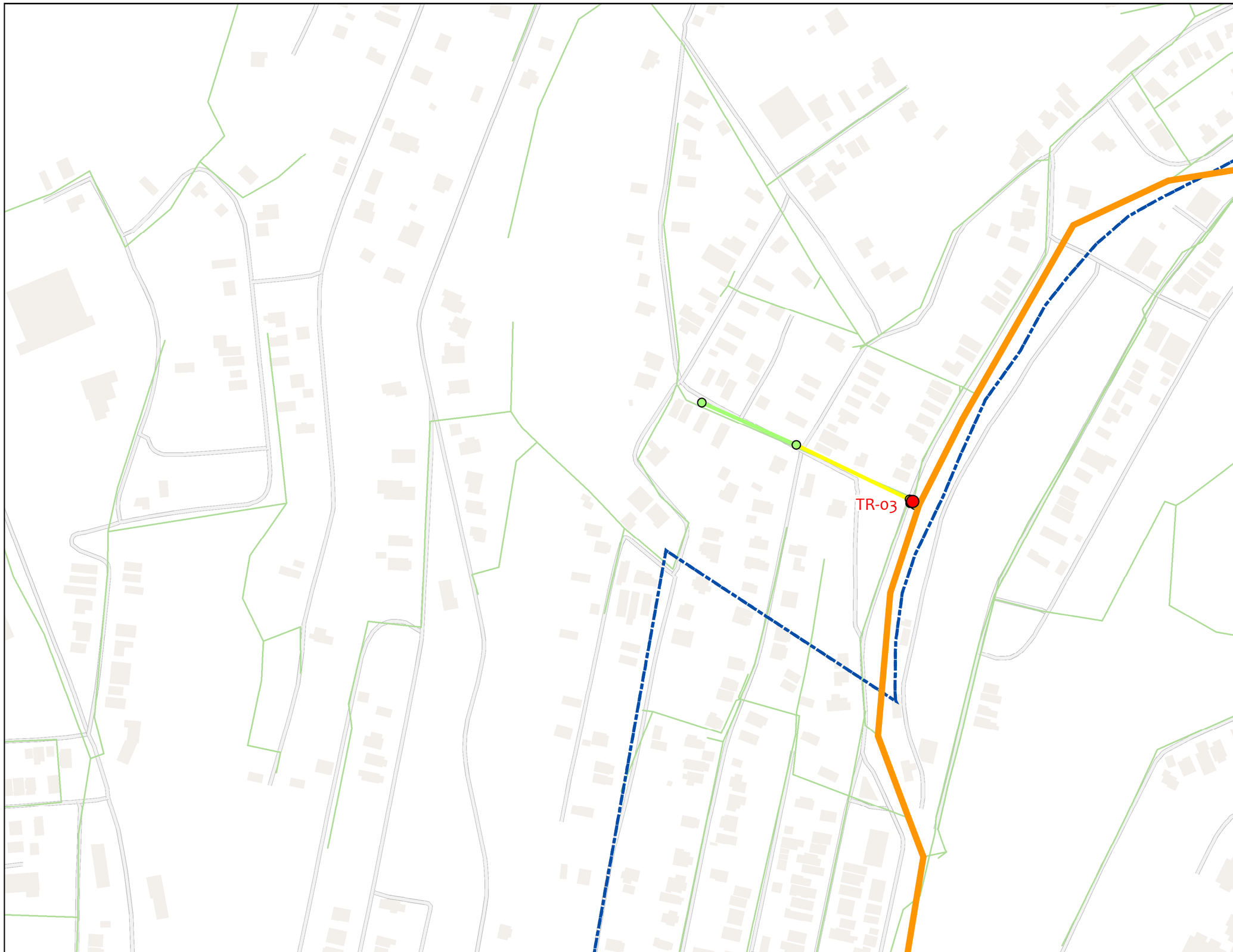
Under 2-Year Summer Design Storm conditions, the Semmens Street trunk sewer is not shown to be capacity deficient along its entire length. There is some surcharging near the POC TR-03. However this is controlled by excess combined system flows leaving the system at the combined sewer overflow TR-03.

Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Semmens Street trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

Under 10-Year Summer Design Storm conditions, the Semmens Street trunk sewer is not shown to be capacity deficient along its entire length. There is some surcharging near the POC TR-03. However this is controlled by excess combined system flows leaving the system at the combined sewer overflow TR-03.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Semmens Street Sewershed.



Sewershed Feasibility Study Report

TR-03 Semmens Street Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions

WILKINS TOWNSHIP
ESTABLISHED 1821

ALLEGHENY County

WESTMORELAND County

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Patrick Moulden

Date: 7/1/2013

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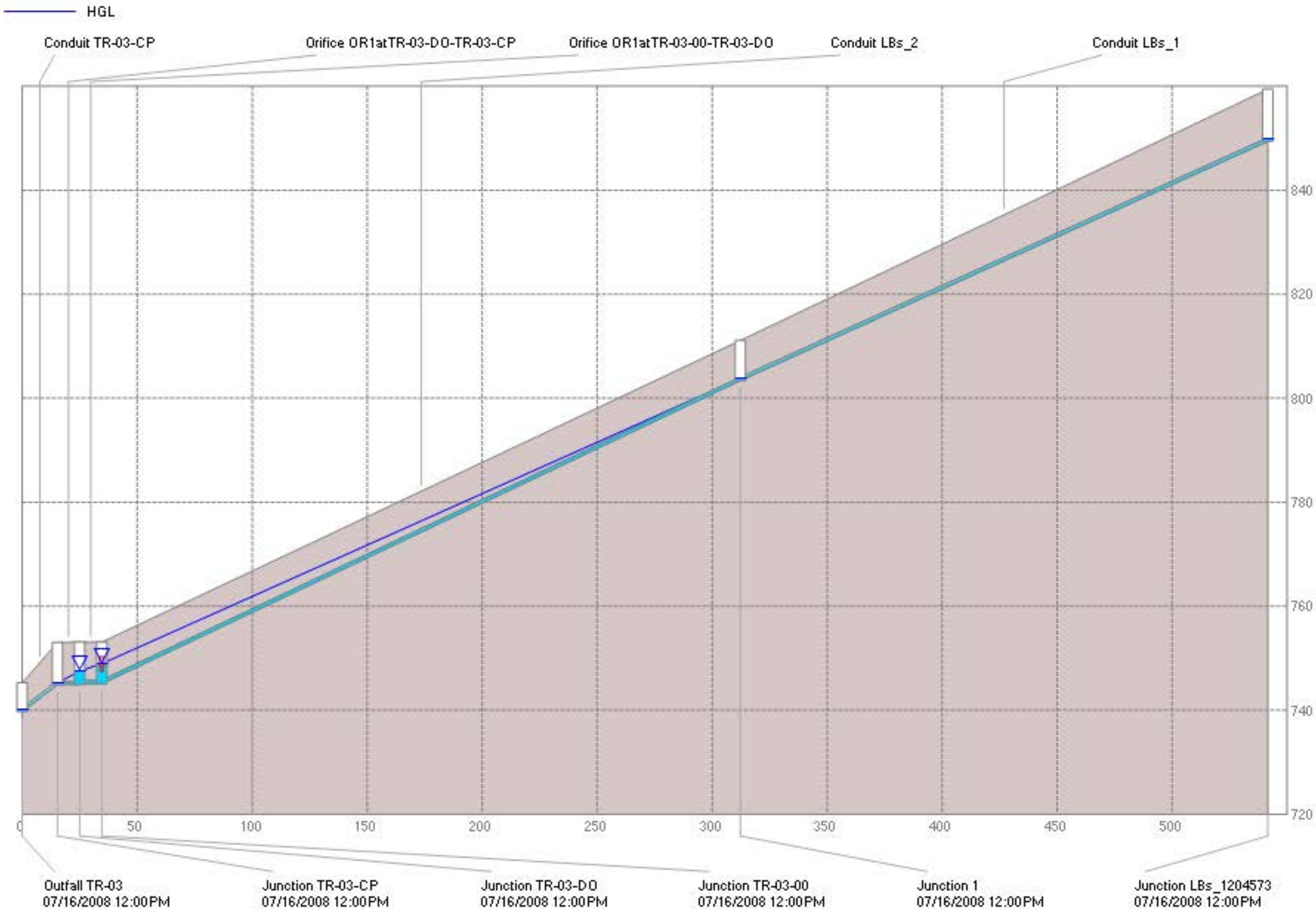
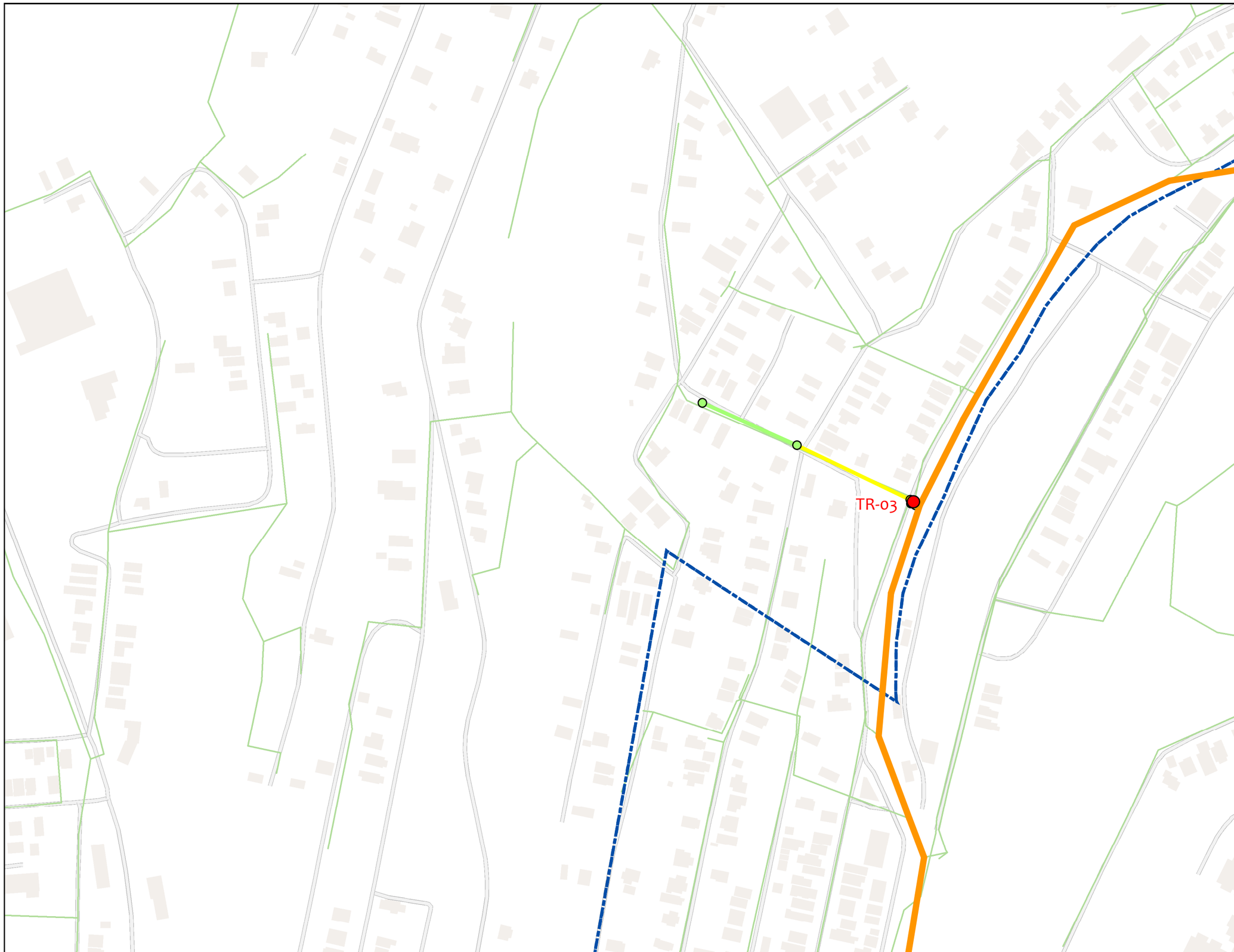
FIGURE 2-3

TR-03 SEMMENS STREET PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

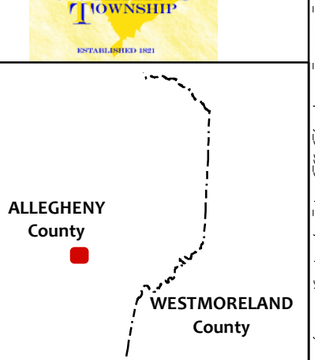




Sewershed Feasibility Study Report

TR-03 Semmens Street Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:2,400

1 inch = 200 feet

0 100 200 400 Feet

Author: Peter Smith

Date: 7/1/2013

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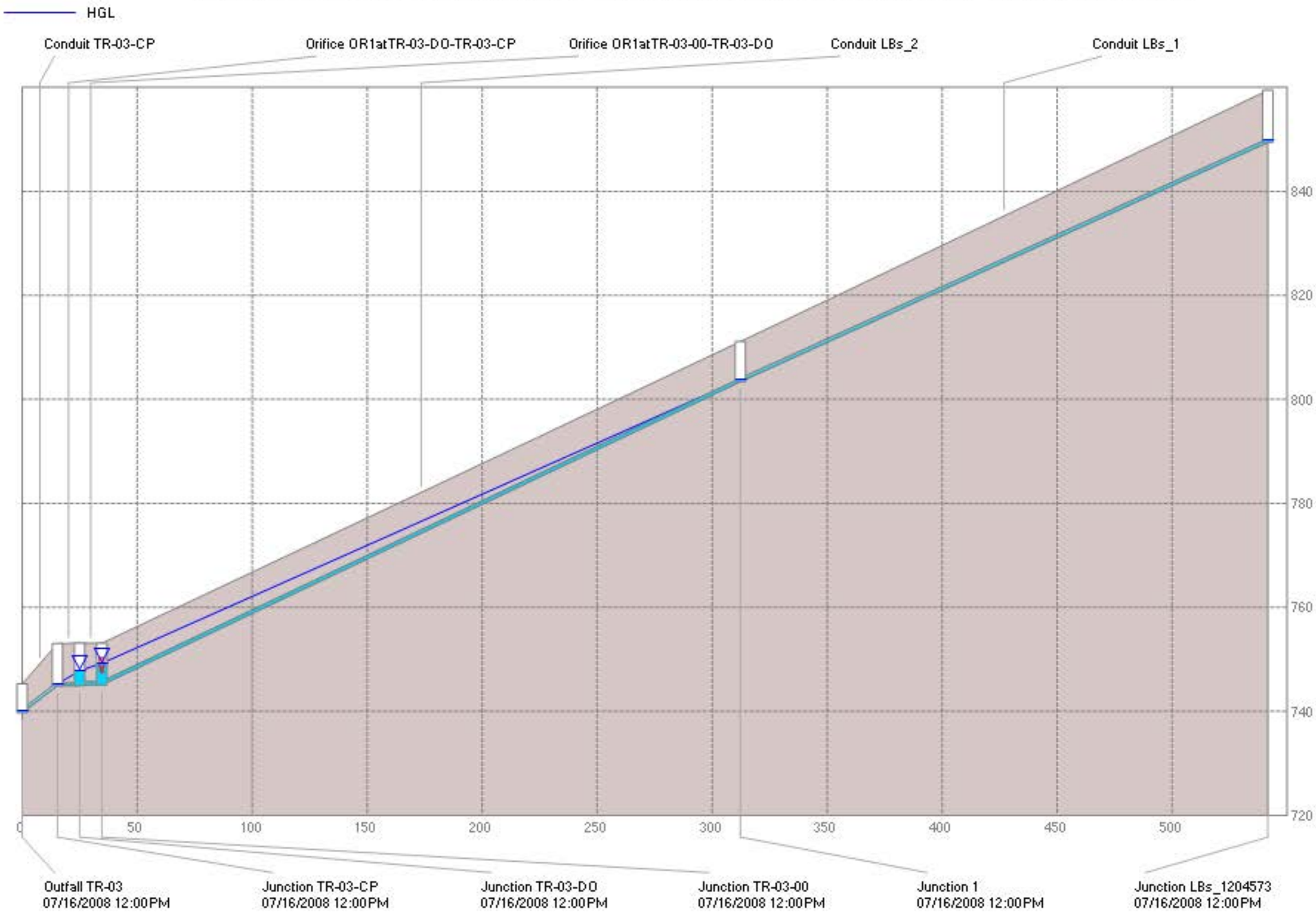
FIGURE 2-5

TR-03 SEMMENS STREET PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS



2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

The PFE analysis was conducted using the revised H&H model that assumes flow estimates from post-storm sewer separation project conditions.. Information for peak flow rates for the various summer design storm conditions is provided in Table 2-8.

TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES – ORIGINALLY SUBMITTED PFE

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins (1)	0.21	0.24	0.27	0.3

(1) As part of the storm sewer separation projects these flows will be routed to the TR-02-04 sewershed.

Information for 24-hour volumes for the various summer design storm conditions is provided in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES – ORIGINALLY SUBMITTED PFE

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins (1)	0.09	0.1	0.104	0.11

(1) As part of the storm sewer separation projects these flows will be routed to the TR-02-04 sewershed.

2.3 Overflow Frequency and Volume

At the present time the Semmens Street Sewershed is served by a combined sanitary sewer system. Pertinent data for CSOs based on the results of the revised existing conditions sewershed model, is reported in Tables 2-10. Table 2-11 provides the result of SSOs based on the post-separation project model. Note that no SSOs are anticipated.

TABLE 2-10: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR SEMMENS STREET SEWERSHED

				Peak Rate (mgd)		
CSO Outfall	Owner	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
TR-03	Wilkins	5	0.31	3.1	0.95	0

TABLE 2-11: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR TR-03 SEMMENS STREET SEWERSHED

SSO Outfall	Owner	2-yr Design Storm		10-yr Design Storm	
		Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
N/A	N/A	N/A	N/A	N/A	N/A

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-03 Semmens Street Sewershed is currently served by a combined sanitary sewer system. A pending sewer separation project will eliminate the CSO's.

3.1.2 SSO Control Level

The TR-03 Semmens Street Sewershed is served by a combined sanitary sewer system. After the planned storm sewer separation project has been completed, this sewershed will become classified as a sanitary sewer sewershed. Per the COA, any SSOs are illegal and are required to be controlled. Additional post project flow monitoring will be required to determine the effectiveness of the storm sewer separation project. As the location of the existing overflow is close to the Thompson Run Interceptor, any remaining SSOs would likely be controlled by increased conveyance from the overflow to the POC.

3.2 Recommendations for Control Level

CSO TR-03 in the Semmens Street Sewershed is modeled to be active during typical year flows, and during 2 and 10 year summer design storm conditions. The intent of the planned storm separation project is to reduce CSO frequency to 0 overflow events per year. However, this will require post project verification.

4.0 SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-03 Semmens Street Sewershed is currently served by a combined sewer system. However, there is a pending storm sewer separation project in this sewershed which will eliminate CSOs and reclassify the sewershed from combined to sanitary. Therefore, no alternatives were developed as part of this Feasibility Study.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

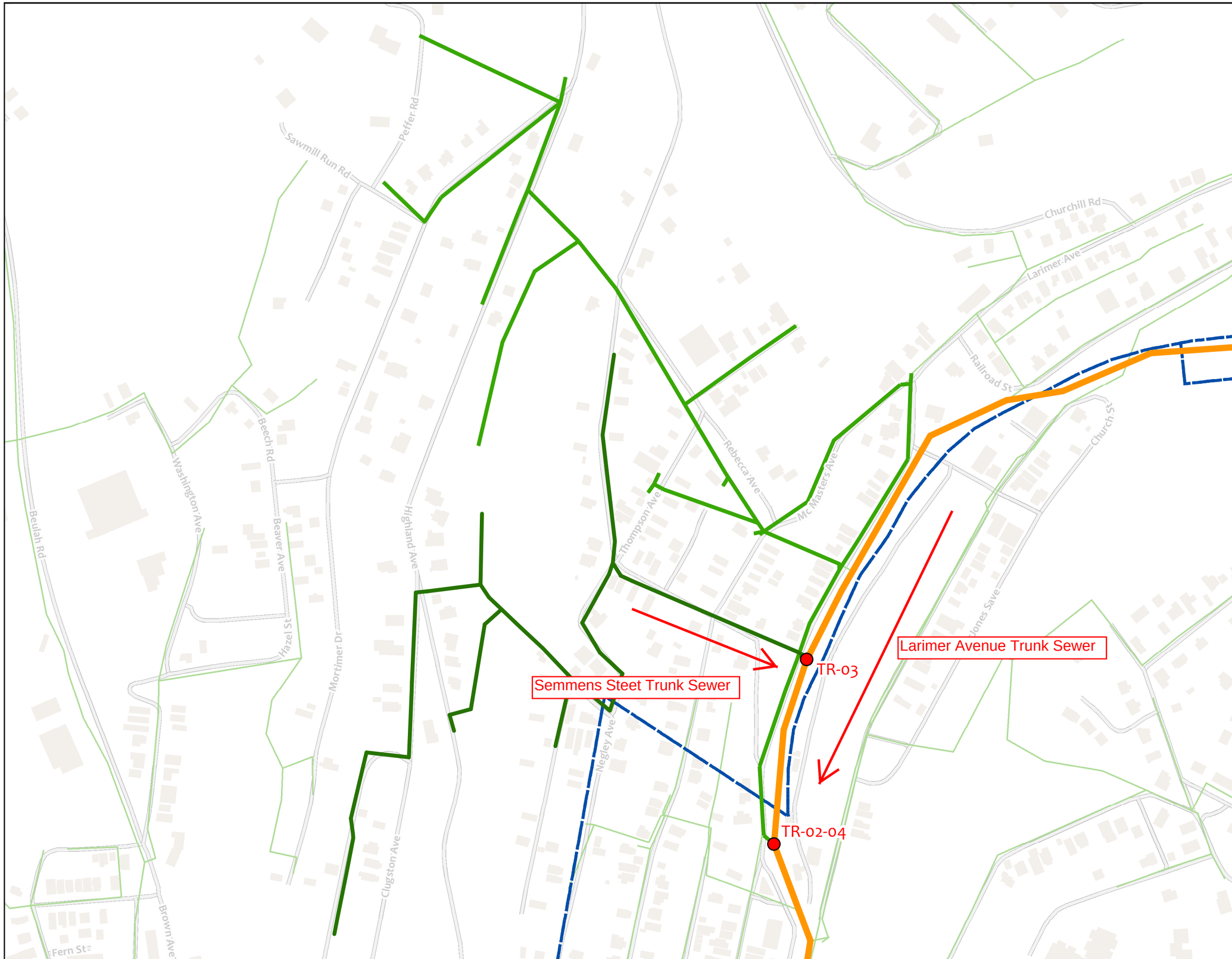
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Due to the proposed storm sewer separation project, no additional alternatives are anticipated to be required in this sewershed for compliance with the COA.

The storm sewer separation project will involve the conversion of existing combined sewer overflows TR-03 and TR-03A into dedicated storm sewer outfalls. The existing POC TR-03 will be abandoned. Separate sanitary flows from the Semmens Street sewershed will be conveyed via a new 8-inch sanitary line and tied into the Larimer Road interceptor at a point near the former POC TR-03. Separate sanitary flows from both sewersheds will be conveyed to POC TR-02-04.

The storm sewer separation project will be conducted in two phases. The first phase is scheduled for completion in 2014 and will involve the separation of the combined sewer area tributary to the Semmens Street sewershed tributary to TR-03. The second phase of the project is scheduled for completion in 2015 and will involve the separation of the combined sewer area tributary to the Larimer Avenue sewershed tributary to TR-02-04. At the completion of the second phase, the existing regulator structure at TR-03 will be abandoned and Semmens Street flows routed to the Larimer Avenue trunk sewer.

Figure 5-1 provides a GIS map depicting the post-separation project conditions. Figures 5-2A and 5-2B provide a hydraulic grade line profile at the time of peak flow during 10-Year Summer Design Storm conditions for the Larimer Avenue and Semmens Street trunk sewers.



Sewershed Feasibility Report

TR-02-04 & TR-03 Sewersheds

Figure 5-1

WILKINS TOWNSHIP
ESTABLISHED 1821

ALLEGHENY County

WESTMORELAND County

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- TR-02-04
- TR-03

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 7/8/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Wilkins_Township_6500b_Projects\2013\Feasibility Mapping\Maps\WK_TR-02-04_and_TR-03_Fig_5-1.mxd

FIGURE 5-2A

TR-03 SEMMENS STREET TRUNK SEWER PEAK FLOW HGL -10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE

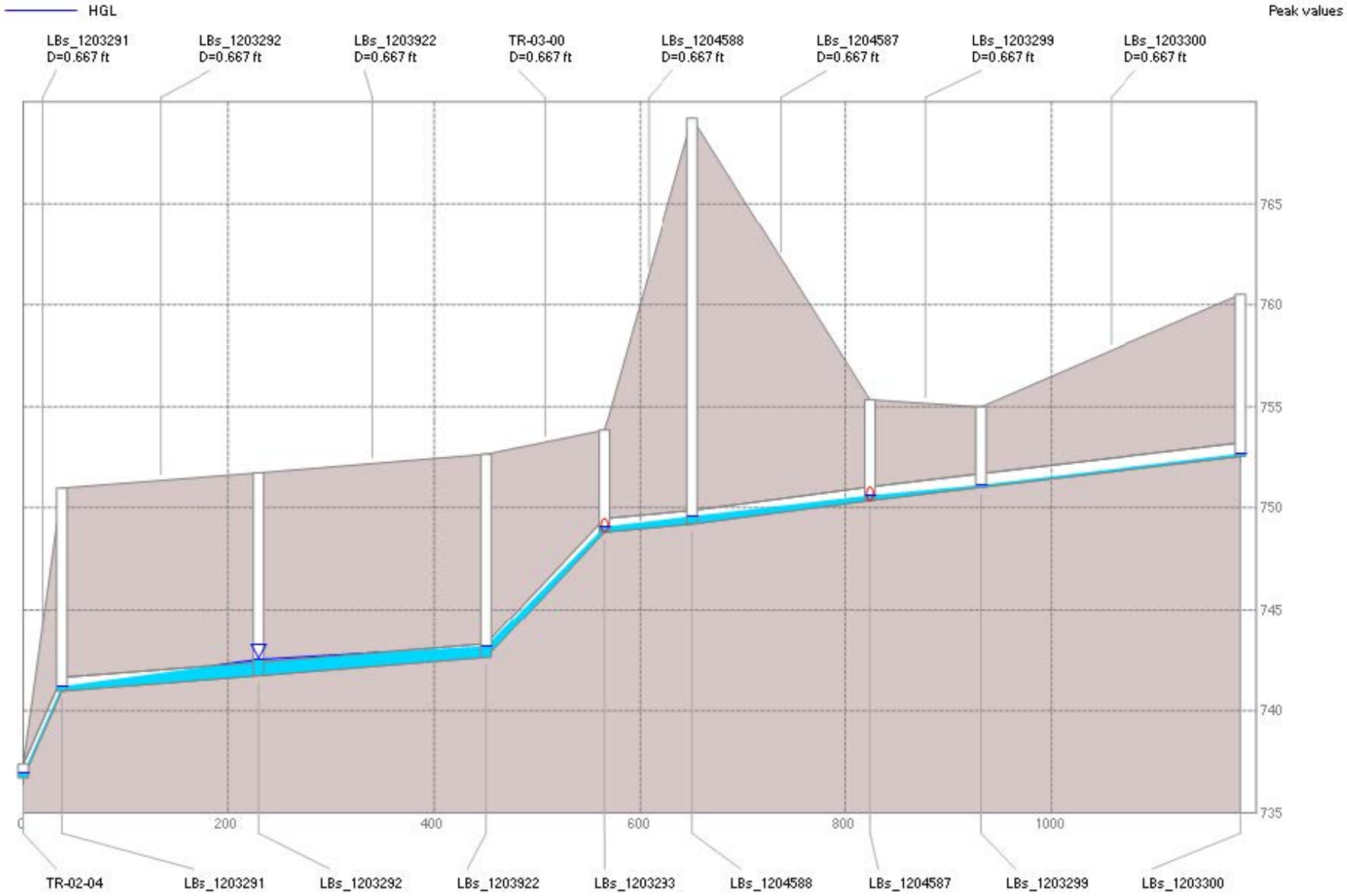
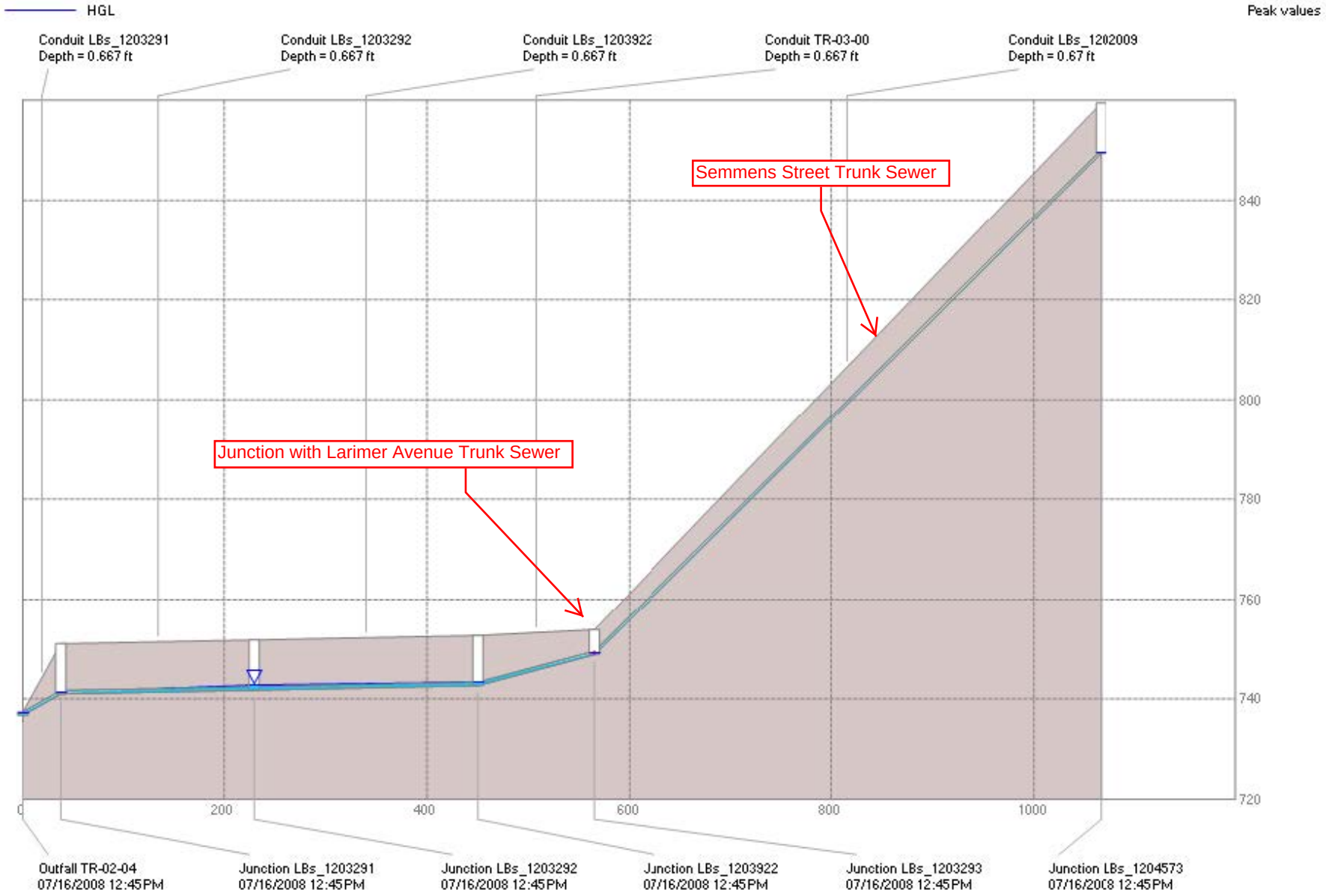


FIGURE 5-2B

TR-03 SEMMENS STREET TRUNK SEWER PEAK FLOW HGL -10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE



While it anticipated that the storm sewer separation project will eliminate CSOs and not generate SSOs, additional post-project flow monitoring will be required to determine the effectiveness of the project. If SSO activation is found, additional alternatives will be developed at that time. However, since the location of the existing overflow is close to the Thompson Run Interceptor, and there is limited available area for storage facilities, the solution to control any remaining SSOs would likely be increased conveyance capacity from the point of the SSO the POC TR-02-04.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-03 Semmens Street Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Semmens Street Sewershed is tributary to the Thompson Run Interceptor at POC TR-03, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity

deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-03 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the TR-03 Sewershed and M-29, any work done in the Semmens Street Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-03 Semmens Street Sewershed provides service to only customers within Wilkins Township, so 100% of the cost of any work performed in this sewershed would be the responsibility of the Wilkins Township. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix F
TR-02-04 Larimer Road Sewershed

FEASIBILITY STUDY REPORT

For

TR-02-04 LARIMER AVENUE SEWERSHED

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

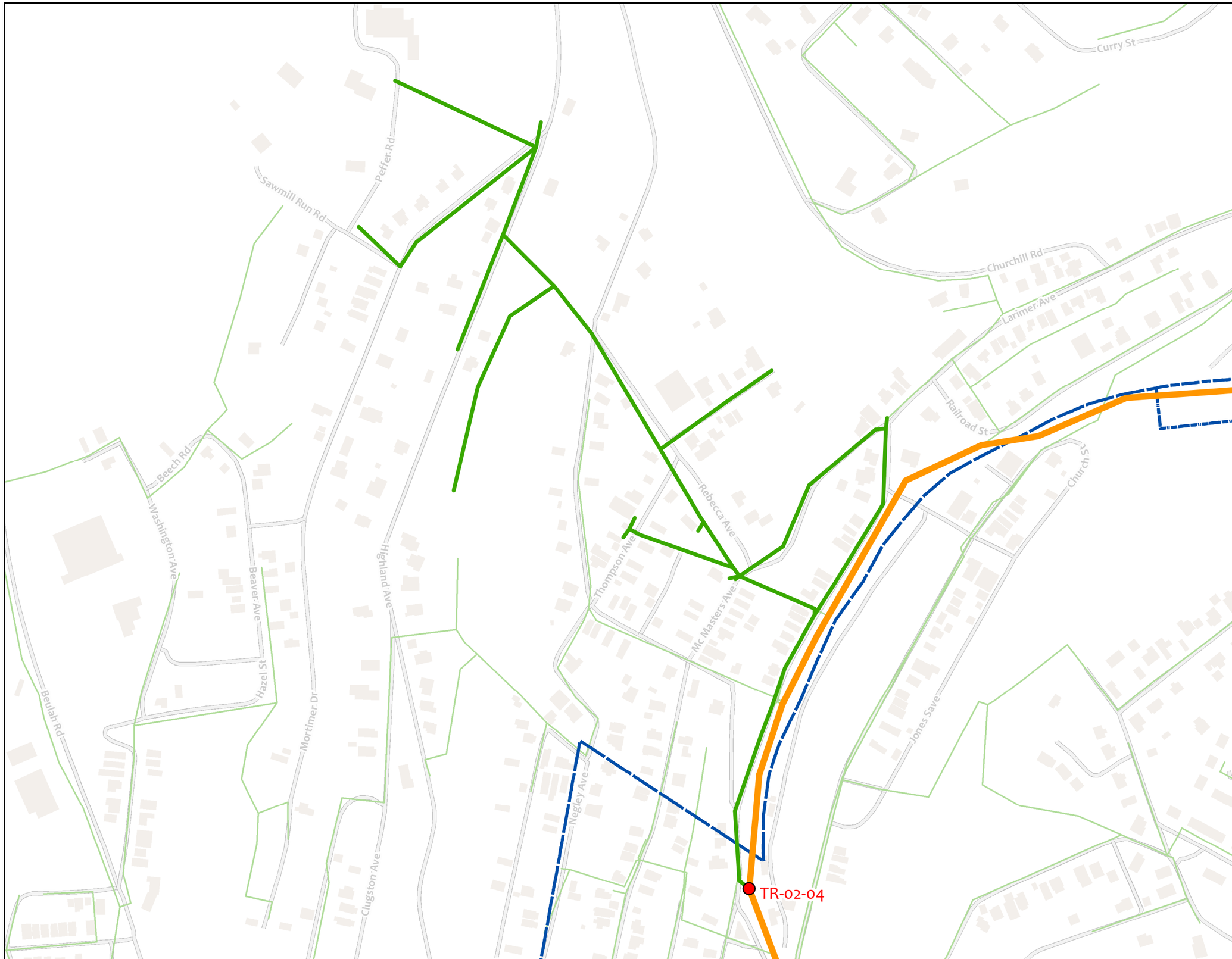
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-02-04 Larimer Avenue Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

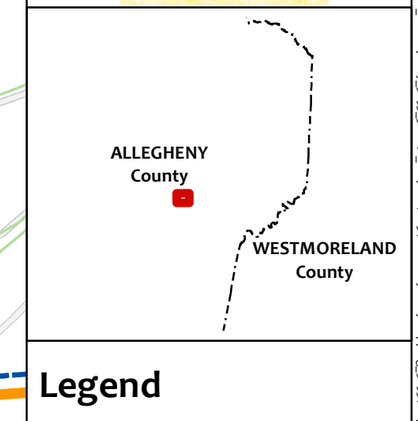
The TR-02-04 Larimer Avenue Sewershed is located in the southeastern section of Wilkins Township. The sewershed is served by a combined system. Service is provided to single family residential households, some small apartment buildings and a small number of commercial/industrial customers. A map of the TR-02-04 Larimer Avenue Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.



Sewershed Feasibility Report

T-02-04 Larimer Road Sewershed

Figure 1-1 Sewershed Map



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Combined)

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 5/14/2013

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Figure 1-2: Sewershed Schematic

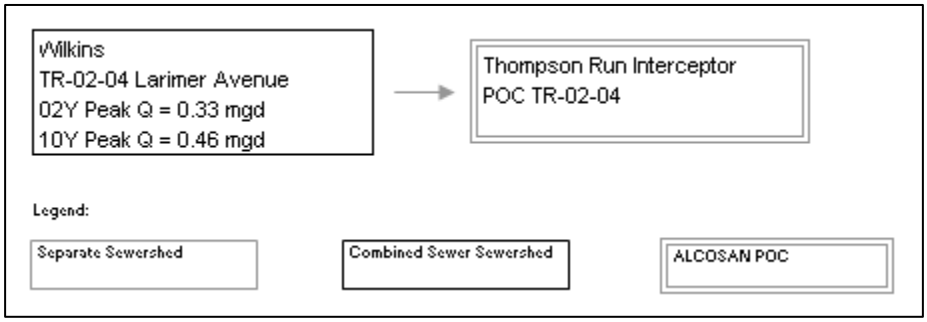


Table 1-1 lists information for the Larimer Avenue Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census.

TABLE 1-1: TR-02-04 LARIMER AVENUE SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units	Persons Per EDU (2)	Population
Wilkins	TR-02-04	28	101	2.14	217

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Values obtained from the 2010 US Census.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Larimer Avenue Sewershed. The Larimer Avenue Sewershed currently has a combined sewer system. Information on the storm sewers in the Larimer Avenue area is not available.

TABLE 1-2: TR-02-04 LARIMER AVENUE SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles/Acre**
Wilkins	13.4	6,574	0.48

TABLE 1-3: TR-02-04 LARIMER AVENUE SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles/Acre**
Wilkins	0	0	0

There are no separate sewers in this sewershed.

TABLE 1-4: TR-02-04 LARIMER AVENUE SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles/Acre**
Wilkins	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-02-04 Larimer Avenue Sewershed is located in the Turtle Creek/Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-02-04 Larimer Avenue Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

Table 1-5 presents information about a single existing overflow including municipal regulatory ID, location, receiving waters and owner. Figure 1-3 shows the location of the discharge point in the TR-02-04 Larimer Avenue Sewershed.

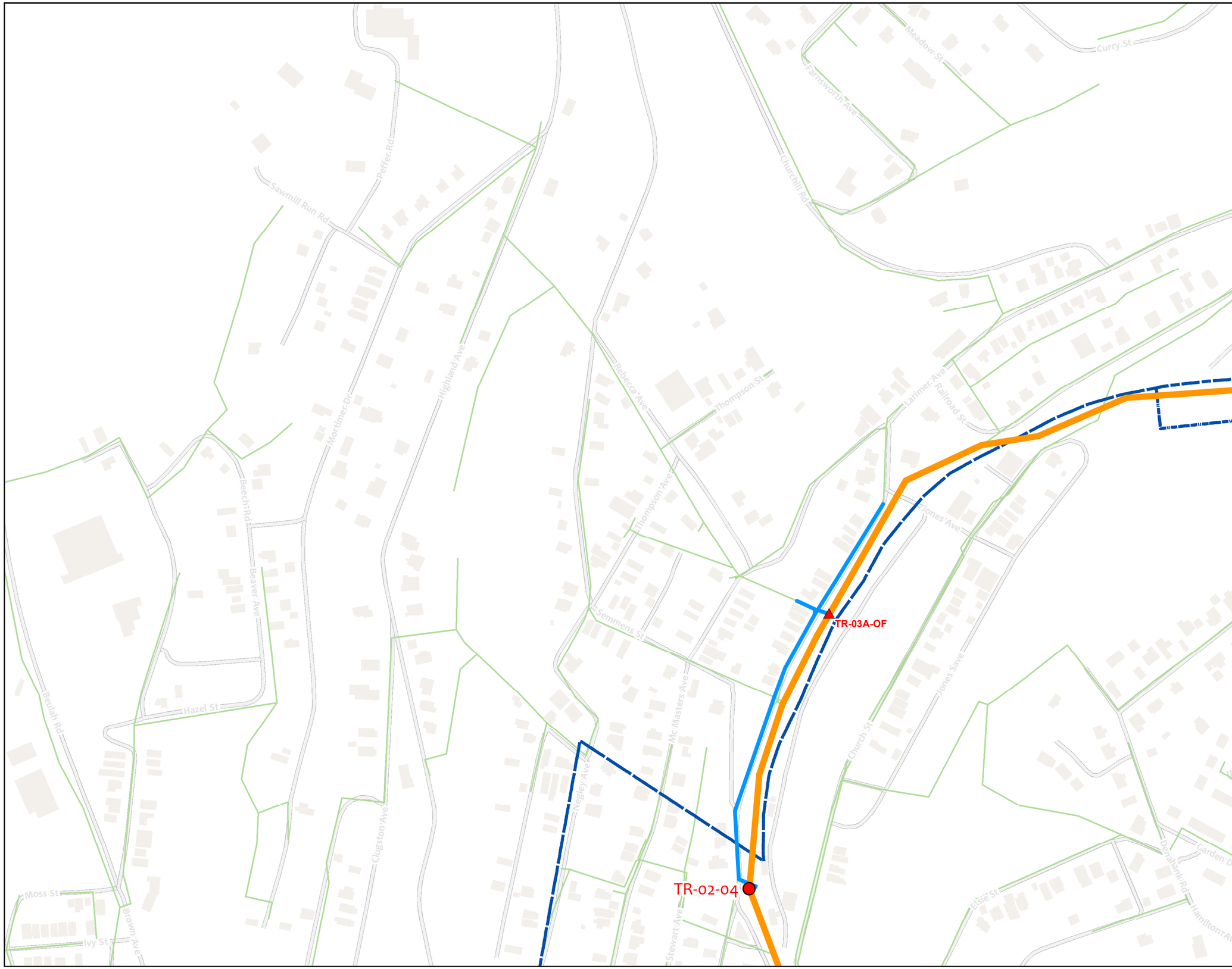
TABLE 1-5: KNOWN CONSTRUCTED DISCHARGE LOCATIONS IN THETR-02-04 LARIMER AVENUE SEWERSHED

Municipal Regulatory ID	Location	Receiving Waters	Owner(s)
TR-03A (1)	Along bank of Thompson Run ~275 LF upstream of Overflow TR-03	Thompson Run	Wilkins

(1) Overflow TR-03A was classified in the original H&H report as being part of the TR-03 sewershed. Based on field investigations performed after this report was submitted, overflow TR-03A was reassigned to the TR-02-04 sewershed. This is a combined sewer overflow.

1.2.4 Direct Stream Inflows

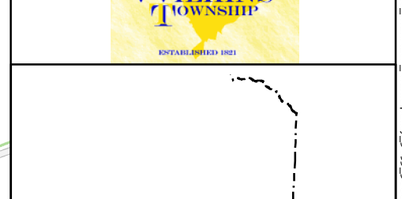
There are no known direct stream inflows into the sewer system in the TR-02-04 Larimer Avenue Sewershed.



Sewershed Feasibility Study Report

TR-02-04 Larimer Road Sewershed

Figure 1-3 Existing Overflow Locations and SWMM Model Extents



Legend

Outfall Type

- Constructed Outfall
- Overflowing Manhole
- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Peter Smith

Date: 7/1/2013

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2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

The approach used by the POC sewersheds was developed the 3RWW PPM Team and vetted by the FSWG. This approach was to use the RTK values developed from the municipal flow data to develop design flows for appropriate design storms such as 1-yr, 2-yr, 5-yr and 10-yr storms. These values were compared to the values derived from the H&H Model. As long the comparisons were within 25%, the municipality would accept the models without further investigations. However, in instances where these values varied by more than 25%, the POC municipalities would review the Model results with the Basin Planner to try and resolve the discrepancy. The main intent of this approach was to offer a way for the municipalities to actively review and accept the ALCOSAN Model for their sewer system evaluations.

The original H&H model extent included 550 LF of 8-inch combined system trunk sewer upstream from TR-02-04 along Larimer Avenue to McMaster Avenue.

Based on field investigations that were conducted after the development of the original H&H model it was determined that a significant revision to the model for this sewershed was required. The original model assumed a connection from JCT LBs_1204588 to POC TR-03. Later field

investigations determined that this connection does not exist. Instead, flows from JCT LBs_1204588 run past the POC TR-03 to JCT LBs_1203922 which is part of the TR-02-04 Larimer Avenue Sewershed. Therefore, the 28 acres of upstream area tributary to this junction was reassigned from TR-03 to TR-02-04. The TR-03 sewershed was reduced to 17 acres tributary via a single trunk sewer that runs down Semmens Street to TR-03 POC. The size of the TR-02-04 sewershed was increased from the original model by 28 acres. The re-assignment of model flows is discussed in Section 2.

Figure 2-1 depicts the extents of the revised H&H model.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements (3RWW/PM Team, June 30, 2009).

This sewershed was not monitored. No flow data is available at this time. Table 2-1 indicates that no monitors were installed in this sewershed.

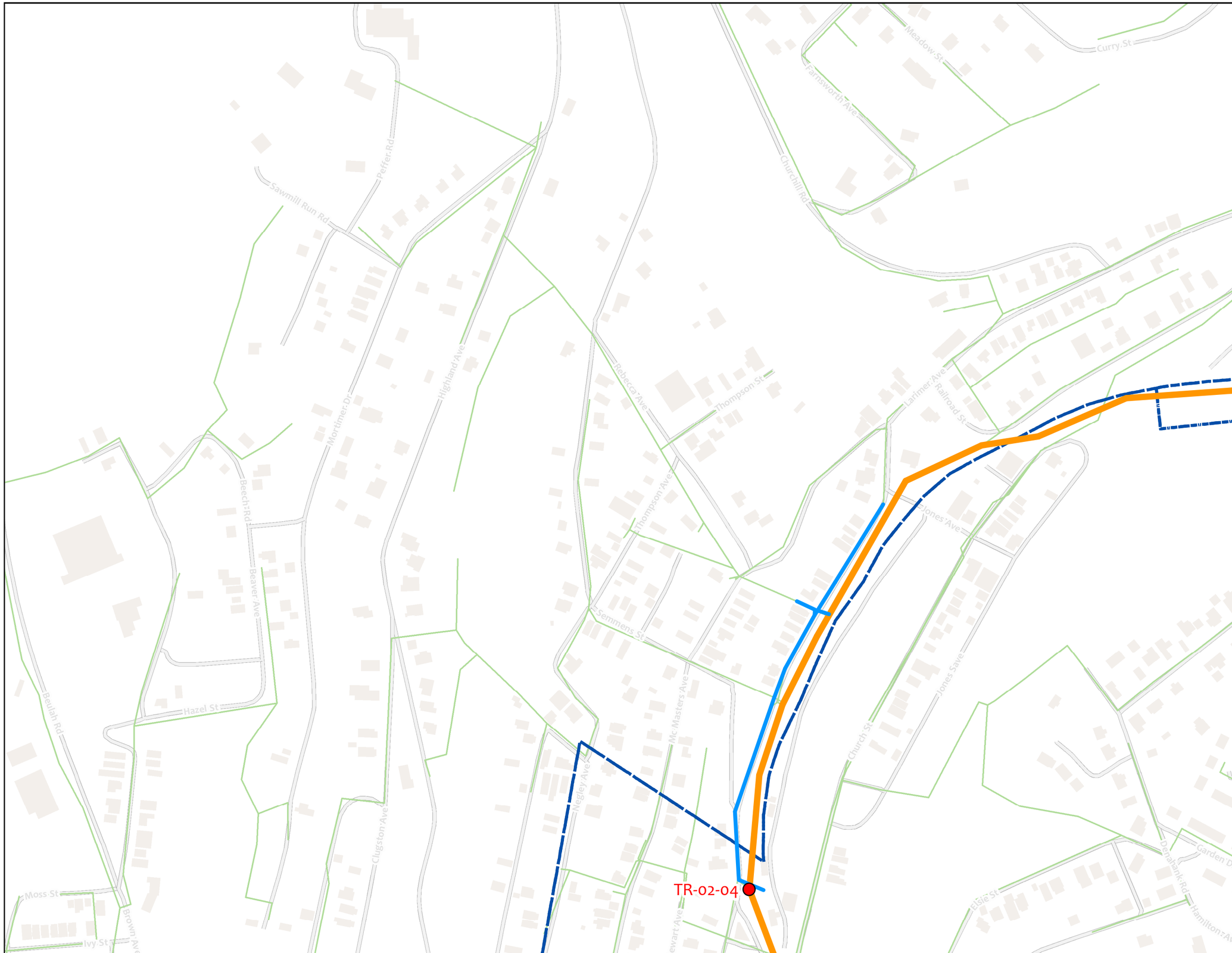
TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-02-04 SEWERSHED

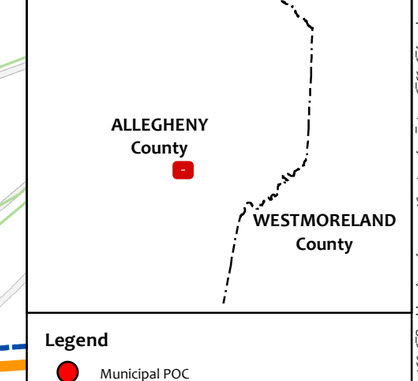
Municipality	Monitor Name	Monitor Type	Monitor Duration	Comments
N/A	N/A	N/A	N/A	

Sewershed Feasibility Study Report

TR-02-04 Larimer Road Sewershed

Figure 2-1 SWMM Model Extents





Legend

- Municipal POC
- Thompson Run Interceptor
- Model Extents
- One Overall Lines
- Municipal Boundaries

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 7/1/2013

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Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Toms\Figure 2-1 TR-02-04 Larimer Road.mxd

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

No additional monitoring has been performed since 2009.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-02-04 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-02-04 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Wilkins	28	28	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-02-04 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	217	6.44%	25%	272

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. According to the Turtle Creek/Thompson Run Basin H&H Model Validation and Characterization Report, the flow values for this sewershed were "…initially obtained from the ALCOSAN preliminary model for TT (SWMM Model file: TTRC-SW5-2005-FebOFUpdate.inp), then disaggregated consistently to reflect greater detail in the municipal systems." Existing conditions BWWFs were extrapolated from flow data at monitor location TR0400-IM-S-03. This monitor collects flows from a 90 acre sub-sewershed in the separate sewer system tributary to TR-04. Dry weather flows for the entire sewershed were extrapolated based on population. Future BWWFs were extrapolated to year

2046 based on assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-02-04 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	28	0.07	0.09	29.4%

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

According to the Turtle Creek/Thompson Run Basin H&H Model Validation and Characterization Report, the flow values for this sewershed were "…initially obtained from the ALCOSAN preliminary model for TT (SWMM Model file: TTRC-SW5-2005-FebOFUpdate.inp), then disaggregated consistently to reflect greater detail in the municipal systems." Existing conditions groundwater infiltration (GWI) values were extrapolated from the nighttime base component of the data at monitor location TR0400-IM-S-03. This monitor collects flows from a 90 acre sub-sewershed in the separate sewer system tributary to TR-04. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-02-04 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-02-04 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Wilkins	28	0.003	0.038	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

2.1.2.5 RDII Flows (Existing and Future)

According to the Turtle Creek/Thompson Run Basin H&H Model Validation and Characterization Report the flow values for this sewershed were "…initially obtained from the ALCOSAN preliminary model for TT (SWMM Model file: TTRC-SW5-2005-FebOFUpdate.inp), then disaggregated consistently to reflect greater detail in the municipal systems." Existing conditions RDII (GWI) values were extrapolated from the nighttime base component of the data at monitor location TR0400-IM-S-03. This monitor collects flows from a 90 acre sub-sewershed in the separate sewer system tributary to TR-04. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-02-04 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-02-04 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	28	0.39	0.39	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

2.1.2.6 Estimation Process for Unmonitored Areas

The TR-02-04 Sewershed was not monitored. The estimation process for flows in this sewershed is discussed in detail in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

Wilkins Township is currently in the design phase of a complete sewer separation project for this sewershed. Table 2-7 lists planned projects that are incorporated into the future model for the sewershed.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO FUTURE MODEL FOR TR-02-04 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Wilkins	Storm Sewer Separation	Design Phase – 07/2013	Municipality	2015

Model revisions included the removal of the upstream Stormwater Subcatchment flow inputs as this flow would now be assumed to be routed to the proposed storm sewer system. RDII flow inputs were assigned as discussed in Section 2.1.2.5. BWWF and ADF values were not changed.

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

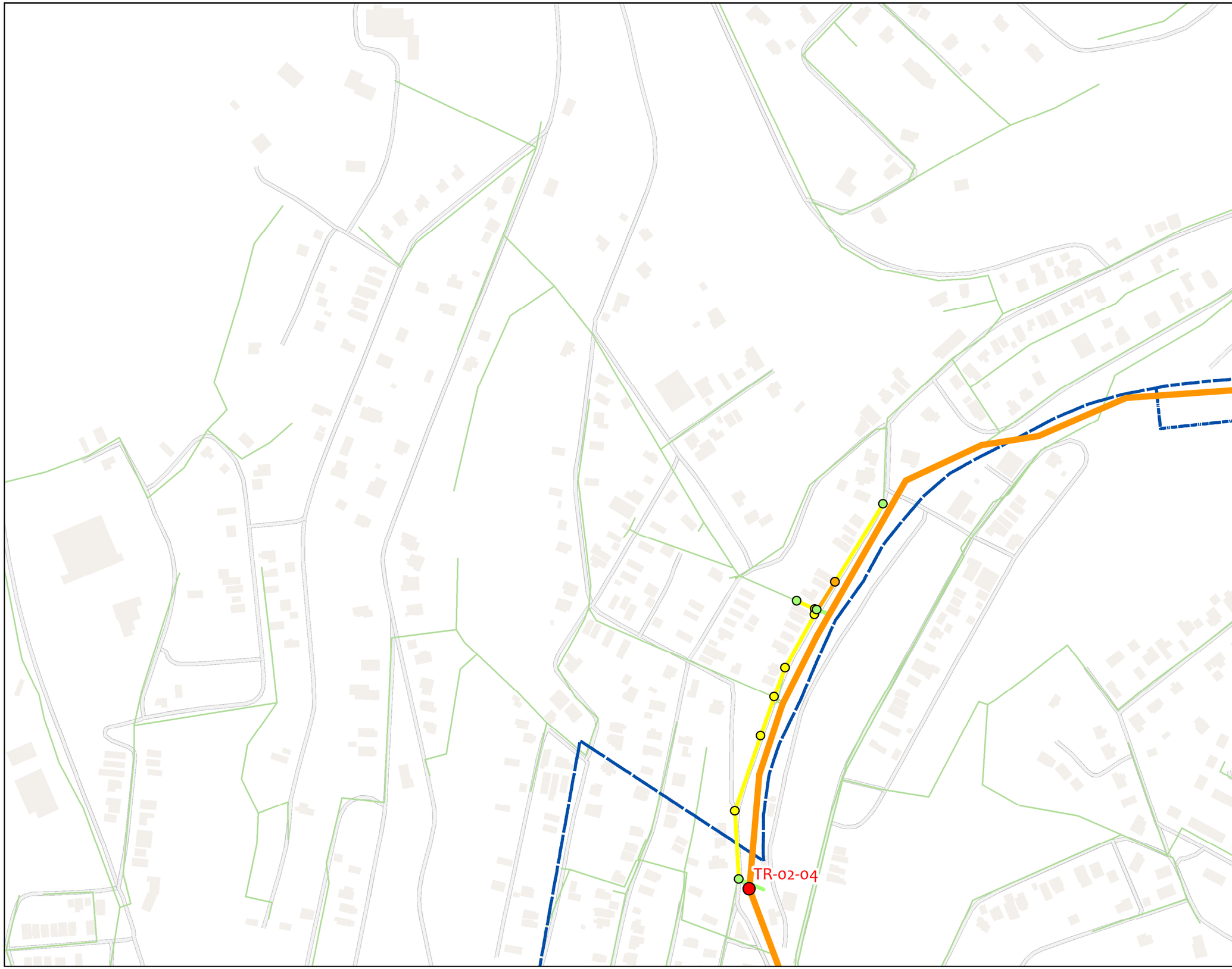
PFE calculations for this sewershed relied on a revised version of the SWMM model submitted as part of the May, 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. Revisions to the model are discussed in Section 2.1 and 2.1.2.7. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Figure 2-2 is an overview map that shows free flowing sewers, surcharged pipes and overflowing manholes along the Larimer Avenue trunk sewer during 2-Year Summer Design Storm conditions. Figure 2-3 presents the hydraulic profile for this segment.

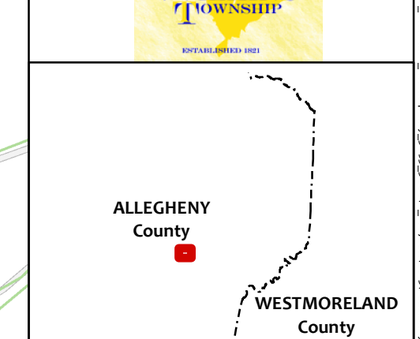
Under 2-Year Summer Design Storm conditions, the Larimer Avenue trunk sewer is shown to be capacity deficient along approximately 1,000 LF if its length. In the existing conditions model, the surcharge is controlled by the active CSO TR-03A.



Sewershed Feasibility Study Report

TR-02-04 Larimer Road Sewershed

Figure 2-2 Surcharge Map of 2-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 7/1/2013

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Document Path: G:\CLIENT\Monroeville_MunAuth_Municipality_3653_3688b_Projects\2013\FeasibilityStudy\Mapping_3653\Maps\Wilkins_LarimerRoad_2_2.mxd

FIGURE 2-3

TR-02-04 LARIMER AVENUE TRUNK SEWER PEAK FLOW HGL - 2 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS

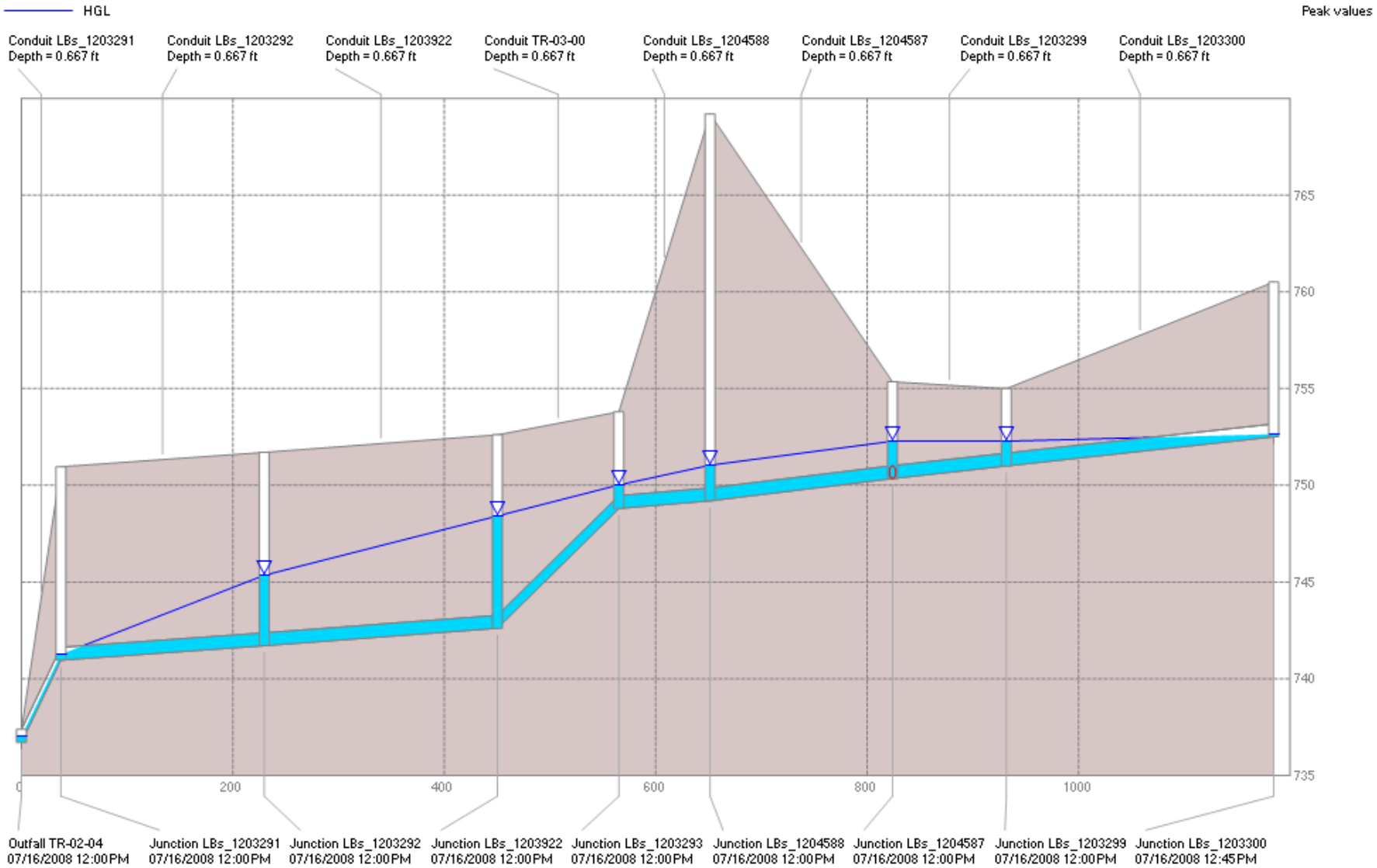


Figure 2-4 shows free flowing sewers, surcharged pipes and overflowing manholes along the Larimer Avenue trunk sewer during 10-Year Summer Design Storm conditions. Figure 2-5 illustrates the hydraulic profile for this segment.

Under 10-Year Summer Design Storm conditions, the Larimer Avenue trunk sewer is shown to be capacity deficient along approximately 1,000 LF if its length. In the existing conditions model, the surcharge is controlled by the active CSO TR-03A.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Larimer Avenue Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

Based on the revisions to model geometry and the proposed sewer separation project in this sewershed, revised PFE values are provided in Table 2-8.

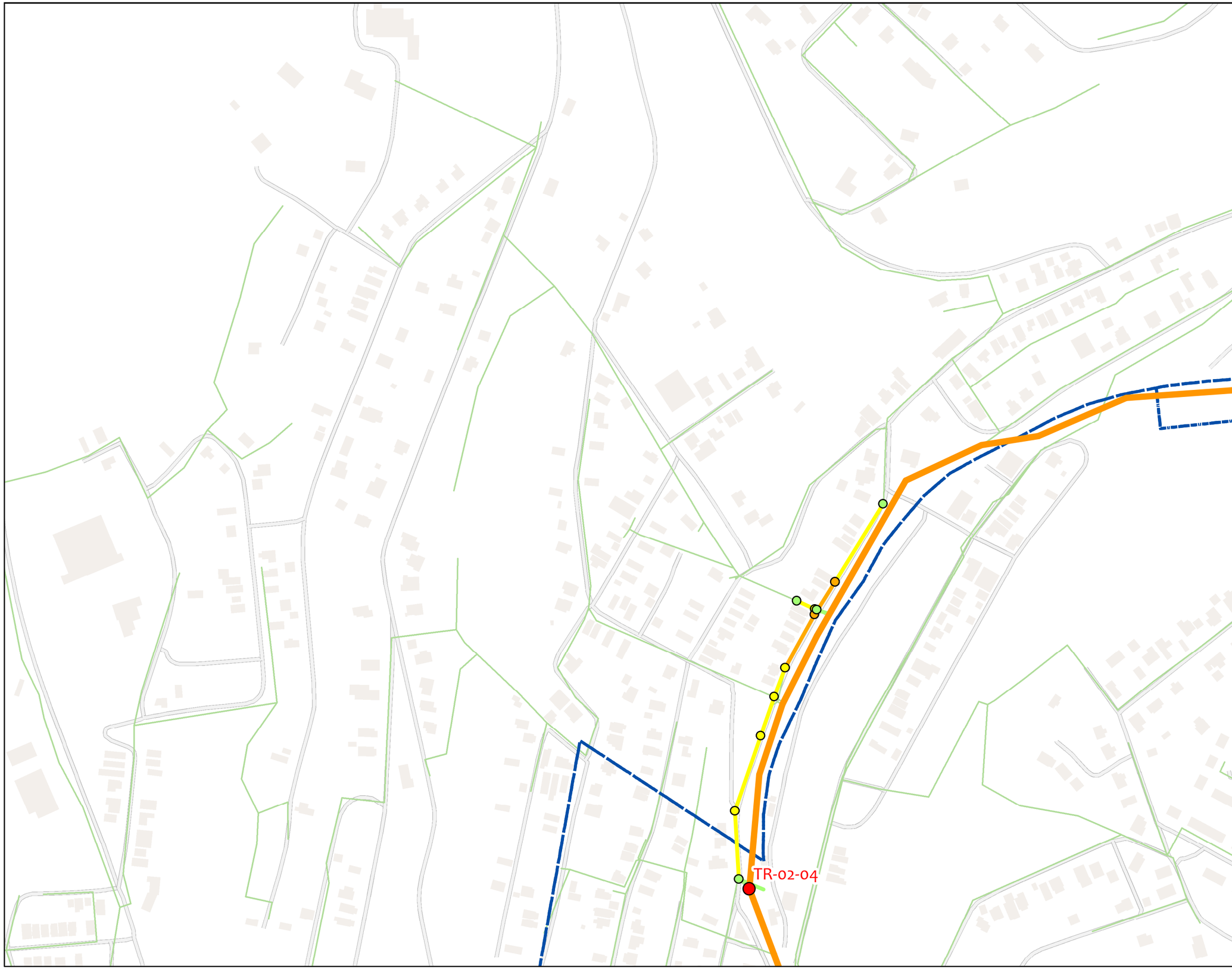
TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd)/Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	0.43	0.48	0.56	0.61

Information for 24-hour volumes for the various Summer Design storm conditions for the tributary communities is listed in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

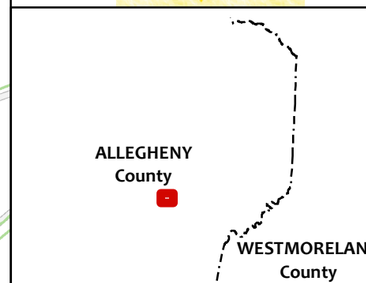
Tributary Community	Volume (MG)/Design Storm			
	1 Year	2 Year	5 Year	10 Year
Wilkins	0.54	0.55	0.56	0.57



Sewershed Feasibility Study Report

TR-02-04 Larimer Road Sewershed

Figure 2-4 Surcharge Map of 10-Year Summer Design Storm Conditions



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Junctions

- Overflow: HGL above MH rim
- Heavy: HGL <3' below MH rim
- Moderate: HGL > 1' above pipe crown
- Light: HGL < 1' above pipe crown
- None: HGL within pipe

Conduits:
Coding is determined by the average of the upstream and downstream junction surcharge conditions.

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 7/1/2013

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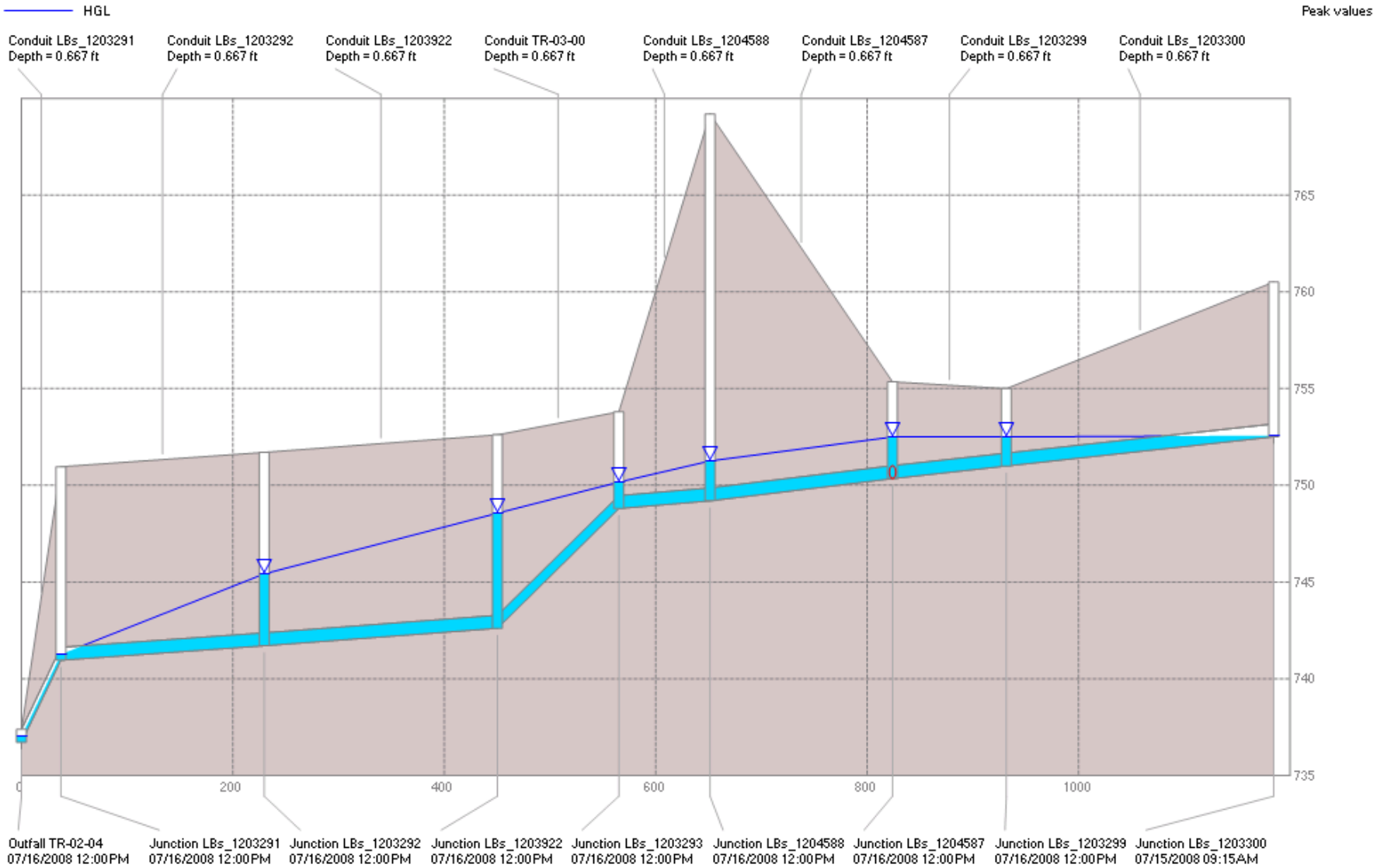
FIGURE 2-5

TR-02-04 LARIMER AVENUE TRUNK SEWER PEAK FLOW HGL - 10 YEAR SUMMER DESIGN STORM FLOWS - EXISTING CONDITIONS



2.3 Overflow Frequency and Volume

At the present time, the Larimer Avenue Sewershed is served by a combined sewer system. Pertinent data for CSOs based on the results of the revised existing conditions sewershed model, is reported in Table 2-10. Table 2-11 provides the result of SSOs based on the post-separation project model. Note that no SSOs are anticipated.

TABLE 2-10: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY

				Peak Rate (mgd)		
CSO Outfall	Owner	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
TR-03A	Wilkins	4	0.05	1.8	0.26	0

TABLE 2-11: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY

		2-yr Design Storm		10-yr Design Storm	
SSO Outfall	Owner	Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
N/A	N/A	N/A	N/A	N/A	N/A

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-02-04 Larimer Avenue Sewershed is currently served by a combined sewer system. A pending sewer separation project will eliminate the CSO's.

3.1.2 SSO Control Level

The TR-02-04 Larimer Avenue Sewershed is served by a combined sewer system. After the planned sewer separation project has been completed, this sewershed will become classified as a sanitary sewer sewershed. Per the COA, any SSOs are illegal and are required to be controlled. Additional post project flow monitoring will be required to determine the effectiveness of the sewer separation project. As the location of the existing overflow is close to the Thompson Run Interceptor, any remaining SSOs would likely be controlled by increased conveyance from the overflow to the POC.

3.2 Recommendations for Control Level

CSO TR-02-04 in the Larimer Avenue Sewershed is modeled to be active during typical year flows and during 2 and 10 year summer design storm conditions. The intent of the planned separation project is to reduce CSO frequency to 0 overflow events per year. However, this will require post project verification.

4.0 MUNICIPAL SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-02-04 Larimer Avenue Sewershed is currently served by a combined sewer system. However, there is a pending sewer separation project in this sewershed which will eliminate CSOs and reclassify the sewershed from combined to sanitary. Therefore, no alternatives were developed as part of this Feasibility Study.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

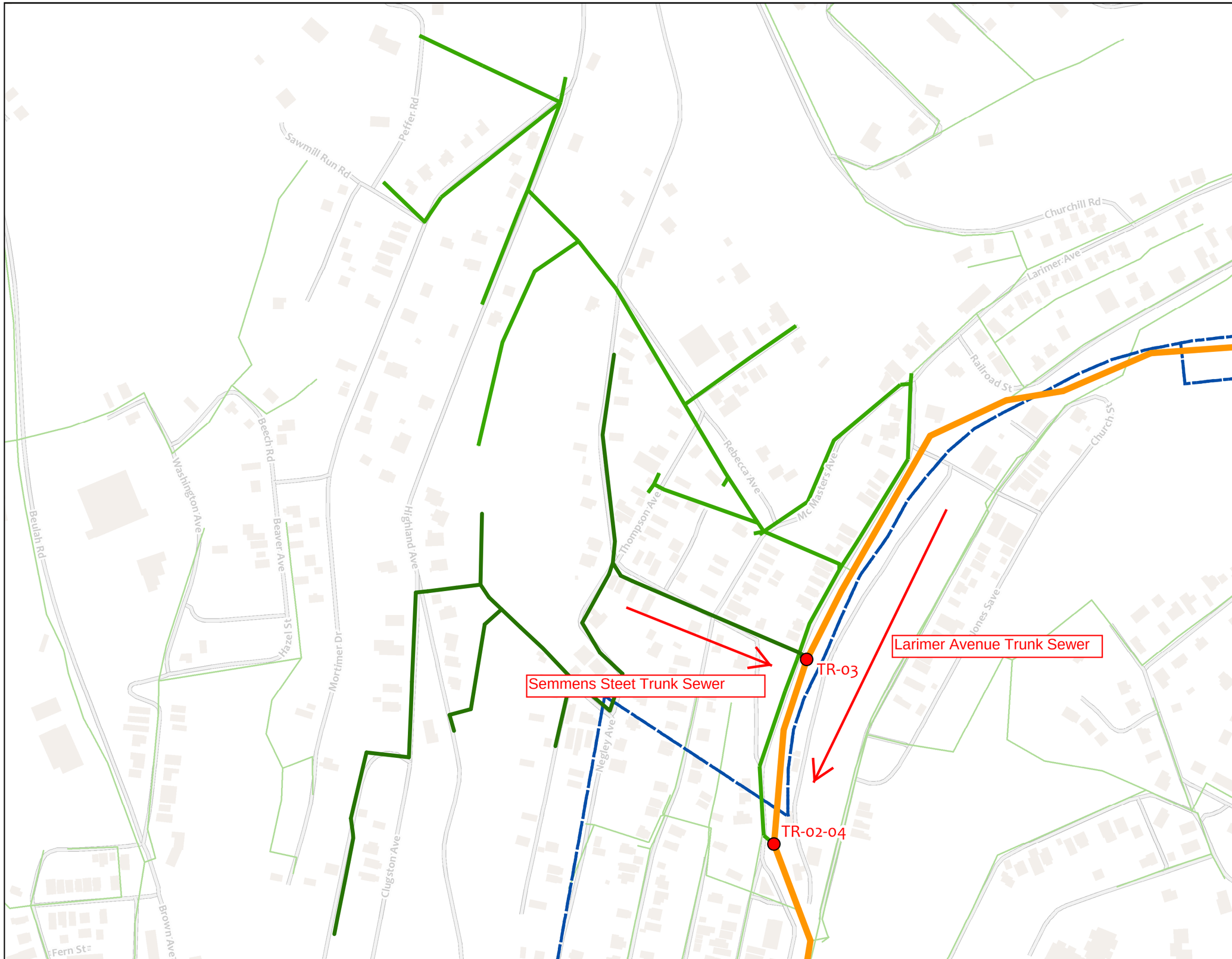
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Due to the proposed sewer separation project, no additional alternatives are anticipated to be required in this sewershed for compliance with the COA.

The sewer separation project will involve the conversion of existing combined sewer overflows TR-03 and TR-03A into dedicated storm sewer outfalls. The existing POC TR-03 will be abandoned. Separate sanitary flows from the Semmens Street Sewershed will be conveyed via a new 8-inch sanitary line and tied into the Larimer Road interceptor at a point near the former POC TR-03. Separate sanitary flows from both sewer sheds will be conveyed to POC TR-02-04.

The sewer separation project will be conducted in two phases. The first phase is scheduled for completion in 2014 and will involve separation of the combined sewer area tributary to the Semmens Street Sewershed tributary to TR-03. The second phase of the project is currently scheduled for 2015 and will involve separation of the combined sewer area tributary to the Larimer Avenue Sewershed tributary to TR-02-04. At the completion of the second phase, the existing regulator structure at TR-03 will be abandoned and Semmens Street flows will be routed to the Larimer Avenue trunk sewer.

Figure 5-1 provides a GIS map depicting the post-separation project conditions. Figures 5-2A and 5-2B provide a hydraulic grade line profile at the time of peak flow during 10-Year Summer Design Storm conditions for the Larimer Avenue and Semmens Street trunk sewers.



Sewershed Feasibility Report

TR-02-04 & TR-03 Sewersheds

Figure 5-1

WILKINS TOWNSHIP
ESTABLISHED 1821

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- TR-02-04
- TR-03

N

1:3,000

1 inch = 250 feet

0 125 250 500 Feet

Author: Patrick Moulden

Date: 7/8/2013

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FIGURE 5-2A

TR-02-04 LARIMER AVENUE TRUNK SEWER PEAK FLOW HGL -10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE

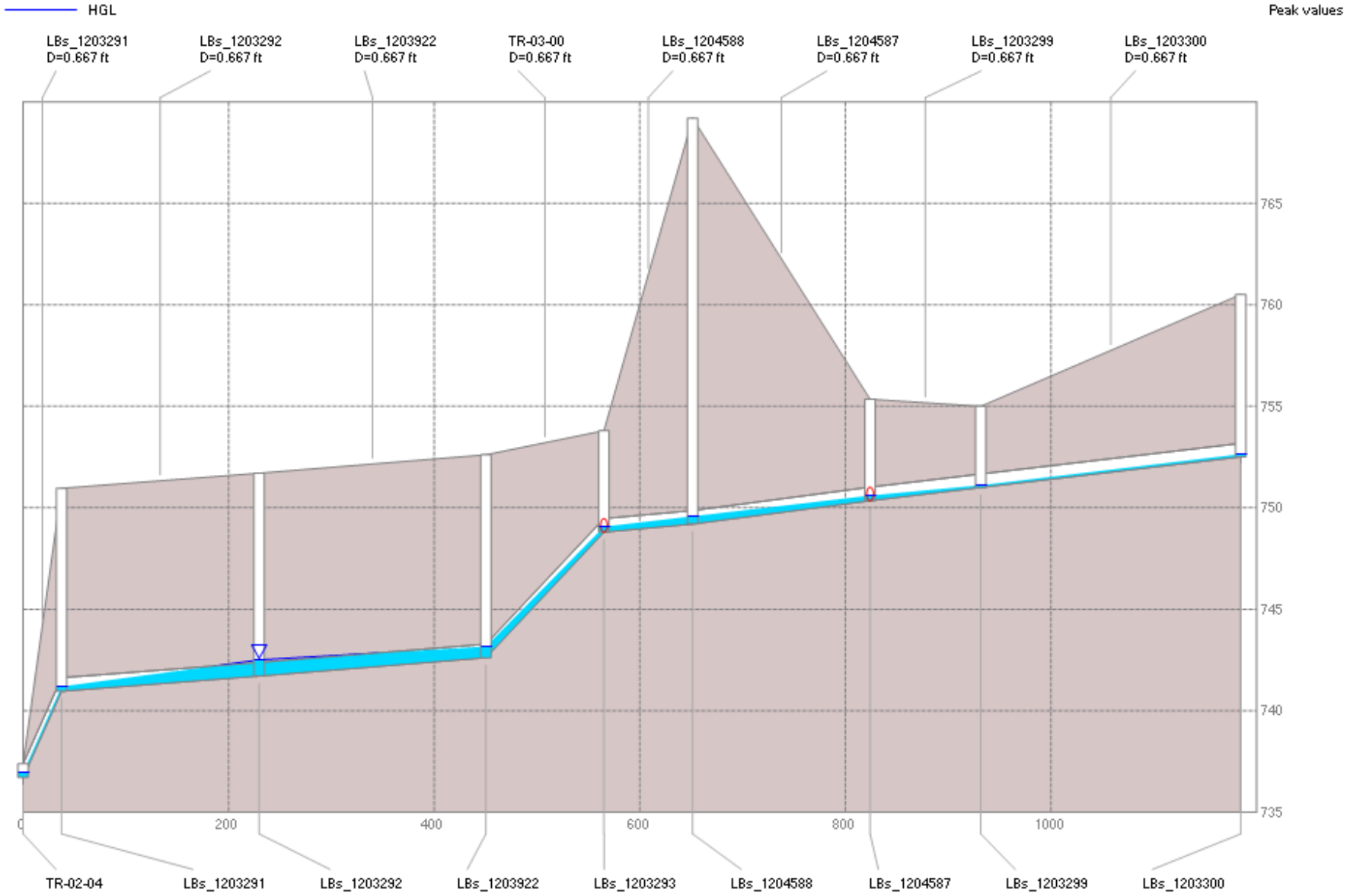
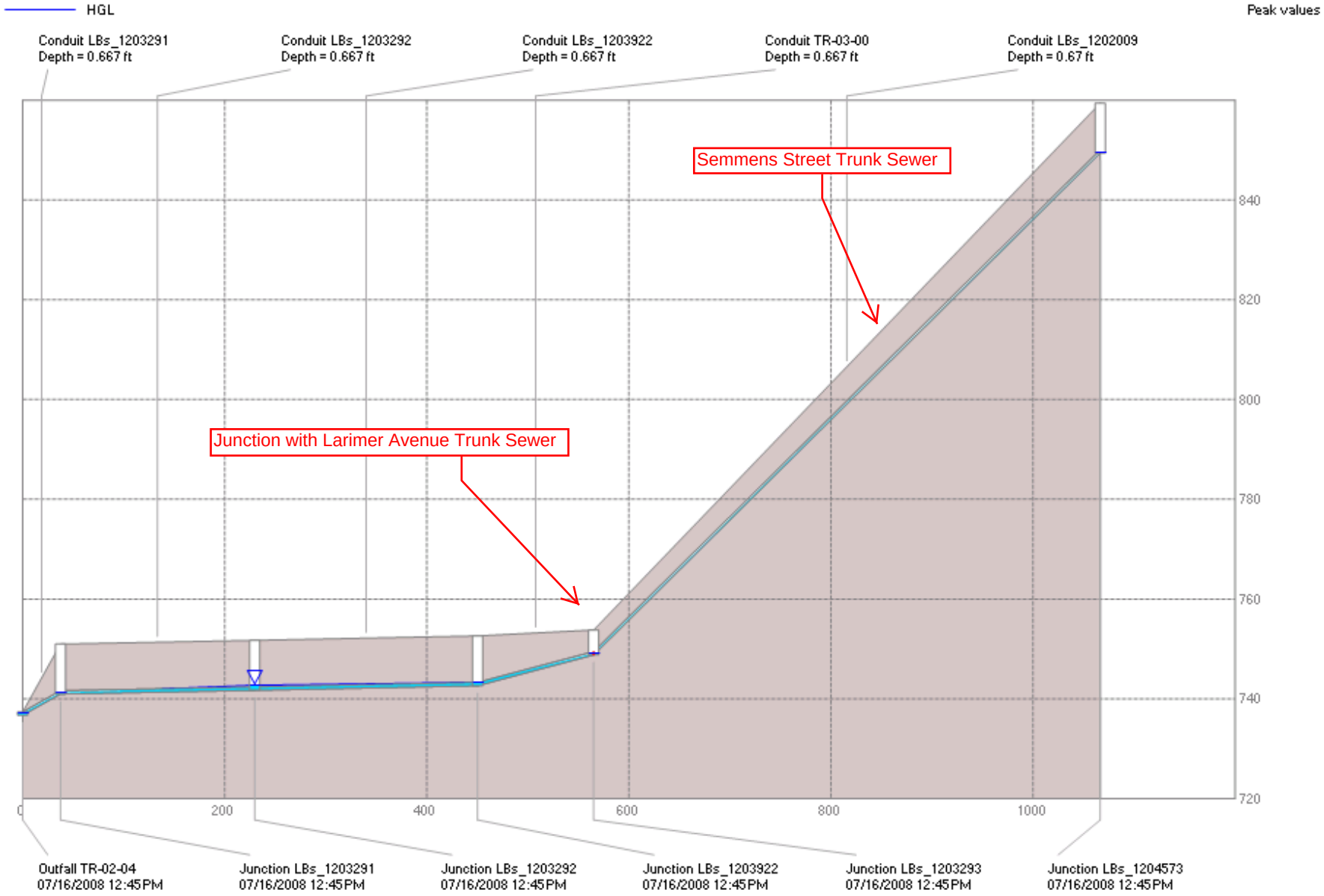


FIGURE 5-2B

TR-02-04 SEMMENS STREET TRUNK SEWER PEAK FLOW HGL -10 YEAR SUMMER DESIGN STORM FLOWS - RECOMMENDED ALTERNATIVE



While it anticipated that the sewer separation project will eliminate CSOs and not generate SSOs, additional post-project flow monitoring will be required to determine the effectiveness of the project. If SSO activation is found, additional alternatives will be developed at that time. However, since the location of the existing overflow is close to the Thompson Run Interceptor and there is limited available area for storage facilities, the solution to control any remaining SSOs would likely be increased conveyance capacity from the SSO location to POC TR-02-04.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the sewer system in the TR-02-04 Larimer Avenue Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Larimer Avenue Sewershed is tributary to the Thompson Run Interceptor at POC TR-02-04, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF length, and will require an estimated $8M to $20M

of capital improvements to convey flows from POC TR-02-04 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5 LF diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the TR-02-04 Sewershed and M-29, any work done in the Larimer Avenue Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-02-04 Larimer Avenue Sewershed provides service to only customers within Wilkins Township, so 100% of the cost of any work performed in this sewershed would be the responsibility of the Wilkins Township. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix G
TR-02-02 McMasters Avenue
Municipal Boundary

FEASIBILITY STUDY REPORT

For

TR-02-02 MCMASTERS AVENUE SEWERSHED

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

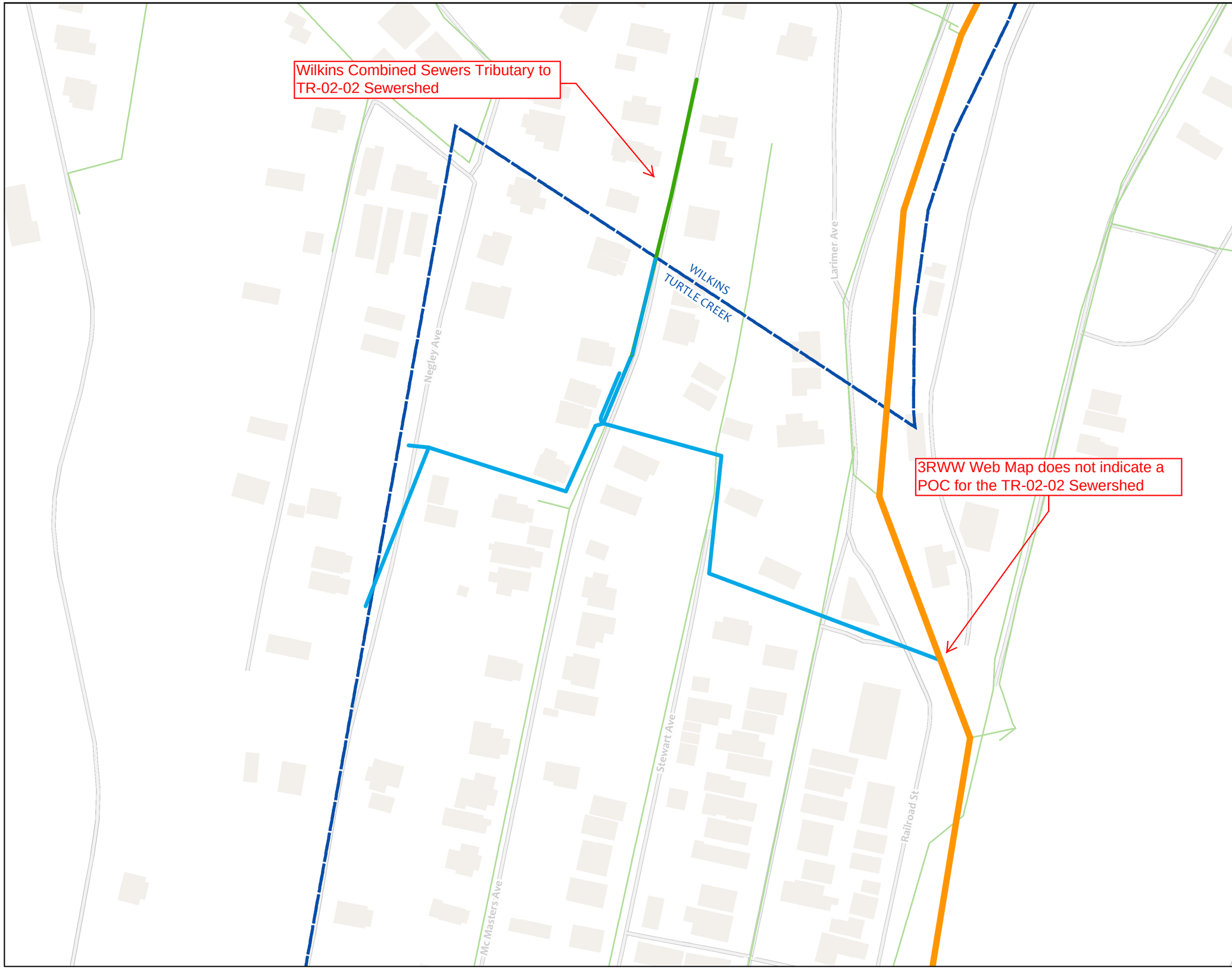
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the TR-02-02 McMasters Avenue Sewershed in Wilkins Township.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-02-02 McMasters Avenue Sewershed is located in the southern section of Wilkins Township. The sewershed is served by a combined system. Service is provided to single family residential households and some small apartment buildings. POC TR-02-02 is located in Turtle Creek Borough. This report considers only the Wilkins Township flows that are tributary to the Turtle Creek / Wilkins Township municipal boundary. For more information pertaining to the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek. A map of the TR-02-02 McMasters Avenue Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.



Sewershed Feasibility Report

TR-02-02 McMasters Avenue Sewershed

Figure 1-1 Sewershed Map

Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Combined)
- Turtle Creek (Combined)

N

1:1,200

1 inch = 100 feet

0 50 100 200 Feet

Author: Patrick Moulden

Date: 7/8/2013

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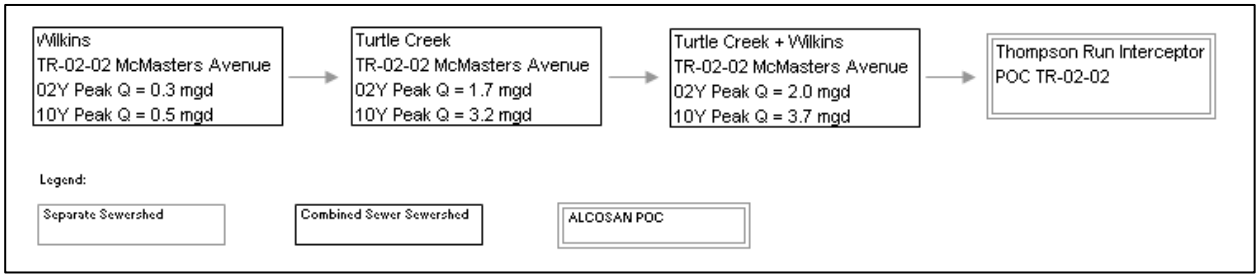
Figure 1-2: Sewershed Schematic (1)



(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

Table 1-1 lists information for the McMasters Avenue Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census.

The McMasters Avenue Sewershed is currently a combined sewer system. Information on the storm sewers in the McMasters Avenue area is not available.

TABLE 1-1: TR-02-02 MCMASTERS AVENUE SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Wilkins	TR-02-02	26	12	2.14	26
Turtle Creek (4)	TR-02-02	43	20	2.16	44

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

(4) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the McMasters Avenue sewershed.

TABLE 1-2: TR-02-02 MCMASTERS AVENUE SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0.5	311.5	0.02
Turtle Creek	3.1	1,129.9	0.07

(1) Combined Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-3: TR-02-02 MCMASTERS AVENUE SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0	0	0
Turtle Creek	0	0	0

(1) Separate Sewer information obtained from 3RWW GIS Web Map. There are no separate sewers in this sewershed.

TABLE 1-4: TR-02-02 MCMASTERS AVENUE SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	N/A	N/A	N/A
Turtle Creek	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-02-02 McMasters Avenue Sewershed is located in the Turtle Creek/Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-02-02 McMasters Avenue Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

There are no known overflows in the TR-02-02 McMasters Avenue Sewershed.

1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the sewer system in the TR-02-02 McMasters Avenue Sewershed.

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

The tributary sewers in this sewershed were not modeled. Additionally the original H&H model did not include any flow inputs into the Thompson Run Interceptor for this sewershed.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This sewershed was not monitored. No flow data is available at this time.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-02-02 SEWERSHED

Municipality	Monitor Name	Monitor Type(1)	Monitor Duration	Comments
N/A	N/A	N/A	N/A	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements (3RWW/PM Team, June 30, 2009).

No flow monitoring has been performed in this sewershed.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-02-02 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and would not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-02-02 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Wilkins	26	26	0%
Turtle Creek (3)	43	43	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

(3) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-02-02 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	26	6.44%	25%	33
Turtle Creek (4)	44	15.92%	15.92%	52

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

(4) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from the BWWF diurnal cycle pattern of the H&H model at the downstream connection to POC TR-02-04 which were determined by downstream flow monitoring data at monitor TR0200_-OSC-M-03_. Future BWWFs were extrapolated to year 2046 based on the assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-02-02 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	26	0.009	0.011	22.2%
Turtle Creek (2)	43	0.017	0.019	11.8%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-02-02. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-02-02 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and would not include a significant amount of sewer system expansion. Additionally, Wilkins

has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-02-02 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (2)
Wilkins	26	0.009	0.009	25%
Turtle Creek (3)	43	0.001	0.001	25%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-03 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-02-02 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its

sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-02-02 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1), (2)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	26	0.28	0.28	0%
Turtle Creek (3)	43	1.7	1.7	0%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

(3) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.6 Estimation Process for Unmonitored Areas

This sewershed was not monitored. The estimation process for unmonitored areas is outlined above in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

This sewershed was not modeled.

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

PFE estimates were not developed for this sewershed pending the installation of flow monitors.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

There are no reports of capacity deficient sewers in this sewershed. However, verification by field investigation and flow monitoring is recommended.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the McMasters Avenue Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

Currently the McMasters Avenue Sewershed has a combined sewer system. No flow data in this sewershed has been collected. Additionally, available mapping does not indicate a CSO structure. Verification of flows with flow monitors is recommended.

2.3 Overflow Frequency and Volume

Currently the McMasters Avenue Sewershed has a combined sewer system. No flow data in this sewershed has been collected. Additionally, available mapping does not indicate a CSO structure. Verification of flows with flow monitors is recommended.

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-02-02 McMasters Avenue Sewershed is currently served by a combined sewer system. The recommended level of CSO control cannot be determined. No flow data in this sewershed has been collected. Additionally, available mapping does not indicate a CSO structure. Verification of flows with flow monitors is recommended.

3.1.2 SSO Control Level

The TR-02-02 McMasters Avenue Sewershed is served by a combined sewer system. No SSOs are anticipated.

3.2 Recommendations for Control Level

Available information does not indicate the presence of CSO or SSO overflows.

4.0 SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As there is no information to indicate the presence of any overflows or capacity restrictions in this sewershed, no alternatives were developed for this sewershed as part of this Feasibility Study.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-02-02 McMasters Avenue Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The McMasters Avenue Sewershed is tributary to the Thompson Run Interceptor at POC TR-02-02, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-02-02 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the TR-02-02 Sewershed and M-29, any work done in the McMasters Avenue Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-02-02 McMasters Avenue Sewershed provides service to customers within Wilkins Township, so 100% of the cost of any work performed in this sewershed would be the responsibility of the Wilkins Township. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix H
TR-01-06 Municipal Boundary

FEASIBILITY STUDY REPORT

For

TR-01-06 CLUGSTON AVENUE SEWERSHED

Prepared by:

CHESTER ENGINEERS

for

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

1.1 Background

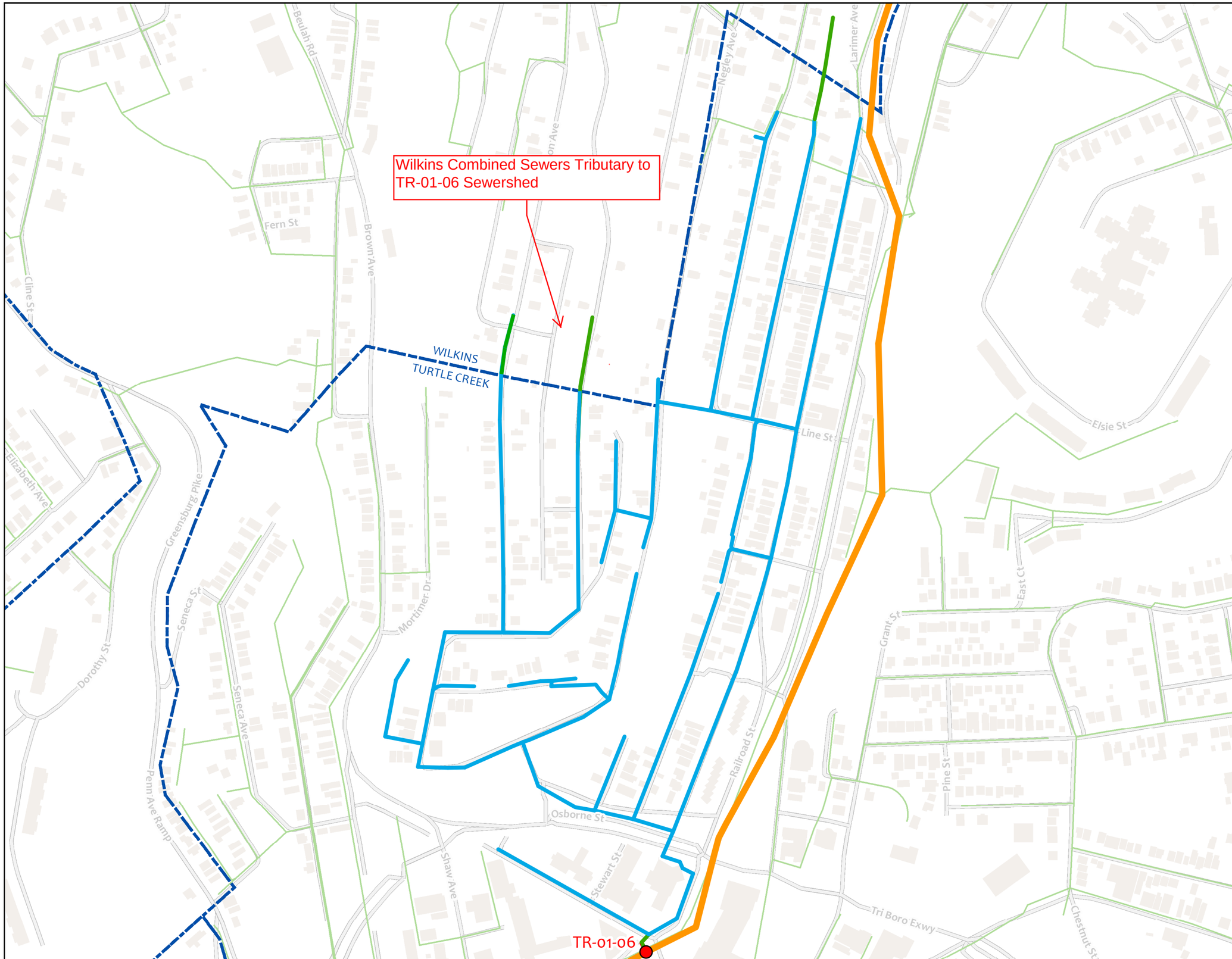
For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the Wilkins Township portion of the TR-01-06 Clugston Avenue Sewershed.

1.2 Existing System Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

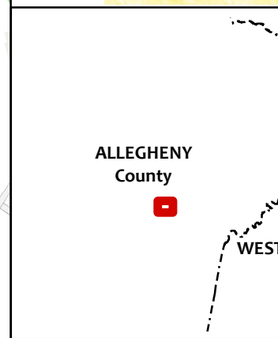
The TR-01-06 Clugston Avenue Sewershed is located in the southwestern section of Wilkins Township. The sewershed is served by a combined system. Service is provided to single family residential households and some small apartment buildings. POC TR-01-06 is located in Turtle Creek Borough. This report considers only the Wilkins Township flows that are tributary to the Turtle Creek / Wilkins Township municipal boundary. The Wilkins portion of this sewershed consists of flows from three small areas tributary to Turtle Creek at three municipal boundary connections. For more information pertaining to the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek. A map of the TR-01-06 Clugston Avenue Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.



Sewershed Feasibility Report

TR-01-06 Clugston Avenue Sewershed

Figure 1-1 Sewershed Map



Legend

- Municipal POC
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Wilkins (Combined)
- Turtle Creek (Combined)

N

1:3,600

1 inch = 300 feet

0 150 300 600 Feet

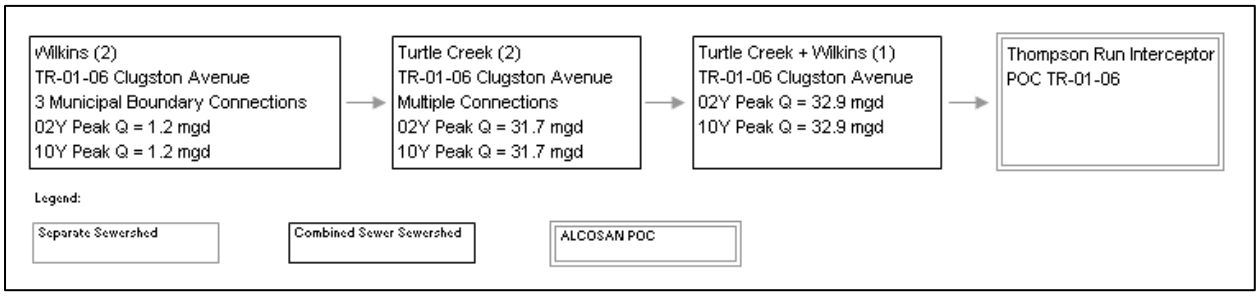
Author: Patrick Moulden

Date: 7/8/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Wilkins_Township_6500b_Projects\2013\Feasibility Mapping\Maps\WK_CL_Fig1-1.mxd

Figure 1-2: Sewershed Schematic



(1) 2 and 10-Year Summer Design Storm peak flow value provided by Glenn Engineering

(2) Flows for Wilkins and Turtle Creek extrapolated from 32.9 mgd. Extrapolation methodology is discussed in Section 2 of this report.

Table 1-1 lists information for the Clugston Avenue Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census.

The Clugston Avenue Sewershed is currently a combined sewer system. Information on the storm sewers in the Clugston Avenue area is not available.

TABLE 1-1: TR-01-06 CLUGSTON AVENUE SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Wilkins	TR-01-06	13	8	2.14	18
Turtle Creek (4)	TR-01-06	68	240	2.16	519

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

(4) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

Tables 1-2, 1-3, and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Clugston Avenue sewershed.

TABLE 1-2: TR-01-06 CLUGSTON AVENUE SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	1.2	729.0	0.09
Turtle Creek	31.6	14,240	0.46

(1) Combined Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-3: TR-01-06 CLUGSTON AVENUE SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	0	0	0
Turtle Creek	0	0	0

(1) Separate Sewer information obtained from 3RWW GIS Web Map. There are no separate sewers in this sewershed.

TABLE 1-4: TR-01-06 CLUGSTON AVENUE SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Wilkins	N/A	N/A	N/A
Turtle Creek	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The TR-01-06 Clugston Avenue Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09. The TR-01-06 Clugston Avenue Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-09.

1.2.3 Existing Overflows

There are no known overflows in the TR-01-06 Clugston Avenue Sewershed.

1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the sewer system in the TR-01-06 Clugston Avenue Sewershed.

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

The original H&H model extent included 1,000 LF of 24-inch and 18-inch combined sewers upstream of POC TR-01-06. However, it is noted that all flow inputs are made one junction upstream of the POC. Therefore, the model cannot be considered to accurately reflect surcharge conditions in this line. For more information, reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and POC T-09.

This sewershed was not monitored. No flow data is available at this time.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE TR-01-06 SEWERSHED

Municipality	Monitor Name	Monitor Type(1)	Monitor Duration	Comments
N/A	N/A	N/A	N/A	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

No flow monitoring has been performed in this sewershed.

2.1.2 Baseline Conditions

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the TR-01-06 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR TR-01-06 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Wilkins	13	13	0%
Turtle Creek (3)	68	68	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

(3) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR TR-01-06 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Wilkins	18	6.44%	25%	23
Turtle Creek (4)	519	15.92%	15.92%	602

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

(4) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from the BWWF diurnal cycle pattern of the original H&H model at the downstream connection to POC TR-01-06. Future BWWFs were extrapolated to year 2046 based on the assumed population change as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR TR-01-06 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	13	0.004	0.0048	21.1%
Turtle Creek (2)	68	0.11	0.13	20.0%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the downstream connection to POC TR-01-06. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-01-06 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its

sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR TR-01-06 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (2)
Wilkins	13	0.002	0.0023	25%
Turtle Creek (3)	68	0.048	0.06	25%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC TR-01-06 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the TR-01-06 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and

maintenance. Therefore, significant additional RDII is unlikely. Therefore, an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR TR-01-06 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1), (2)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Wilkins	13	1.2	1.2	0%
Turtle Creek (3)	68	31.6	31.6	0%

(1) No flow monitoring was performed in this sewershed. All flow values are estimated and are considered preliminary and pending verification by flow data.

(2) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

(3) TR-01-06 PFE Values provided by Glen Engineering. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.6 Estimation Process for Unmonitored Areas

This sewershed was not monitored. The estimation process for unmonitored areas is outlined above in Sections 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.1.2.7 Planned Projects Incorporated Into Future Model

This sewershed was not modeled.

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.1 Background

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

2.1.3.2 Developing PFEs for the POC

Reference is made to Peak Flow Estimates submitted to ALCOSAN on July 16, 2010.

A PFE value of 32.91 mgd for both 2 and 10-Year Summer Design Storms for the TR-01-06 Sewershed was provided by Glenn Engineering. PFE calculations for the Wilkins portion of this sewershed used this value to estimate flow values as outlined in Section 2.1.2.3, 2.1.2.4, and 2.1.2.5.

2.2 Capacity Deficient Sewers

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

There are no reports of capacity deficient sewers in the Wilkins portion of this sewershed. For more information pertaining to the Turtle Creek portion of this sewershed reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Wilkins portion of the Clugston Avenue Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

Flow rates and volumes were extracted from the 2003 Typical Year model. Information for peak flow rates for the various levels of CSO control for typical year precipitation are is listed in Table 2-7.

TABLE 2-7: PROJECTED SUMMER PEAK FLOW RATES – ORIGINALLY SUBMITTED PFE

Municipality	Peak Flow Rate (mgd) by CSO Control Level – Number of Overflow Events Per Year					
Tributary Community	1	2	3	5	7	11
Wilkins	1.42	0.58	0.49	0.3	0.18	0.04
Turtle Creek	37.31	15.37	12.93	7.97	4.7	1.17

Information for 24-hour volumes for the various levels of CSO control for typical year precipitation are is listed in Table 2-8.

TABLE 2-8: PROJECTED SUMMER 24-HOUR VOLUMES – ORIGINALLY SUBMITTED PFE

Municipality	Flow Volume (MG) by CSO Control Level – Number of Overflow Events Per Year					
Tributary Community	1	2	3	5	7	11
Wilkins	0.047	0.012	0.019	0.011	0.015	0.001
Turtle Creek	1.229	0.317	0.494	0.285	0.38	0.021

2.3 Overflow Frequency and Volume

The existing H&H model does not have an outfall structure at this POC. However, the 3RWW Web Map has a comment that indicates that an unsealed outfall exists at this location. Since there is no outfall in the model, values cannot be provided for CSO rate and volume. Pertinent data for CSOs based on the results of the revised sewershed model is reported in Table 2-9.

Table 2-10 provides the result of SSOs based on the post-separation project model. Note that no SSOs are anticipated.

TABLE 2-9: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR CLUGSTON AVENUE SEWERSHED

				Peak Rate (mgd)		
CSO Outfall	**Owner**	**Number of Overflows in the Typical Year**	**Annual Overflow Volume (MG)**	**0 Overflows per Year**	**4 Overflows per Year**	**10 Overflows per Year**
TR-01-06	Turtle Creek	(1)	(1)	(1)	(1)	(1)

(1) These values cannot be extracted from the current version of the H&H model. For more information, reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

TABLE 2-10: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR TR-01-06 CLUGSTON AVENUE SEWERSHED

		2-yr Design Storm		10-yr Design Storm	
SSO Outfall	**Owner**	**Peak Rate (mgd)**	**Volume (MG)**	**Peak Rate (mgd)**	**Volume (MG)**
N/A	N/A	N/A	N/A	N/A	N/A

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The TR-01-06 Clugston Avenue Sewershed is currently served by a combined sewer system. As it is tributary to the T-09 Complex Sewershed, the recommended level of CSO control was determined to be 0 overflow events per year. Reference is made to the ALCOSAN T-09 Complex Sewershed Feasibility Study Report.

3.1.2 SSO Control Level

The TR-01-06 Clugston Avenue Sewershed is served by a combined sewer system. No SSOs are anticipated.

3.2 Recommendations for Control Level

Available information does not indicate the presence of CSO or SSO overflows.

4.0 SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As there is no information to indicate the presence of any overflows or capacity restrictions in this sewershed, no alternatives were developed for this sewershed as part of this Feasibility Study.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous Flow Monitoring and Data Analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of Critical Sewers at least once every 7 years, and Non-Critical Sewers at least once every 15 years.
3. System Cleaning as necessary.
4. System Maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the separate sanitary sewer system in the TR-01-06 Clugston Avenue Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Clugston Avenue Sewershed is tributary to the Thompson Run Interceptor at POC TR-01-06, which is tributary to ALCOSAN POC T-09. The Thompson Run Interceptor is capacity deficient along its approximately 22,000 LF, and will require an estimated $8M to $20M of capital improvements to convey flows from POC TR-01-06 to T-09. From T-09, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the TR-01-06 Sewershed and M-29, any work done in the Clugston Avenue Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The TR-01-06 Clugston Avenue Sewershed provides service to customers within Wilkins Township and Turtle Creek Borough, so 100% of the cost of any work performed in this sewershed would be the shared responsibility of Wilkins Township and Turtle Creek Borough. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to Feasibility Study Reports for Wilkins Township and ALCOSAN POC T-09.

Appendix I
T-07 Municipal Boundary

FEASIBILITY STUDY REPORT

For

T-07 BROWN AVENUE SEWERSHED

Prepared for:

WILKINS TOWNSHIP

July 2013

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1.0 INTRODUCTION

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

1.1 Background

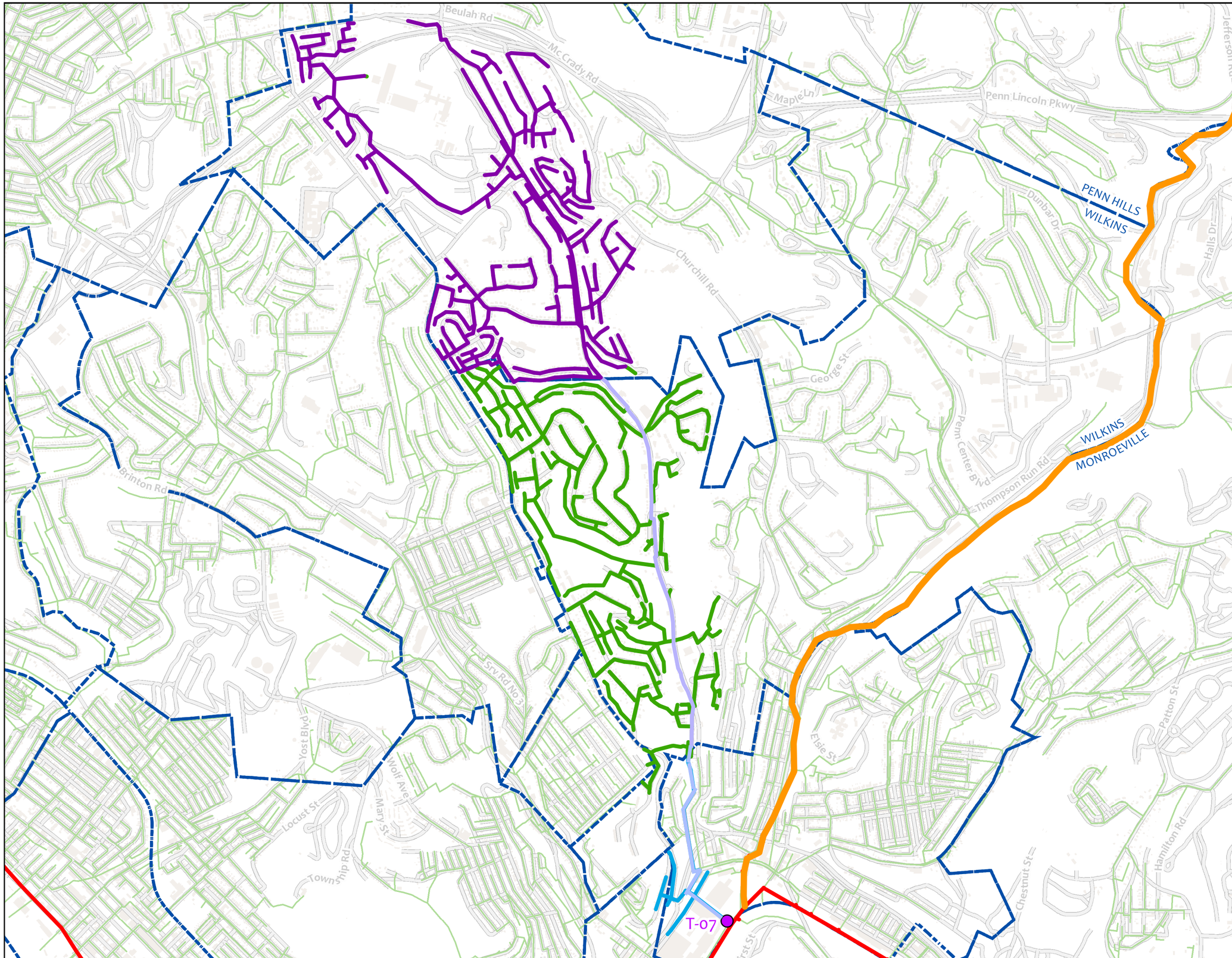
For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

This Feasibility Study Report is intended to present a description of the work tasks performed, as well as the results of the tasks that culminate in recommended wet weather control alternatives for the Wilkins Township portion of the T-07 Brown Avenue Sewershed.

1.2 Existing System Description

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

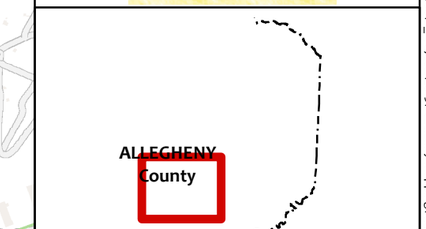
The T-07 Brown Avenue Sewershed is located in the southwestern section of Wilkins Township. Service is provided to single family residential households, some small businesses and apartment buildings. The T-07 sewershed is a multi-municipal sewershed that receives flows from three communities: Churchill, Wilkins and Turtle Creek. The Churchill and Wilkins portions of the sewershed are served by a separate sanitary sewer system. The Turtle Creek portion is served by a combined sewer system. POC T-07 is located in Turtle Creek Borough. This report considers only the Wilkins Township flows that are tributary to the Turtle Creek / Wilkins Township municipal boundary. For more information pertaining to the Churchill and Turtle Creek portions of this sewershed, reference is made to the Churchill and Turtle Creek Feasibility Study Reports prepared respectively by Churchill and Turtle Creek. A map of the T-07 Brown Avenue Sewershed is presented in Figure 1-1. A schematic diagram showing the distribution of 2 and 10 year summer design storm peak flows in this sewershed is presented in Figure 1-2.



Sewershed Feasibility Report

T-07 Sewershed

Figure 1-1 Sewershed Map



Legend

- ALCOSAN POC
- ALCOSAN Interceptors
- Thompson Run Interceptor
- One Overall Lines
- Municipal Boundaries

Tributary Sewer Lines

- Churchill (Separate)
- Wilkins & Churchill
- Wilkins (Separate)
- Turtle Creek (Combined)

N

1:19,200

1 inch = 1,600 feet

0 800 1,600 3,200 Feet

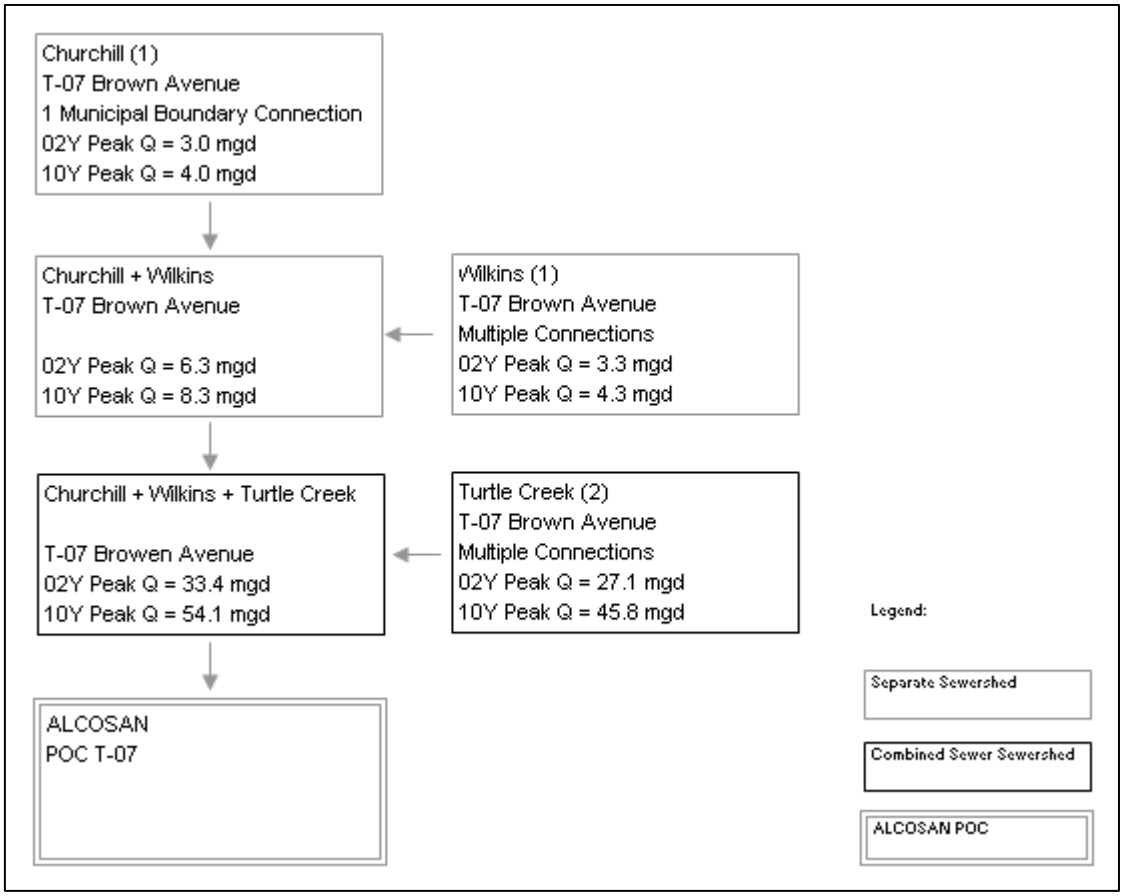
Author: Patrick Moulden

Date: 7/8/2013

CHESTER ENGINEERS

Document Path: G:\CLIENT\Wilkins_Township_6500\b_Projects\2013\Feasibility Mapping\Maps\WK_T-07_Fig_1-1.mxd

Figure 1-2: Sewershed Schematic



(1) Flows for Churchill and Wilkins extrapolated from original H&H model RDII flows.

(2) Flows for Turtle Creek extrapolated from original H&H model RDII and Subcatchment flows.

Table 1-1 lists information for the Brown Avenue Sewershed including tributary area, population and equivalent dwelling units (EDUs). EDUs were estimated based on a building count for the sewershed. Population was estimated using the EDU number and the 2.14 person per household figure for Wilkins Township from the 2010 US Census.

TABLE 1-1: T-07 BROWN AVENUE SEWERSHED AREA AND POPULATION

Municipality	Sewershed	Tributary Area (Acres) (1)	Equivalent Dwelling Units (2)	Persons Per EDU (3)	Population
Churchill (4)	T-07	552	867	2.16	1,873
Turtle Creek (4)	T-07	33	440	2.34	94
Wilkins	T-07	393	1,036	2.14	2,218

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) Equivalent Dwelling Unit value based on 3RWW GIS Web Map building counts.

(3) Values obtained from the 2010 US Census.

(4) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Wilkins and Turtle Creek.

Tables 1-2, 1-3 and 1-4 present characteristics for the combined, separate sanitary and storm sewer systems in the Brown Avenue sewershed.

TABLE 1-2: T-07 BROWN AVENUE SEWERSHED COMBINED SEWER CHARACTERISTICS

Combined (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	0	0	0
Turtle Creek	0.76	7,049	0.78
Wilkins	0	0	0

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-3: T-07 BROWN AVENUE SEWERSHED SEPARATE SEWER CHARACTERISTICS

Separate (1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	112.7	73,688	0.2
Turtle Creek	0	0	0
Wilkins	121	72,822	0.31

(1) Separate Sewer information obtained from 3RWW GIS Web Map.

TABLE 1-4: T-07 BROWN AVENUE SEWERSHED STORM SEWER CHARACTERISTICS

Storm(1)			
Municipality	**Inch-Miles**	**Linear Feet**	**Inch-Miles / Acre**
Churchill	N/A	N/A	N/A
Turtle Creek	N/A	N/A	N/A
Wilkins	N/A	N/A	N/A

(1) Storm Sewer data was not requested as part of ACO/COA orders. If available, this information may be obtained directly from the municipality.

1.2.1 Basin Planning Areas (ALCOSAN)

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

The T-07 Brown Avenue Sewershed is located in the Turtle Creek / Thompson Run Planning Basin.

1.2.2 Complex Sewershed System(s)

For general background information, reference is made to the Feasibility Study Report for Wilkins Township. The T-07 Brown Avenue Sewershed is a municipal sewershed that is tributary to complex sewershed ALCOSAN POC T-07.

1.2.3 Existing Overflows

There are no known overflows in the T-07 Brown Avenue Sewershed.

1.2.4 Direct Stream Inflows

There are no known direct stream inflows into the sewer system in the T-07 Brown Avenue Sewershed.

2.0 SEWER SYSTEM CHARACTERIZATION AND CAPACITY ANALYSIS

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

This portion of the report presents the approach utilized to determine existing flows in the sewer system through regional flow monitoring. It presents flow monitor locations and the data used to determine preliminary flow estimates. It also discusses calibration and acceptance of the ALCOSAN H&H model developed by the Basin Planners.

2.1 Development and Calibration/Verification of H&H Tools

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

The original H&H model extent included approximately 800 LF of 48-inch combined sewers and approximately 200 LF of 12-inch separate sewers upstream of POC T-07. However, it is noted that all flow inputs are made one junction upstream of the POC. Therefore, the model cannot be considered to accurately reflect surcharge conditions in this line. For more information, reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek. As the model does not extend into Wilkins or Churchill, no information was available for these communities.

2.1.1 2008 Flow Monitoring Data Evaluation

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

2.1.1.1 Flow Monitoring Program Background

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

ALCOSAN installed monitors in 2008. ALCOSAN flow monitors that were installed in this sewershed are summarized in Table 2-1. No additional flow monitoring was performed.

TABLE 2-1: SUMMARY OF FLOW MONITORS FOR THE T-07 SEWERSHED

Municipality	Monitor Name	Monitor Type(1)	Monitor Duration	Comments
Turtle Creek	T0700_-MB-L-01	MB	01/03/2008 to 12/31/2008	
Wilkins	T0700_-MB-L-02	MB	01/01/2008 to 11/27/2008	

(1) Type of monitor as defined in the flow monitoring plan (i.e., municipal boundary, internal municipal, overflow, etc.).

2.1.1.2 Flow Monitoring Results

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

The results of the system-wide flow monitoring program are presented in detail in the *Summary Report of the Flow Monitoring Conducted Pursuant to the Municipal Administrative Consent Orders and Consent Order Agreements* (3RWW/PM Team, June 30, 2009).

2.1.2 Baseline Conditions

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

2.1.2.1 Tributary Area (Existing and Future)

All tributary areas in the T-07 Sewershed are considered to be 100 percent built-out. Future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Table 2-2 provides a summary of existing and expected future tributary sewershed areas.

TABLE 2-2: EXISTING AND FUTURE TRIBUTARY AREAS FOR T-07 SEWERSHED

Municipality	Tributary Area (acres) (1)		
	Existing	Future	Percent Difference(2)
Churchill (3)	552	552	0%
Turtle Creek (3)	33	33	0%
Wilkins	393	393	0%

(1) Tributary area by overall sewershed delineation; may include non-contributing areas.

(2) All tributary areas are considered to be 100% built-out.

(3) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Churchill and Turtle Creek.

2.1.2.2 Tributary Population (Existing and Future)

2010 United States Census data was used for existing population. Information presented in the 2007 Southwestern Pennsylvania Commission (SPC) Study was used as the basis for estimating future population. The SPC study presented population statistics from 2005 to 2035. Future population was extrapolated to 2046 based on a linear trend between years 2010 and 2035. Table 2-3 provides a summary of existing and expected future tributary population in this sewershed.

2.1.2.3 Dry Weather Flows (Existing and Future)

Dry Weather Flows (DWF) consist of the sum of two flow components: Base Wastewater Flow (BWWF) and Groundwater Infiltration (GWI) flows. Existing conditions BWWFs were extrapolated from the BWWF diurnal cycle pattern of the original H&H model at the downstream connection to POC T-07. Future BWWFs were extrapolated to year 2046 based on assumed population changes as discussed in Section 2.1.2.2. GWI flow distributions are discussed in Section 2.1.2.4. Table 2-4 summarizes dry weather flows for the areas tributary to this sewershed.

TABLE 2-3: EXISTING AND FUTURE POPULATION FOR T-07 SEWERSHED

Municipality	Population			
	Existing Population	SPC Percent Difference (1)	Assumed Percent Difference (2)	Future Population (3)
Churchill (4)	1,873	-4.0%	25%	2,342
Turtle Creek (4)	94	15.92%	15.92%	109
Wilkins	2,218	6.44%	25%	2,773

(1) Population change based on 2007 Southwestern Pennsylvania Commission Study.

(2) Assumed population change based on conservative interpretation of SPC results. There is a 25% population difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(3) Future Population based on Assumed Percent Difference.

(4) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Churchill and Turtle Creek.

TABLE 2-4: SUMMARY OF DRY WEATHER FLOWS FOR T-07 SEWERSHED

Municipality	Tributary Area (acres)	Total Average Dry Weather Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Churchill (1)	552	0.3	0.39	29.1%
Turtle Creek (1)	33	0.043	0.052	21.6%
Wilkins	393	0.34	0.44	29.5%

(1) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Churchill and Turtle Creek.

2.1.2.4 Groundwater Infiltration Flows (Existing and Future)

Existing conditions groundwater infiltration (GWI) flows in this sewershed were obtained from the nighttime base flow component of the diurnal cycle pattern of the H&H model at the

downstream connection to POC T-07. Existing and Future GWI values were distributed by inch-miles of tributary sewer.

All areas tributary to the T-07 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional groundwater infiltration is unlikely. However, for conservative purposes, an allowance of an additional 25% is allotted for future groundwater infiltration.

Table 2-5 presents existing and future groundwater infiltration (GWI) for the sewershed.

TABLE 2-5: EXISTING AND FUTURE GWI FOR T-07 SEWERSHED

Municipality	Tributary Area (acres)	GWI Flow		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference (1)
Churchill (2)	552	0.15	0.19	25%
Turtle Creek (2)	33	0.035	0.043	25%
Wilkins	393	0.16	0.2	25%

(1) There is a 25% difference assumed for conservatism in flow estimations. This value also corresponds with the percent difference calculated for Monroeville.

(2) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.5 RDII Flows (Existing and Future)

Rainfall Dependent Inflow and Infiltration (RDII) flows were extrapolated from the total flow hydrograph of the H&H model at the downstream connection to POC T-07 during 2-Year Summer Design Storm conditions. Existing and Future RDII values were distributed by inch-miles of tributary sewer.

All areas tributary to the T-07 Sewershed area are considered to be 100% built-out. Therefore, any future development would be limited to redevelopment of existing infrastructure and not include a significant amount of sewer system expansion. Additionally, Wilkins has complied with COA requirements pertaining to removing significant sources of I/I from its sewerage facilities and is committed to continued ongoing proactive facilities operation and maintenance. Therefore, significant additional RDII is unlikely and an allowance of 0% is allotted for future RDII.

Table 2-6 presents existing and projected rainfall dependent infiltration and inflow (RDII) for the sewershed.

TABLE 2-6: EXISTING AND FUTURE RDII FOR T-07 SEWERSHED

Municipality	Tributary Area (acres)	RDII Flow (1)		
		Existing Conditions (mgd)	Future 2046 Conditions (mgd)	Percent Difference
Churchill (2)	552	3.0	3.0	0%
Turtle Creek (2)	33	27.1	27.1	0%
Wilkins	393	3.3	3.3	0%

(1) RDII rated indicated for 2 Year Summer Design storm conditions. RDII = Total Peak Flow – ADF – GWI.

(2) Values for Turtle Creek are estimated. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.2.6 Estimation Process for Unmonitored Areas

The separate sanitary systems from Wilkins and Churchill areas were monitored at their respective municipal boundary connections. The downstream portion in Turtle Creek, which is a combined system, was not monitored. Flows for the combined system were generated by a series of 8 runoff subcatchments each, with identical infiltration properties. However, drainage area, width and slope were varied.

2.1.2.7 Planned Projects Incorporated Into Future Model

Table 2-7 lists planned projects that are incorporated into the future model for the sewershed. As the model extends only into Turtle Creek, Churchill and Wilkins are excluded from the model.

TABLE 2-7: SUMMARY OF PLANNED PROJECTS INCORPORATED INTO THE FUTURE MODEL FOR T-07 SEWERSHED

Municipality	Planned Project	Project Status	Funding Source	Project Completion Date
Churchill (1)	N/A	N/A	N/A	N/A
Turtle Creek (2)	None	N/A	N/A	N/A
Wilkins (1)	N/A	N/A	N/A	N/A

(1) These communities were not included in the original H&H model.

(2) Chester Engineers is currently not aware of any planned projects in Turtle Creek. Reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.1.3 Preliminary Flow Estimates

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

2.1.3.1 Background

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

2.1.3.2 Developing PFEs for the POC

PFE calculations for this sewershed relied on the SWMM models submitted as part of the 2010 Hydrologic and Hydraulic Model Validation and Characterization Report. To allow for full conveyance from the upstream system to the POC, conduit diameters were upsized to contain surcharge to below the crown of the pipe.

2.2 Capacity Deficient Sewers

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

There are no reports of capacity deficient sewers in the Wilkins portion of this sewershed. For more information pertaining to the Turtle Creek portion of this sewershed, reference is made to the Turtle Creek Feasibility Study Report prepared by Turtle Creek.

2.2.1 Existing Basement Flooding Areas–History and Locations

There are no reported basement flooding areas in the in the Wilkins portion of the Brown Avenue Sewershed.

2.2.2 Capacity Requirements for Various Design Storms and Levels of Protection

Summer Design Storm Peak flows are estimated for all three communities. However, it is noted that the Turtle Creek portion is a combined system and reports peak flows with reference to the 2003 Typical Year precipitation. For information on Typical Year peak flows for Turtle Creek, reference is made to the Turtle Creek Feasibility Study prepared by Turtle Creek. The peak flows for the tributary communities are listed in Table 2-8.

TABLE 2-8: PROJECTED SUMMER PEAK FLOW RATES

Tributary Community	Peak Flow Rate (mgd) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Churchill (1)	2.66	3.02	3.54	3.95
Turtle Creek (1)	20.04	27.1	37.32	45.77
Wilkins	2.88	3.26	3.82	4.26

(1) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Churchill and Turtle Creek.

Information for 24-hour volumes for the various Summer Design storm conditions for the tributary communities is listed in Table 2-9.

TABLE 2-9: PROJECTED SUMMER 24-HOUR VOLUMES

Tributary Community	Volume (MG) / Design Storm			
	1 Year	2 Year	5 Year	10 Year
Churchill (1)	0.49	0.5	0.52	0.54
Turtle Creek (1)	3.72	4.46	5.48	6.29
Wilkins	0.53	0.54	0.56	0.59

(1) Values for Churchill and Turtle Creek are estimated. Reference is made to the Churchill and Turtle Creek Feasibility Study Reports respectively prepared by Churchill and Turtle Creek.

2.2 Overflow Frequency and Volume

The T-07 Sewershed has both combined and separate sanitary sewer facilities. No sanitary sewer overflows have been reported in the Wilkins portion of this sewershed.

2.3 Overflow Frequency and Volume

Pertinent data for CSOs based on the results of the H&H model at the T-07 CSO structure in Turtle Creek, is reported in Tables 2-10. Table 2-11 provides the result of SSOs. Note that there are no constructed SSO structures and no SSOs have been reported.

TABLE 2-10: BASELINE CONDITION, TYPICAL YEAR ANNUAL CSO DISCHARGE SUMMARY FOR T-07 BROWN AVENUE SEWERSHED

				Peak Rate (mgd)		
CSO Outfall (1)	Owner	Number of Overflows in the Typical Year	Annual Overflow Volume (MG)	0 Overflows per Year	4 Overflows per Year	10 Overflows per Year
T-07	Turtle Creek	32	1.4	14.2	9.6	7.3

(1) CSO values are estimated. Reference is made to Turtle Creek Feasibility Study Report prepared by Churchill and Turtle Creek.

TABLE 2-11: BASELINE CONDITION 2 AND 10 YEAR SUMMER DESIGN STORM SSO DISCHARGE SUMMARY FOR T-07 BROWN AVENUE SEWERSHED

SSO Outfall (1)	Owner	2-yr Design Storm		10-yr Design Storm	
		Peak Rate (mgd)	Volume (MG)	Peak Rate (mgd)	Volume (MG)
N/A	N/A	N/A	N/A	N/A	N/A

(1) There are no reported SSOs in the T-07 Sewershed.

3.0 CSO/SSO CONTROL GOALS

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

3.1 Background for Selection of Control Level

3.1.1 CSO Control Level

The T-07 Brown Avenue Sewershed is served by separate sanitary and combined sewer systems. There are no CSOs in the Wilkins portion of this sewershed. For more information pertaining to CSOs in the Turtle Creek portion of the sewershed, reference is made to the Turtle Creek Feasibility Study Report.

3.1.2 SSO Control Level

No SSOs have been reported in the sanitary sewer portions of the T-07 Brown Avenue Sewershed.

3.2 Recommendations for Control Level

For more information pertaining to CSOs in the Turtle Creek portion of the sewershed, reference is made to the Turtle Creek Feasibility Study Report.

4.0 SEWERSHED ALTERNATIVE EVALUATION

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

As there is no information to indicate the presence of any overflows or capacity restrictions in the Wilkins portion of this sewershed, no alternatives were developed for this sewershed as part of this Feasibility Study.

5.0 RECOMMENDED ALTERNATIVE

5.1 Recommended Alternative Description

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

As no alternatives are required in this sewershed for compliance with the COA, this section is not applicable.

5.2 Recommended Alternative Operation and Maintenance

Wilkins Township is committed to a practice of continuous proactive system inspection and maintenance. The recommended alternative operation and maintenance will include the following.

1. Continuous flow monitoring and data analysis to quickly identify any substantial changes in expected system flows.
2. Periodic CCTV inspection of critical sewers at least once every 7 years, and non-critical sewers at least once every 15 years.
3. System cleaning as necessary.
4. System maintenance as necessary.

5.3 Stream Removals

There are no known direct stream inflows into the combined sewer or separate sanitary sewer systems in the T-07 Brown Avenue Sewershed.

5.4 Integration with ALCOSAN Regional Wet Weather Plan

The Brown Avenue Sewershed is tributary to the Thompson Run Interceptor at POC T-07. From T-07, flows travel approximately 13,500 LF via a 4.5-foot diameter combined sewer to ALCOSAN Structure M-61 on the Monongahela River. ALCOSAN's Recommended Plan includes increased conveyance deep tunnel interceptor facilities to Structure M-29, which is located along the north bank of the Monongahela River in the City of Pittsburgh approximately 5.5 miles downstream of M-61. As there are many overflow structures and tributary downstream communities between the T-07 Sewershed and M-29, any work done in the Brown Avenue Sewershed is unlikely to have noticeable effect on the overall ALCOSAN Regional Wet Weather Plan.

6.0 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS

The T-07 Brown Avenue Sewershed provides service to customers within Wilkins Township, Churchill Borough, and Turtle Creek Borough, so 100% of the cost of any work performed in this sewershed would be the shared responsibility of the three communities. Wilkins Township does not differentiate customer billing by individual sewersheds. Therefore, the cost of any work performed in this sewershed would be passed on to the entire customer base. For a discussion of financial and institutional considerations including an affordability analysis, reference is made to Feasibility Study Report for Wilkins Township.

7.0 PUBLIC INVOLVEMENT (STAKEHOLDER PARTICIPATION)

For general background information, reference is made to the Feasibility Study Report for Wilkins Township.

Appendix J
Cost Estimate Supporting Documentation

Appendix J
Cost Estimate Supporting Documentation

Please see Appendix J folder on disk

Appendix K
MOU and Inter-Municipal Agreements

TOWNSHIP OF WILKINS

INTER-MUNICIPAL AGREEMENT
WITH

MONROEVILLE
CHURCHILL
TURTLE CREEK
ALCOSAN

AUGUST, 1963

A G R E E M E N T

THIS AGREEMENT, dated as of the first day of August 1963 and executed in six copies

by, between and among

BOROUGH OF MONROEVILLE,

TOWNSHIP OF WILKINS,

BOROUGH OF CHURCHILL,

BOROUGH OF TURTLE CREEK,

all located in the County of Allegheny, Pennsylvania and herein called "Monroeville", "Wilkins", Churchill" and "Turtle Creek Borough", respectively, and referred to individually as "Municipality" and collectively as the "Municipalities",

and

ALLEGHENY COUNTY SANITARY AUTHORITY,

a municipal authority organized and existing under the Municipality Authorities Act of 1945 as amended, herein called the "Sanitary Authority",

WITNESSETH:

WHEREAS, The parties hereto entered into an agreement dated as of February 1, 1961 (herein called the "Design Agreement") under which the Sanitary Authority has prepared, at the expense of the Municipalities, detailed construction plans and specifications (herein called "plans") for an intercepting sewer and appurtenances in Thompson Run (herein called the "Thompson Run Sewer"); and

WHEREAS, Such plans have been approved by the State Sanitary Water Board, and construction can begin as soon as financing is assured; and

WHEREAS, The Municipalities have requested the Sanitary Authority to construct such sewer for them in accordance with such plans; and

WHEREAS, For the reason, among others, that the Municipalities should have constructed an intercepting sewer in Thompson Run prior to June 1, 1959 (when the Sanitary Authority's Sewage Treatment System went into operation), the Sanitary Authority is willing to comply with their request

(a) provided that it will not in any way financially obligate itself or any of the 67 other Municipalities it serves to pay any part of the cost of the Thompson Run Sewer, and

(b) only if and after it has received, or been adequately assured of receiving, the full estimated construction cost;

and

WHEREAS, The Thompson Run Sewer will connect into the Sanitary Authority's Turtle Creek intercepting sewer at the mouth of Thompson Run, and will be used as follows:

(a) from Station 0 + 00 to Station 44 + 52--by all four Municipalities,

(b) from Station 44 + 52 to Station 88 + 13--by Churchill, Wilkins and Monroeville,

(c) from Station 88 + 13 to Station 151 + 36--by Wilkins and Monroeville, and

(d) from Station 151 + 36 to Station 199 + 54--by Monroeville alone;

and

WHEREAS, A Federal grant in the amount of $324,472 has been approved under the Accelerated Public Works Act in behalf of Turtle Creek Borough, Churchill and Wilkins for 50% of the estimated construction cost of the portion of the sewer that extends from Station 0 + 00 to Station 151 + 36, and a second Federal grant in the amount of $35,141.10 is being applied for under the Water Pollution Control Act in behalf of Monroeville for 30% of the estimated construction cost of the portion of the sewer that extends from Station 151 + 36 to Station 199 + 50; and

WHEREAS, Certain corporations that will be served by the Thompson Run Sewer have promised to make contributions toward its construction cost; and

WHEREAS, The Municipalities have agreed that all grants-in-aid shall be applied in reduction of the gross cost of the entire sewer, and have agreed to pay the remaining cost in proportion to each Municipality's use of entire sewer, as more fully set forth hereinafter,

NOW, THEREFORE, The parties hereto, each intending to be legally bound, covenant and agree as follows:

Section 1. The Design Agreement--executed pursuant to Monroeville Ordinance No. 294, Wilkins Ordinance No. 288, Turtle Creek Borough Ordinance No. 845, Churchill Ordinance No. 262, and Sanitary Authority Resolution adopted August 10, 1961--is by reference incorporated in and made part of this agreement, including particularly the preamble of said Design Agreement which recites the purpose of and need for the Thompson Run Sewer. Reference is also made to the Sanitary Authority's report dated December 18, 1959, as modified by Wilkins' assumption of the share allocated to Penn Hills Township.

Section 2. The Municipalities hereby designate and appoint the Sanitary Authority as their agency to construct, maintain and repair the Thompson Run Sewer for them, and the Sanitary Authority hereby agrees to act as such agency under the terms of this agreement.

Section 3. The Municipalities agree that the Thompson Run Sewer is a joint project that will benefit all of them; that such benefit will be in proportion to each Municipality's use of the entire sewer; and that each Municipality's proportion of the total cost of the entire sewer, based upon such use, is as follows:

Monroeville	70.64%
Wilkins	23.91%
Churchill	2.05%
Turtle Creek Borough	3.40%
Total	100.00%

The Municipalities therefore agree:

(a) that all grants-in-aid (from any source) received by the Sanitary Authority in behalf of any one or more of them for any portion of the Thompson Run Sewer shall benefit all of them in said proportions;

(b) that any grant or contribution received by any of them from any source toward the cost of the sewer shall be turned over to the Sanitary Authority, which shall credit all the Municipalities for the amount thereof in the percentages above set forth; and

(c) that each Municipality will bear and pay its aforesaid

percentage of all remaining costs and expenses relating in any way to any and every portion of the sewer.

Section 4. The Municipalities agree to pay to the Sanitary Authority, and the Sanitary Authority agrees to accept as compensation in full for all its services performed under the Design Agreement and to be performed by it hereunder until the completion of construction of the Thompson Run Sewer, the sum of Sixty Thousand Dollars ($60,000), as follows:

$40,000.00 for engineering services
5,000.00 for legal services
15,000.00 for administrative and fiscal services
Total $60,000.00

The Municipalities shall pay said sum of $60,000 to the Sanitary Authority not later than ten (10) days after the execution of this agreement, in the proportions set forth above in Section 3, less sums previously paid by them under the Design Agreement, namely:

		Gross Amount		Am't paid under Design Agreement		Net Amount to be paid
Monroeville	70.64%	$42,384.00	-	$14,130.00	=	$28,254.00
Wilkins	23.91%	14,346.00	-	7,627.50	=	6,718.50
Churchill	2.05%	1,230.00	-	742.50	=	487.50
Turtle Creek Borough	3.40%	2,040.00	-	2,500.00*	=	0.00
	100.00%	$60,000.00		$25,000.00		$35,460.00 *

* This $460.00 overpayment shall be deducted from the amount to be paid by Turtle Creek Borough under Section 5 below.

The parties agree that the Sanitary Authority shall not be required to account for or to return to the Municipalities any portion of the aforesaid $60,000.00, and that the Municipalities shall not be required to add thereto.

Section 5. Upon receipt of said additional sum of $35,460.00, the Sanitary Authority shall promptly advertise, and if necessary readvertise, for bids for the construction of the Thompson Run Sewer.

As soon as possible after opening the construction bids, the Sanitary Authority shall submit to the Municipalities a report and recommendation for the award of the construction contract to the lowest responsible bidder. Such report shall set forth the total cost of the project and the portion thereof to be advanced to the Sanitary Authority by the Municipalities. The total cost will include--in addition to the contract price of the construction contract and other costs as estimated by the Sanitary Authority--10% more as a reserve for contract extras and unforeseeable expenditures. The amount to be advanced by the Municipalities shall be such total cost minus the aggregate of (a) the $60,000.00 mentioned above in Section 4, (b) the estimated total amount of approved Federal grants-in-aid and (c) any amounts actually received by the Sanitary Authority as contributions from others toward the cost of the Thompson Run Sewer.

The Municipalities agree to advance the total net sum to the Authority, in the proportions set forth above in Section 3, within thirty (30) days after receipt of the Sanitary Authority's report and recommendation, so that the Sanitary Authority may award the construction contract within sixty (60) days after having opened the bids therefor.

The Municipalities understand the need for speedy payment of the sums provided for in Sections 3 and 4 hereof (in order to assure the receipt

of the 50% APW Federal grant, which is conditioned upon the start of construction within 120 days after the receipt by the Sanitary Authority of the APW Grant Offer). If any Municipality fails to pay its share promptly, one or more of the other Municipalities shall have the right to advance such share and receive repayment thereof from the delinquent Municipality.

The Sanitary Authority shall not be obliged to proceed further unless and until the Municipalities have advanced all such moneys in time to assure the complete financing of the entire construction cost.

Section 6. Promptly after the timely receipt of such moneys from the Municipalities, the Sanitary Authority shall award the construction contract and supervise the construction work with due diligence until the completion of the Thompson Run Sewer.

The Sanitary Authority shall keep full records of all costs of constructing the Thompson Run Sewer (except those of the Sanitary Authority itself, for which the Municipalities have agreed to pay $60,000.00, as provided above in Section 4). All moneys received by it for such purpose shall not be expended for any other work, project or purpose.

The Sanitary Authority shall not be obliged to expend any of its own funds to pay any construction costs. If the cost of construction exceeds the total amount received by the Sanitary Authority from the Municipalities and others, the additional cost shall be advanced to the Sanitary Authority by the Municipalities, in the proportions set forth above in Section 3. Similarly, any unexpended funds remaining in the hands of the Sanitary Authority after payment of all construction costs shall be refunded to them

in the same proportions (except the unexpended portion, if any, of the aforementioned $60,000.00).

Section 7. All real estate and easements required for the Thompson Run Sewer shall be acquired promptly by the Municipalities so that construction may proceed without delay. Each Municipality shall at its own cost and expense purchase or condemn such thereof as may be located within its corporate limits, but the total cost of all the required land and easements shall be borne by all the Municipalities in the proportions set forth above in Section 3; any overexpenditure by any Municipality shall be reimbursed to it by the others in order to accomplish the proper sharing of such total cost. The Sanitary Authority will assist the Municipalities by providing each Municipality with legal descriptions of the required land and easements within its corporate limits.

Section 8. Upon completion, the entire Thompson Run Sewer shall by owned jointly by all the Municipalities. Each Municipality shall have the percentage ownership interest listed above in Section 3, and each shall be responsible for the payment of its said share of the total cost of maintaining, repairing and renewing the sewer regardless of the location of the portion of the sewer that may require maintenance, repair or renewal. If any Municipality shall at any time expend more than its share of the cost thereof, by reason of the failure or refusal of any other Municipality to pay its own share promptly, such first Municipality shall be entitled to reimbursement of its overexpenditure from the delinquent Municipality or Municipalities.

Section 9. After the Thompson Run Sewer has been completed, it shall be maintained, repaired, renewed and reconstructed by the Sanitary

Authority. If necessary, the Sanitary Authority shall prepare plans and specifications for major repairs or renewals, advertise for and award contracts therefor, and supervise the construction or repair work, in like manner as for the original construction of the Thompson Run Sewer.

It is expressly understood and agreed that the Sanitary Authority shall not be obliged to perform any of such services unless and until all moneys required to pay the cost thereof, as estimated by the Sanitary Authority and requested in writing by it, shall first have been received from the Municipalities. Monroeville, Wilkins, Churchill and Turtle Creek Borough hereby agree to advance such cost to the Sanitary Authority promptly, in the proportions set forth above in Section 3.

To enable the Municipalities' officials to provide therefor in their budgets, the Sanitary Authority shall prepare and submit to Monroeville, Wilkins, Churchill and Turtle Creek Borough annually, on or before the first day of October, an estimate of the cost of maintaining the Thompson Run Sewer during the ensuing calendar year, together with an estimate, if the need therefor can be foreseen, of the cost of repairs or renewals to be made during such year.

The Sanitary Authority shall keep records, separate and apart from its other books, records and accounts, of all costs and expenses having to to with operation, maintenance and repair of the Thompson Run Sewer, including the cost of its own personnel's salaries or wages for time spent thereon. All moneys advanced by the Municipalities for such purpose shall not be expended by the Sanitary Authority for any other work, project or purpose.

Section 10. The Municipalities covenant and agree that they shall be jointly responsible, in the proportions set forth in Section 3 hereof, for

all damages that may result from the construction, operation and maintenance of the Thompson Run Sewer, including damages caused by the overflow of surface waters. The Sanitary Authority shall in no event by liable therefor, and the Municipalities jointly and severally covenant to indemnify the Sanitary Authority for, defend it against, and hold it harmless from all loss, cost, damage and expense. If any Municipality is required to pay damages in excess of its said proportions thereof, it shall be entitled to receive from the other Municipalities the portions thereof for which such other Municipalities are hereby made responsible.

Section 11. The Municipalities understand and agree that the Sanitary Authority shall in no event be obliged or forced to expend any of its own funds for or in connection with the Thompson Run Sewer, and they jointly and severally covenant to indemnify the Sanitary Authority for, defend it against, and hold it harmless from any and all loss, cost, damage and expense resulting from or arising out of its performance of any services relating to the Thompson Run Sewer.

Monroeville, Wilkins, Churchill and Turtle Creek Borough covenant and agree, with the Sanitary Authority and with each other, to advance to the Sanitary Authority promptly their respective shares of the cost of constructing, maintaining, repairing, renewing and reconstructing the Thompson Run Sewer.

If, in order to avoid delay in the work, any Municipality advances to the Sanitary Authority part or all of the share owing by one of the other Municipalities, the Municipality advancing such money in behalf of the other shall have the right to recover the same plus interest from the defaulting Municipality.

Section 12. This agreement incorporates the final understanding and

agreement of the parties regarding the Thompson Run Sewer. It shall supersede all prior agreements, including particularly the Design Agreement, to the extent of any inconsistency with the provisions hereof.

IN WITNESS WHEREOF this agreement has been executed and delivered by the Borough of Monroeville pursuant to its Ordinance No. 407 duly enacted and approved on the 14th day of August, 1963.

Attest:

s/ Gladys Diller
Borough Secretary

BOROUGH OF MONROEVILLE

By s/ A. O. Strathern
President of Council

(Borough)
(Seal)
(attached)

Approved as to form:

s/ C. Francis Fisher
Borough Solicitor

by the Township of Wilkins pursuant to its Ordinance No. 316 duly enacted and approved on the 12th day of August, 1963.

Attest:

s/ M. Jos. Martinelli
Township Secretary

TOWNSHIP OF WILKINS

By s/ George Porado
President of the Board
of Township Commissioners

(Township)
(Seal)
(attached)

Approved as to form:

s/ John M. Means
Township Solicitor

(Signatures continued on next page)

by the Borough of Churchill pursuant to its Ordinance No. 312 duly enacted and approved on the 13th day of August, 1963.

Attest:

s/ Ralph C. Heckel
Borough Secretary

BOROUGH OF CHURCHILL

By s/ W. E. Richards
President of Council

(Borough)
(Seal)
(attached)

Approved as to form:

s/ John H. Elder Jr.
Borough Solicitor

by the Borough of Turtle Creek pursuant to its Ordinance No. 873 duly enacted and approved on the 5th day of August, 1963.

Attest:

s/ Alfred A. Dybiec
Borough Secretary

BOROUGH OF TURTLE CREEK

By s/ John Evak
Vice President of Council

(Borough)
(Seal)
(attached)

Approved as to form:

s/ Samuel Strauss
Borough Solicitor

and by Allegheny County Sanitary Authority pursuant to Resolution duly adopted by its Board on the 8th day of August, 1963.

Attest:

s/ Richard B. Tucker, Jr.
Secretary

ALLEGHENY COUNTY SANITARY AUTHORITY

By s/ Julius E. Graf
Chairman

(Authority)
(Seal)
(attached)

Approved as to form:

s/ Leon Wald
Chief Counsel

TOWNSHIP OF WILKINS

INTER-MUNICIPAL AGREEMENT
WITH

CHURCHILL
WESTINGHOUSE ELECTRIC CORPORATION

JANUARY, 1955

ORDINANCE NO. 167 OF THE
BOROUGH OF CHURCHILL

ORDINANCE NO. 210 OF THE
TOWNSHIP OF WILKINS

AN ORDINANCE AUTHORIZING AN AGREEMENT TO BE ENTERED INTO BETWEEN THE BOROUGH OF CHURCHILL AND THE TOWNSHIP OF WILKINS AND OTHERS FOR THE CONSTRUCTION OF A JOINT SANITARY SEWER TRUNKLINE THROUGH THE BOROUGHS OF CHURCHILL, TURTLE CREEK AND THE TOWNSHIP OF WILKINS.

IAA751

SECTION 1: BE IT ORDAINED AND ENACTED by the Township of Wilkins, in meeting duly assembled, and it is hereby ordained and enacted by authority of the same, that the proper officers of the Township of Wilkins are hereby authorized and directed to enter into and to execute the attached agreement which follows with the Borough of Churchill and the other parties thereto and the Secretary of the said Township is hereby appointed the attorney for the Township of Wilkins to acknowledge the said agreement for it and in its name and stead as its corporate act and deed.

A G R E E M E N T

THIS AGREEMENT, made the _____day of _____, 1955, between

THE TOWNSHIP OF WILKINS

(hereinafter referred to as "WILKINS") and the

BOROUGH OF CHURCHILL

(hereinafter referred to as "CHURCHILL") both being municipal sub-divisions of the Commonwealth of Pennsylvania and being located in the County of Allegheny and the Commonwealth of Pennsylvania,

A N D

the WESTINGHOUSE ELECTRIC CORPORATION,

a corporation with its principal place of business located in East Pittsburgh, Allegheny County, Pennsylvania (hereinafter referred to as "WESTINGHOUSE")

A N D

RALPH SCHERGER and PAULINE A. SCHERGER, his wife;

STEPHEN CATARINELLA and LUCIA CATARINELLA, his wife;

and HAROLD W. GRAY and WALTER J. DUQUETTE, partners doing business as GRAY & DUQUETTE, and NORM F. VOGEL, all of Allegheny County, Pennsylvania (hereinafter referred to as the "DEVELOPERS"):

WHEREAS, Wilkins and Churchill are contiguous and topographically have common drainage areas; and,

WHEREAS, neither of said municipalities have a sanitary sewer system draining such contiguous portions of their respective areas, and such system is necessary for the development of such areas; and,

WHEREAS, the terrain of said contiguous areas of Wilkins and Churchill is such as to naturally drain toward, to and into the Borough of Turtle Creek, a municipality, (hereinafter referred to as "Turtle Creek") contiguous to Wilkins and after study it has been determined that the most economical, advantageous and satisfactory results for the sanitary sewerage drainage of the contiguous areas of Wilkins and Churchill can be obtained by mutual cooperation of Churchill and Wilkins, by means of a sanitary trunk sewer line to be constructed jointly by Churchill and Wilkins, along the course hereinafter referred to and as set forth in the plan hereto attached; and,

WHEREAS, Westinghouse and the Developers own various tracts of land fronting on the road running through Churchill, Wilkins and Turtle Creek and known as Beulah Road in Churchill and as Brown Avenue Extension in Wilkins and Turtle Creek areas and desire a sanitary sewer trunk line and appurtenant facilities to serve the area hereinafter designated and which includes their several tracts of land; and,

WHEREAS, to induce Churchill and Wilkins to construct such sewer line and appurtenant facilities, Westinghouse and the Developers have proposed to advance the funds necessary to meet all of the costs, expenses and financial obligations to be incurred by Churchill and Wilkins for, in connection with and arising from the construction of said sewer trunk line and its appurtenant facilities; and,

WHEREAS, after careful study Churchill and Wilkins have determined that it is to their mutual advantage and benefit to have such a sanitary sewer trunk line with appurtenant facilities and are willing to undertake said project upon the terms, provisions, covenants and conditions hereinafter set forth.

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

ARTICLE I.

DEFINITIONS

The following words or phrases as used in this Agreement, unless the context clearly indicates otherwise, shall have the following meanings:

"Sewer Project" shall mean the construction of a sanitary sewer trunk line together with its appurtenant facilities along the road running through Churchill, Wilkins and Turtle Creek and known as "Beulah Road" in Churchill and as "Brown Avenue" and "Brown Avenue Extension" in Wilkins and Turtle Creek as shown on the plan attached hereto, made a part hereof and marked Exhibit "A" and along such other courses as are necessary for the completion of the same.

"Costs And Expenses Of The Project" shall mean the labor and materials for the construction of the sewer project;

engineering fees for the engineers of Churchill, Wilkins and Turtle Creek; solicitors' fees of Churchill, Wilkins and Turtle Creek; advertising of the necessary Notices, Ordinances and Resolutions by Churchill, Wilkins and Turtle Creek; recording fees for this Agreement, right-of-way grants or acquisitions and other documents; permit fees of any and all nature; cost of acquiring rights-of-ways over public and private property by purchase and/or condemnation, including court costs, attorneys fees and awards for damages; damage claims; insurance premiums; inspection fees; costs, fees and expenses for legal proceedings which may be brought by or against Churchill, Wilkins and Turtle Creek or any of them; and all other costs, fees and expenses incurred for, in connection with and arising from the Sewer Project.

"Joint Construction Bank Account" shall mean a joint account between Churchill and Wilkins to be known as "Churchill-Wilkins Joint Sewer Construction Fund" in such bank or banks as Churchill and Wilkins shall agree upon from time to time, wherein shall be deposited all moneys received for the construction of the Sewer Project under this Agreement from Westinghouse and the Developers.

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"Joint Sewer Administrative Account" shall mean a joint account between Churchill and Wilkins to be known as "Churchill-Wilkins Joint Sewer Administrative Account" in such bank or banks as Churchill and Wilkins shall agree upon from time to time, wherein shall be deposited all moneys received by Churchill and/or Wilkins in accordance with the provisions of this Agreement, except, the moneys to be deposited in the Joint Construction Bank Account.

"Building" shall mean a single family residence and structures accessory and appurtenant to such residence. In the event that any structure other than a single family residence is to be served, the tapping-in charge therefore shall be determined as follows: Each 25,000 cubic feet of space in such structure shall be deemed equivalent to one "building", and for each such unit of 25,000 cubic feet or fraction thereof the tapping-in charge for a "building" in such area shall be paid, but in no event shall the tapping-in charge be less than the charge fixed for a "building" at that location.

"Joint Sewer Committee" shall mean a committee established by Churchill and Wilkins consisting of six members, three of whom shall be appointed by Churchill and three of whom shall be appointed by Wilkins. Churchill shall also appoint one alternate member of said "Joint Sewer Committee" who shall act in the event of the absence or disability of any one of the members appointed by Churchill. Wilkins shall also appoint one alternate member of said "Joint Sewer Committee" who shall act in the event of the absence or disability of any one of the members appointed by Wilkins. Churchill and Wilkins shall each have the right to change their appointees from time to time.

"Beulah Sanitary Sewer" shall mean the completed sanitary sewer system to be constructed pursuant to this Agreement.

"Developers' Deposit Ratio" shall mean the fractional proportion which the initial deposit of each Developer bears to the total sum of the initial deposits of all of the Developers as contained in Exhibit "B" hereof.

"Project Owners" shall mean Churchill and Wilkins jointly.

ARTICLE II.

Churchill and Wilkins covenant and agree as follows:

1. To construct the Sewer Project to and connect it with the sanitary sewer line in Turtle Creek as is shown in Exhibit "A" herein or as Turtle Creek has or shall approve.

2. The Sewer Project shall be constructed in accordance with plans and specifications prepared jointly by the engineers of Churchill and Wilkins and approved by Churchill and Wilkins, and subject to the approval of Turtle Creek as to the portion thereof within Turtle Creek Borough.

3. The construction of the Sewer project is to be undertaken on bids to be advertised under the direction and supervision of the engineers of Churchill and Wilkins and shall be in three sections, which sections shall be determined by the said engineers, and construction of the same is to be subject to the inspection and approval of the engineers of Churchill and Wilkins, and that portion of the Sewer Project located in Turtle Creek shall be subject further to the inspection and approval of the Turtle Creek Borough engineer. All contracts shall be awarded for the three sections, after due public bidding as required by law, and all contracts shall be executed simultaneously by the proper officers of Churchill and Wilkins. Each engineer shall have the final decision as to engineering matters within his respective municipality.

4. All moneys advanced by Westinghouse and the Developers to Churchill and Wilkins shall be deposited in the Joint Construction Bank Account and shall be subject to withdrawal only upon the signatures of the properly authorized officials of both Churchill and Wilkins.

5. All matters relating to construction of the Sewer Project shall be referred to the Joint Sewer Committee for its determination and all decisions of the Joint Sewer Committee shall be by agreement of at least two of the members of said Committee appointed by Churchill and at least two members of the said Committee appointed by Wilkins. The Joint Sewer Committee shall keep minutes of its meetings and copies thereof shall be filed with Churchill and Wilkins. Notices of all meetings of the said Committee shall be given to the Developers and Westinghouse and their duly appointed representatives shall have the right to attend any and all meetings.

6. All requisitions for payments to any contractor or for other costs arising from matters subject to the inspection of the engineers of Churchill and Wilkins shall first be approved jointly by the engineers of Churchill and Wilkins and then by the Joint Sewer Committee before submission to Churchill and Wilkins.

All other requisitions for payments shall first be approved by the Joint Sewer Committee before submission to Churchill and Wilkins.

7. Notwithstanding the authority vested in the Joint Sewer Committee under paragraphs "5" and "6" immediately preceding, Churchill and Wilkins reserve the right to make all decisions and authorize all payments notwithstanding any decisions of the Joint Sewer Committee or any failure of the Joint Sewer Committee to render any decision or grant approval, or without submitting any matter for decision of or authorization by the Joint Sewer Committee.

8. After completion of the construction of the Sewer Project the same shall be repaired, maintained and reconstructed jointly by Churchill and Wilkins and all costs and expenses therefor shall be borne equally by them, except that Churchill and Wilkins shall each make periodic inspections, at its own expense, of the portion of the Sewer Project within its municipality. Periodic inspections of the portion of the Sewer Project in Turtle Creek shall be made at such times and by such persons as Churchill and Wilkins shall jointly direct, and the cost of such inspections to be borne equally by Churchill and Wilkins.

9. Unless otherwise agreed by Churchill and Wilkins, Churchill and Wilkins shall secure insurance for the protection of Churchill and Wilkins and Turtle Creek against public liability and property damage which may be caused by or arise from the operation and maintenance of the Sewer Project through Churchill, Wilkins and Turtle Creek, in an amount of not less than that required under that certain Agreement between Turtle Creek, Wilkins and Churchill dated the 12th day of October, 1954, made part hereof by reference thereto. The cost of all premiums for such insurance shall be borne equally by Churchill and Wilkins.

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10. Churchill and Wilkins shall each have the right to connect and tap into the Beulah Sanitary Sewer for the servicing of all properties in their respective municipalities within the areas shown on Exhibit "A" herein. All matters relating to connecting and tapping into the Beulah Sanitary Sewer shall be exclusively within the jurisdiction and under the direction of Churchill within the municipality and of Wilkins within its municipality, except as to matters relating to tapping-in charges as are hereinafter detailed. Properties in each said municipality beyond the said areas aforementioned may be connected to and tapped into the Sewer Project upon agreement of Churchill and Wilkins.

11. Churchill and Wilkins each agree to take all action and do all things necessary to prohibit any surface drainage into the Beulah Sanitary Sewer from properties within their respective municipalities.

12. Churchill and Wilkins shall both continue as parties to their respective contracts with the Allegheny County Sanitary Authority or its successors and assigns for and during the time that this Agreement shall be in effect or Churchill and Wilkins shall jointly otherwise agree, whichever shall first occur.

13. Churchill and Wilkins shall each grant and/or acquire by purchase or condemnation, the necessary rights-of-ways and easements and releases if any, and grant such permits and licenses as are now required by each of them within their respective municipalities. The costs and expenses of acquiring any such rights-of-ways or easements shall be paid out of the Joint Construction Bank Account. All purchases of such rights-of-ways shall be subject to the Written approval of Churchill and Wilkins and Churchill and Wilkins shall each have the right to participate with the other in all legal proceedings for or relating to the condemnation of such rights-of-ways and the payment of damages therefor.

14. Churchill and Wilkins each agree that before either will approve any Subdivision Plan within its municipal-

ity and within the area to be served by the Beulah Sanitary Sewer, it will require the owner or owners of such Subdivision Plan either to pay the tapping-in charges for all of the lots laid out in such Subdivision Plan on the basis of one building for each lot or to furnish a bond in the total amount of such tapping-in charges with corporate surety for the payment of such tapping-in charges within a period of two (2) years from the date of the approval of such Subdivision Plan for recording purposes only. If more than a building (as defined herein) shall be constructed on any such lot, the owner or owners thereof shall be liable for the payment of any additional tapping-in charge which may become payable therefor. Each Project Owner agrees to enact appropriate legislation to effectuate the foregoing.

15. Churchill and Wilkins shall do all things, acts, deeds, enact Ordinances and Resolutions, execute all documents and instruments, necessary and incident to the construction, completion, maintenance, operation and re-construction of the Sewer Project and the performance of all of the terms, covenants and provisions of this Agreement.

ARTICLE III.

Churchill and Wilkins and the Developers covenant and agree as follows:

1. Concurrently with the execution of this Agreement, each of the Developers shall deposit with Churchill and Wilkins the respective sums of money set opposite their names in the Schedule attached hereto, made part hereof and marked Exhibit "B", for the purposes and subject to the provisions of this Agreement.

2. The sums so received by Churchill and Wilkins from the Developers as aforesaid and all additional sums deposited by the Developers as hereinafter provided, shall be deposited in the Joint Construction Bank Account.

3. Churchill and Wilkins shall have the right, but shall not be obligated, to invest the moneys in the Joint Construction Bank Account in obligations of the United States of America at such times and in such amounts as they in their sole discretion shall determine, provided that the maturity dates of such obligations shall be such as to make available funds as needed for the payment of the obligations to be incurred for and in connection with the Sewer Project. The income from such investments shall be retained in the Joint Construction Bank Account and shall be added to and become a part of the deposit of each of the Developers in accordance with the Developers' Deposit Ratio. If any losses result from any such investments, such losses shall be borne by the Developers in accordance with the Developers' Deposit Ratio, and neither Churchill, Wilkins nor any persons making said investments shall be liable therefor.

4. It is hereby declared to be the intent of all of the parties hereto that all Costs And Expenses Of The Project shall be borne and paid for by the Developers and Westinghouse, subject to the right of the Developers only, to be reimbursed to the extent, from the sources and in the manner hereinafter provided, and that Churchill and Wilkins shall not be required to pay or become obligated to pay any of such Costs and Expenses Of The Project from their own funds.

It is hereby further declared that it is the intent of all of the parties hereto that Westinghouse shall deposit only the sum determined as set forth in ARTICLE IV, paragraph "1" herein toward the payment of the Costs And Expenses Of The Project and shall not be obligated to make any additional deposits or payments therefor. It is agreed by all of the parties hereto that the initial deposits to be made in accordance with Exhibit "B" hereof is based on a preliminary estimate of all costs and expenses of the Sewer Project andy by reason thereof and of the foregoing intent, it is agreed as follows:

(a) In the event, that after bids have been received and prior to entering into the contracts for the Sewer Project, Churchill and Wilkins shall determine that the total sum deposited by the Developers and Westinghouse may be less than will be required for the payment of all Costs And Expenses Of The Sewer Project, the Developers agree upon demand of Churchill and Wilkins to deposit such additional sums as Churchill and Wilkins shall determine in accordance with the Developers' Deposit Ratio. If the Developers shall fail to deposit with Churchill and Wilkins such additional sums requested within the time fixed by Churchill and Wilkins, then Churchill and Wilkins shall have the right to reject all bids and terminate this Agreement and abandon the Sewer Project. In the event of such termination and abandonment, Churchill and Wilkins shall pay all Costs And Expenses Of The Sewer Project incurred and/or paid and the balance remaining thereafter shall first be used to repay to Westinghouse the sums actually deposited by it under this Agreement, and the then remaining balance shall be divided and paid over to the Developers in accordance with the Developers' Deposit Ratio and thereupon all of the parties hereto shall be released and discharged from any and all liabilities and obligations under this Agreement.

(b) In the event that during construction of the Sewer Project, Churchill and Wilkins shall determine that all sums deposited by the Developers may be insufficient to pay the Costs And Expenses Of The Project, including extras occurring during construction, the Developers agree, upon demand of the Project Owners, to deposit such additional sums as Churchill and Wilkins shall request, in accordance with the Developers' Deposit Ratio.

(c) In the event that the Project Owners or either of them shall elect to advance, or shall be compelled to pay any of the Costs And Expenses Of The Project, all sums so advanced or paid shall be repaid as soon as sufficient moneys are available from the Joint Construction Bank Account, and if not available therefrom, shall be repaid from the Joint Sewer Administrative Account as soon as sufficient moneys for such repayment are in said Joint Sewer Administrative Account and before the Developers shall be entitled to receive any reimbursements from said Joint Sewer Administrative Account, notwithstanding anything which may be contained in this Agreement to the contrary.

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(d) After the completion of the Sewer Project as determined by Churchill and Wilkins, and after the payment in full of all Costs And Expenses Of The Project, any balance remaining from the sums deposited by the Developers and Westinghouse, together with any income from investments as aforesaid, shall be distributed to the Developers only, in accordance with the Developers' Deposit Ratio.

5. All of the obligations, liabilities and duties of the Developers under this Agreement shall be joint and several. Any Developer or Developers who shall deposit or be compelled to deposit any other Developer's proportion of any additional deposits demanded by the Project Owners shall be subrogated to the Project Owners' rights against such defaulting Developer or Developers and shall further be entitled to receive all reimbursements to become payable to the defaulting Developer or Developers and shall also be entitled to credits as hereinafter provided, against tapping-in charges incurred by the Developer who shall advance such additional deposit for the defaulting Developer, until repaid in full to the extent of such deposit by such credits and/or by reimbursement payments as hereinafter set forth.

6. That Churchill and Wilkins will each enact Ordinances requiring permits to be obtained for connecting to or draining into said Beulah Sanitary Sewer and fixing a tapping-in charge required to be paid by all, including the Developers, their heirs, executors, administrators, successors and assigns, of buildings, who shall desire to connect to or to drain into the said Beulah Sanitary Sewer. The Project Owners shall use reasonable efforts to enforce such Ordinances. The tapping-in charges to be required shall be in accordance with a schedule to be prepared by the engineers of the Project Owners and approved by the Project Owners subject to such changes, reductions or increases of such charges from time to time as the Project Owners shall deem equitable due to special circumstances in individual cases, provided, however, that the total amount of tapping-in charges fixed in the aforesaid schedule for existing and anticipated buildings within the areas to be served by the Beulah Sanitary Sewer, as estimated by the Project Owners, shall not be less than the total of all of the Costs And Expenses Of The Project and that the tapping-in charges fixed for buildings in both Churchill and Wilkins shall be uniform; and provided further that the amount deposited under this Agreement by Westinghouse shall constitute payment in full by Westinghouse for tapping into said Beulah Sanitary Sewer for the servicing only of the buildings now being erected on its property in Churchill. The tapping-in charge for each building erected and to be erected on the property of each of the Developers which shall be connected to or which shall drain into the said Beulah Sanitary Sewer need not be paid by each such Developer but shall be charged against and treated as part payment of each such Developer's reimbursement of the amount deposited by such Developer under this Agreement as hereinafter provided, subject to the limitations hereinafter set forth. If any Developer shall fail to make any additional deposit as required hereunder, such defaulting Developer shall be required to pay in cash for all tapping-in charges for the servicing of buildings of the defaulting Developer in Churchill and/or Wilkins until the total of such cash payment shall equal the total of the additional deposits remaining due and unpaid by such defaulting Developer.

7. All moneys received in payment of said tapping-in charges shall be deposited in the Joint Sewer Administrative Account. After payment of all costs and expenses for and in connection with collection, handling and disbursement of such tapping-in charges, and the keeping of records thereof and after payment of all costs and expenses, if any, of all costs and expenses, if any, under paragraph "1" of ARTICLE V herein, ninety (90%) percent of the balance of the moneys in the Joint Sewer Administrative Account shall be distributed semi-annually to the Developers, each Developer to receive the proportion thereof which his or their then (i.e. at the time of each such distribution) unreimbursed balance of the total amount deposited hereunder by such Developer bears to the then unreimbursed balance of the total amount deposited hereunder by all of the Developers.

Churchill and Wilkins shall each through its duly authorized agent or employee issue the permits to tap into the Beulah Sanitary Sewer for properties within its municipality and collect the said tapping-in charges therefor. Churchill and Wilkins shall each give to the other monthly, a statement of the permits issued, the properties for which such permits were issued and the amounts received therefor during each such month. All tapping-in charges collected shall be paid over to a person designated by the Project Owners for deposit in the Joint Sewer Administrative Account shall be made only upon the signatures of the properly authorized officials of both Churchill and Wilkins.

The right of the Developers to set-off tapping-in charges against their said reimbursements in lieu of payment, as aforesaid, shall be subject to the limitations that no such set-offs shall be allowed and no reimbursement payment shall be payable to any Developer, after the total amount received by any Developer by reimbursements and by set-offs, shall equal the total sum deposited by such Developer under this Agreement, or after the expiration of twenty (20) years from the date of the completion of the construction of said Sewer Project as certified by the engineers of the Project Owners, whichever shall first occur; and thereafter the Project Owners and each of them shall be released and discharged from all further obligations and liabilities to the Developers and each of them under this Agreement and all rights and claims of the Developers and each of them under this Agreement, including all rights and claims to any funds in the Joint Sewer Administrative Account, shall terminate.

As various owners of properties in Churchill by their several contributions have heretofore paid the sum of $1,680.00 for certain preliminary engineering work performed in connection with part of the Sewer Project, the Developers agree that when, as and if any such contributor shall desire to connect to the Beulah Sanitary Sewer any property owned by him within the area to be served by the Beulah Sanitary Sewer, such contributor shall be entitled to a credit against the tapping-in charge for such property to the extent of such contribution. A list of such contributors with the amount contributed by each is on file with Churchill and by reference thereto is made part hereof. The Developers further agree that the Project Owners shall not be liable for any reimbursement to the Developers for the sums credited as aforesaid.

8. That the Project Owners, or either of them, shall not be liable to the Developers or any of them for the repayment of any sum deposited by the Developers under this Agreement

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except by set-offs allowed as aforesaid or from tapping-in charges actually paid to and received by the Project Owners as hereinbefore provided and subject to the limitations set forth in paragraph "7" of this ARTICLE III.

9. Each Developer upon request of the Project Owners shall grant and convey to the Project Owners all rights-of ways or easements through properties of such Developer, which the Project Owners deem necessary for the construction of the Sewer Project.

ARTICLE IV.

Churchill, Wilkins and Westinghouse agree as follows:

1. Concurrently with the execution of this Agreement, Westinghouse shall deposit with Churchill and Wilkins the sum of $75,000.00 less the following amounts:

(a) The sum of $4,700.23 heretofore paid by Westinghouse to J. Fred Triggs, registered engineer, for the Borough of Churchill for engineering services previously rendered in connection with the Sewer Project, and

(b) The cost to Westinghouse for the construction of a temporary sewerage disposal system, hereinafter more fully referred to, to serve the buildings now being erected on its property in Churchill pending the completion of the Sewer Project, provided, however, that the deduction therefor shall not exceed the sum of $7,300.00 and provided, further, that upon the request of the Project Owners Westinghouse shall furnish such receipts, invoices or vouchers, as may be necessary to establish to the reasonable satisfaction of the Project Owners the amount of such cost. Such maximum sum of $7,300.00 shall be deducted at the time Westinghouse shall make its deposit hereunder and in the event the cost of such temporary system shall be less than said maximum sum, the difference between said maximum sum and the cost thereof shall be deposited with the Project Owners as part of Westinghouse's original deposit.

2. That concurrently with or prior to the execution of this Agreement, Westinghouse shall receive from the proper officials of the Borough of Churchill, and of the Commonwealth of Pennsylvania, and of any other public authority having jurisdiction over the same, all necessary rights, licenses and permits to construct upon its property in Churchill a temporary sewerage disposal system to be designed by Westinghouse and to be approved by the proper authorities of Churchill and of the Commonwealth of Pennsylvania, and to use, operate and maintain such system until January 1, 1956 or until such earlier date when the Sewer Project shall be ready for use and operation.

3. That in the event any litigation of any kind whatsoever for the purpose of enjoining the construction and use of such temporary system or of the Sewer Project shall be instituted within thirty (30) days after the Board of Adjustment of The Borough of Churchill shall authorize the construction and use of such temporary system by Westinghouse or within thirty (30) days after the Project Owners shall each enact an

Ordinance authorizing the construction of the Sewer Project, Westinghouse shall have the right to elect to withdraw as a party to this Agreement, terminate its obligations and liabilities hereunder and to be repaid all moneys deposited by Westinghouse with the Project Owners at the time of and subsequent to the execution of this Agreement; provided, however, that Westinghouse shall not have the said right of withdrawal and repayment if Churchill shall extend the right of Westinghouse to use such temporary system and Westinghouse shall not be enjoined by order of any Court from constructing and using such temporary system during the pendency of such litigation; and provided further that in no event shall Westinghouse have the right of withdrawal and repayment as aforesaid after the Project Owners have entered into any contracts for the construction of the Sewer Project or any part thereof.

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4. That notwithstanding anything contained in this Agreement to the contrary, by implication, inference or otherwise, Westinghouse shall not be required to deposit any additional moneys for the cost and expenses of the Sewer Project and shall not be entitled to repayment of any of the moneys deposited hereunder, except as specifically set forth in this Agreement.

5. That the right of Westinghouse to use the Beulah Sanitary Sewer without payment of any tapping-in charge other than the amount deposited under this Agreement is restricted and limited to the servicing of the buildings now being erected on its property in Churchill and for which Churchill issued its Building Permit No. 622 dated March 17, 1953.

6. That Westinghouse upon request of the Project Owners will grant and convey to the Project Owners all rights-of-ways or easements through properties owned by Westinghouse and which the Project Owners deem necessary for the construction of the Sewer Project. And further, that Westinghouse will grant to the Project Owners such rights as it may have or can grant to connect the Sewer Project to and drain into the 48-inch sewer now through the property of Westinghouse in Turtle Creek.

7. That the Project Owners shall have the right to invest the moneys deposited by Westinghouse, as provided in ARTICLE III, paragraph "3" of this Agreement.

ARTICLE V.

All of the parties hereto further agree as follows:

1. That nothing contained in this Agreement shall be construed (1) to impose any general obligation upon the Project Owners, or either of them, for the repayment of the sums deposited by the Developers hereunder from any funds of the Project Owners or either of them, other than for the moneys deposited hereunder and the moneys to be received for tapping-in charges which shall be used and disbursed for the purposes and in the manner set forth in this Agreement, and the obligations and liabilities of said Project Owners shall be limited and restricted to the funds actually received hereunder and deposited in the bank accounts established under this Agreement and as such obligations and liabilities are expressly and specifically imposed by the provisions of this Agreement; or (2) to subject the Project Owners, or either of them, to any liability for failure to collect and receive any tapping-in charges for any reason or cause whatsoever, or for the invalidity of any liens, assessments or other claims which may be filed or made or for failure to collect the same. In the event Churchill and/or Wilkins shall elect to file any such

liens, assessments or institute any legal proceedings to enforce collection of any tapping-in charge or shall be required to defend such tapping-in charges in any legal proceedings instituted against Churchill and/or Wilkins, all costs and expenses incurred by Churchill and/or Wilkins for and in connection therewith shall be paid out of the Joint Sewer Administrative Account.

2. That in no event shall any interest be payable or become due and owing to any Developer for moneys deposited or collected hereunder, except as hereinbefore specifically provided.

3. That the Project Owners are and shall be the sole owners of the Sewer Project and the Beulah Sanitary Sewer.

4. That in the event the moneys deposited by Westinghouse under this Agreement must be repaid to Westinghouse in accordance with the provisions of this Agreement, the Developers shall deposit immediately a sum equal to that repaid to Westinghouse in accordance with the Developers' Deposit Ratio.

5. That each of the Project Owners shall have the right at any time and from time to time to impose and collect sewer rental charges in such amounts and upon such basis as it shall determine within its respective municipality for the use of the Beulah Sanitary Sewer.

6. That the Project Owners shall have the right at any time to sell, convey, transfer or assign the Beulah Sanitary Sewer or any portion thereof to any municipal authority created under the laws of the Commonwealth of Pennsylvania or to any public or governmental agency subject to the obligations imposed upon the Project Owners under this Agreement.

7. That all connections to be made to the Beulah Sanitary Sewer shall be made in a manner to be approved by the engineer of the municipality wherein any such connection is made, and only after permit therefor has been issued by the municipality wherein the connection is to be made. All such connections shall be made by and at the cost of the person, firm or corporation, including the Developers and Westinghouse, desiring to make such connection.

8. That Churchill and Wilkins shall each have the right to make a charge for the inspection of any connection to the Beulah Sanitary Sewer within its municipality and for the issuance of a permit to make such connection. Said charges shall belong to the municipality wherein the connection shall be made and shall be payable upon the filing of the application for such permit or as otherwise determined by each Project Owner, Further said charges shall be paid by the Developers and Westinghouse independently of this Agreement and neither the Developers nor Westinghouse shall have any claim or right to such charges or any part thereof.

9. That Churchill and Wilkins are or prior to the awarding of the contracts for the Sewer Project will be members of the Allegheny County Sanitary Sewer Authority, its successors or assigns, and shall have entered into contracts with the Allegheny County Sanitary Sewer Authority, its successors or assigns.

10. That at any time prior to the time the Project Owners shall enter into any contract for the construction of

any part of the Sewer Project, the Developers may terminate this Agreement by written notice delivered to the Secretary of each Project Owner, for either of the following reasons:

(a) That Westinghouse shall have withdrawn as a party to this Agreement pursuant to the provisions of ARTICLE IV, paragraph "3" hereof; or,

(b) That the bids received for the construction of the Sewer Project shall cause the total of the Costs And Expenses Of The Project to exceed the total of the initial deposits set forth in Exhibit "B" herein.

In the event of such termination by the Developers, Churchill and Wilkins shall pay out of the Joint Construction Bank Account all Costs And Expenses Of The Project incurred and/or paid and all sums payable to Westinghouse in the same manner as provided in ARTICLE III, paragraph "4", subparagraph "(a)" of this Agreement.

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ARTICLE VI.

This Agreement is made subject to the following conditions:

1. That at any time prior to entering into any contract by the Project Owners for the construction of the Sewer Project, the Project Owners, or either of them, shall have the right to terminate this Agreement, and in such event the Project Owners shall disburse all moneys deposited by the Developers and Westinghouse under this Agreement in the same manner as is provided in the event of the termination of this Agreement in accordance with ARTICLE III, paragraph "4", subparagraph "(a)".

2. That the Borough of Turtle Creek shall execute an Agreement with the Project Owners for the construction of of the portion of the Sewer Project to be situate within the Borough of Turtle Creek upon the terms and conditions acceptable to the Project Owners.

The provisions of this Agreement shall enure to the benefit of and be binding upon each of the parties, hereto, his, her, their and its heirs, executors, administrators, successors and assigns.

EXHIBIT "B"

INITIAL DEPOSITS BY

DEVELOPERS AND

WESTINGHOUSE ELECTRIC CORPORATION

Westinghouse Electric Corporation	$62,999.77
Ralph Scherger and Pauline A. Scherger, his wife	$31,600.11
Stephen Catarinella and Lucia Catarinella, his wife	$103,800.12
Harold W. Gray and Walter J. Duquette partners doing business as "Gray and Duquette", and Norm F. Vogel	$ 16,600.00
Total	$215,000.00

Exhibit "A" -- Plan referred to in above Agreement is on file and available for public inspection at the Churchill Borough Municipal Building, 2302 Wm. Penn Highway, Pittsburgh 35, Pennsylvania and at the office of the Secretary of Wilkins Township, 703 McMasters Avenue, Turtle Creek, Pennsylvania.

SECTION 2: That any ordinance or part of any ordinance conflicting with the provisions of this ordinance be, and the same is hereby repealed, so far as the same affects this ordinance.

ORDAINED AND ENACTED into Law, this 31 day of January, AD, 1955.

BOROUGH OF CHURCHILL

BY: _____
Robert M. Entwisle
President of Council

ATTEST:

_____
Ralph C. Heckel
Secretary
(Corporate seal)

Examined and approved this 31 day of January, A.D. 1955.

William H. Ford,
Burgess

ORDAINED AND ENACTED into Law, this 24th day of January, A.D., 1955.

COMMISSIONERS OF
WILKINS TOWNSHIP

By: Richard B. Rose
Richard B. Rose
President

ATTEST:

M. Jos. Martinelli
M. Jos. Martinelli,
Secretary
(Corporate seal)

Approved this 24th day of January, A.D., 1955.

_____
Frank Reich,
Solicitor

TOWNSHIP OF WILKINS

INTER-MUNICIPAL AGREEMENT
WITH

PENN HILLS

OCTOBER, 1965

ORDINANCE NO. 370

AN ORDINANCE OF THE TOWNSHIP OF WILKINS AUTHORIZING AND DIRECTING THE PROPER TOWNSHIP OFFICERS TO EXECUTE AND DELIVER AN AGREEMENT BETWEEN THE TOWNSHIP OF WILKINS AND THE TOWNSHIP OF PENN HILLS, PROVIDING FOR USE OF SANITARY SEWERS IN THE TOWNSHIP OF WILKINS BY THE TOWNSHIP OF PENN HILLS AND PROVIDING FOR PRO-RATED SHARING OF THE COSTS OF CONSTRUCTION AND MAINTENANCE OF SAID SANITARY SEWERS.

THE TOWNSHIP OF WILKINS HEREBY ORDAINS AS FOLLOWS:

SECTION I. The proper Township officers are hereby authorized and directed to execute and deliver on behalf of the Township of Wilkins an agreement between the Township of Wilkins and the Township of Penn Hills in substantially the following form:

BBG491

A G R E E M E N T

MADE AND ENTERED INTO THIS 4th day of October, 1965, by and between:

THE TOWNSHIP OF WILKINS, a municipal subdivision of the Commonwealth of Pennsylvania, situate in Allegheny County, Pennsylvania, hereinafter called "Wilkins",

A N D

THE TOWNSHIP OF PENN HILLS, a municipal subdivision of the Commonwealth of Pennsylvania, situate in Allegheny County, Pennsylvania, hereinafter called "Penn Hills".

WHEREAS, "Wilkins" and "Penn Hills" are adjacent municipalities; and

WHEREAS, there exists a community locally known as "Eastmont" which is situate mostly in "Wilkins" and partly in "Penn Hills" and which has heretofore been afforded sanitary sewage privileges by way of sanitary sewer lines partly within "Penn Hills" and mostly within "Wilkins" leading to a sanitary sewage treatment plant wholly located within "Wilkins"; and

WHEREAS, the said sanitary sewage system above described is now found to be inadequate, and it has been deemed that the only practical solution to the problem is to conduct the drainage of the sanitary flow from that portion of the two municipalities locally known as "Eastmont" by construction of a sanitary sewer bypass from a point at or near the present Eastmont Sewage Treatment Plant to an interceptor sewer known as Thompson Run Sewer situate in "Wilkins", the said sanitary sewage to be eventually treated through the facilities of the Allegheny County Sanitary Authority; and

WHEREAS, that area of "Eastmont" situate in the Township of Penn Hills contains approximately 125 families and the water shed and area affecting same is more fully described in a Plan prepared by Alex Hutchinson & Son, Registered Engineers, dated September, 1965 and bearing Order Number 13878,

a copy of which is annexed hereto and a copy of which is on file in the office of the Secretary of the Township of Wilkins at 110 Peffer Road, Wilkins Township, Allegheny County, Pennsylvania, and in the office of the Secretary of the Township of Penn Hills, 12245 Frankstown Road, Penn Hills Township, Allegheny County, Pennsylvania, where same may be examined by the public.

AND WHEREAS, "Wilkins" has offered to "Penn Hills" the necessary facilities constructed by "Wilkins" so that the sanitary sewage can be lawfully collected and transported through "Wilkins" and the sanitary facilities--as above described--constructed by it, the sewage to be ultimately treated and disposed of by Allegheny County Sanitary Authority for certain considerations as hereinafter stipulated.

NOW, THEREFORE, in consideration of the mutual covenants herein contained, and with the intent to be legally bound hereby, "Wilkins" and "Penn Hills " agree as follows:

FIRST: "Wilkins", subject to the provisions and conditions of this agreement, hereby grants to "Penn Hills" the right of connecting certain sanitary sewers existing in that portion known as the "Eastmont" area, which area is fully described in the engineering reports of Alex Hutchinson & Son, on file as aforesaid, into and through certain sanitary sewers of "Wilkins" and being more particularly the bypass line heretofore mentioned and the Thompson Run Interceptor Sewer.

SECOND: "Penn Hills", upon execution of this agreement and subject to the provisions and conditions of this Agreement hereby agrees to pay and/or reimburse "Wilkins", via:

a. The "Penn Hills" pro-rated share based on usage of the cost of the Thompson Run Interceptor Sewer; said pro-rated share being 1.5 per cent of the total cost of the said Thompson Run Interceptor Sewer; the total cost being $374,971.47 dollars and the amount to be paid by "Penn Hills" to "Wilkins" being $5,624.57 dollars which sum "Wilkins" has already paid to the Allegheny County Sanitary Authority for construction of the Thompson Run Interceptor Sewer.

b. The"Penn Hills" pro-rated share, based on usage of the total construction cost of the Eastmont Sewage Disposal Plant by-pass line; said pro-rated share being 17% of the said total cost; the total cost being $10,794.48 and the amount to be paid by "Penn Hills" to "Wilkins" being $1,834.99, "Wilkins" having previously paid for the entire cost of construction of said by-pass sewer line.

c. "Penn Hills" agrees to pay a pro-rata share of the cost of maintenance and repair of the Thompson Run Interceptor Sewer, which pro-rated share shall be 1.5 per cent of the total cost of maintenance and repair.

d. "Penn Hills" agrees to pay a pro-rata share of the cost of maintenance and repair of the trunk line extending from the "Penn Hills" - "Wilkins" boundary, to the Thompson Run Interceptor Sewer, said obligation only extending to lines through which seage from "Penn Hills" flows, and the pro-rata share to be 17 per cent of the total cost.

THIRD: "Penn Hills" will enter into an Agreement with the Allegheny County Saintary Authority for the treatment and disposal of sanitary sewage from that portion of Eastmont which is situate wholly within the said Township, said Agreement to be made by powers contained in an ordinance of the Township, and regulating the discharge of waste materials into the said sanitary sewers in accordance with the rules and regulations of Allegheny County Sanitary Authority, as well as rules and regulations of the Township. "Penn Hills" further agrees that no storm water or water from roofs, or any other type of water, shall at any time, be permitted to enter into the siad sewers located within the boundaries of the said Township, and as hereinabove referred to.

FOURTH: This Agreement rescinds and makes null and void an Agreement heretofore entered into between the Township of Penn Hills — (then known as the Township of Penn); the Township of Wilkins; Sampson Brothers, Inc. and Sampson Land Company, being Pennsylvania corporations, dated July 12, 1954, insofar as same pertains to or applies to the Township of Wilkins and the Township of Penn Hills.

IN WITNESS WHEREOF, the Township of Wilkins and the Township of Penn Hills have duly executed this Agreement, each by its proper officers thereunto duly authorized, and under municipal seal, and also pursuant to the powers of an ordinance duly ordained and enacted authorizing and directing the execution thereof.

TOWNSHIP OF WILKINS

ATTEST:

Wilmer R. Baldwin
Secretary

By Harry M. Fagell
President of the Board of Commissioners

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BBG491

TOWNSHIP OF PENN HILLS

ATTEST:

Wm. P. Jones, Secretary

By
Alfred C. Ireland, President
Board of Commissioners

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SECTION II. All ordinances or parts of ordinances inconsistent with or in conflict with the provisions of this ordinance be and the same hereby are repealed insofaras the same are inconsistent or in conflict with provisions of this ordinance.

Ordained and adopted by the Boardof Commissioners of the Township of Wilkins at a duly assembled meeting held the 4th day of October, 1965.

TOWNSHIP OF WILKINS

By Harry McFeagell
President of the Board
of Commissioners

ATTEST:

William H. Baldwin
Secretary

Appendix L
Affordability Analysis Forms

Schedule 6.
AFFORD
(FORM LTCP-EZ)

Schedule 6. CSO AFFORDABILITY

➢ Attach to FORM LTCP-EZ

Attachment Sequence # 06

Community name shown on FORM LTCP-EZ	NPDES number	Date
Wilkins Township		5/31/13

Current Costs	1	Annual operations and maintenance expenses (excluding depreciation). *See instructions.*	1	$824,776
	2	Annual debt service (principal and interest). *See instructions.*	2	$443,868
	3	Current Costs. *Add lines 1 and 2.*	3	$1,268,644
Projected Costs (Current Dollars)	4	Projected annual operations and maintenance expenses (excluding depreciation). *See instructior*	4	$320,212
	5	Present value adjustment factor. *See instructions.*	5	0.6600
	6	Present value of projected costs. *Multiply line 4 by line 5.*	6	$211,340
	7	Projected debt costs. *See instructions.*	7	$6,407,385
	8	Annualization factor. *See instructions.*	8	0.0908
	9	Annual debt service (principal and interest) for projected WWT facilities and CSO controls. *Multiply line 7 by line 8.*	9	$581,511
	10	Projected Costs. *Add lines 6 and 9.*	10	$792,851
Total Costs	11	Total current and projected WWT and CSO costs. *Add lines 3 and 10*	11	$2,061,495
Cost Per Household	12	Residential WWT flow (MGD). *See instructions*	12	1.000
	13	Total WWT flow (MGD). *See instructions*	13	1.000
	14	Fraction of total WWT flow attributable to residential users. *Divide line 12 by line 13.*	14	1.000
	15	Residential share of total costs. *Mulitply line 11 by line 14.*	15	$2,061,495
	16	Number of households in service area. *See instructions.*	16	3,148
	17	Cost Per Household (CPH). *Divide line 15 by line 16.*	17	$655
Median Household Income	18	Census Year MHI. *See instructions.*	18	$48,300
	19	MHI adjustment factor. *See instructions.*	19	1.0000
	20	Adjusted MHI. *Multiply line 18 by line 19.*	20	$48,300
Residential Indicator	21	Annual WWT/CSO control CPH as % adjusted MHI. *Divide line 17 by line 20, then multiply by 10*	21	1.36
	22	Residential Indicator. *See instructions.*	22	Mid-Range
Bond Rating	23 a	Date of most recent general obligation bond	23a	01/00/1900
	b	Rating agency (Moody's or Standard and Poor's)	23b	0
	c	Rating (Moody's Aaa-C or Standard and Poor's AAA-D)	23c	0
	24 a	Date of most recent revenue (water or sewer) bond	24a	01/00/1900
	b	Rating agency (Moody's or Standard and Poor's)	24b	0
	c	Bond insurance (Yes/No)	24c	0
	d	Rating (Moody's Aaa-C or Standard and Poor's AAA-D)	24d	0
	25	Bond Rating Benchmark. *See instructions.*	25	Weak
Overall Net Debt	26	Direct net debt (G.O. bonds excluding double-barreled bonds). *See instructions.*	26	$365,000
	27	Debt of overlapping entities (proportionate share of multijurisdictional debt). *See instructions.*	27	$15,968,696
	28	Overall net debt. *Add lines 26 and 27.*	28	$16,333,696
	29	Full market property value (MPV). *See instructions.*	29	$376,098,172
	30	Overall net debt as a percent of full MPV. *Divide line 28 by line 29, then multiply by 100.*	30	4.34
	31	Net Debt Benchmark. *See instructions*	31	Mid-Range
Unemployment Rate	32	Unemployment rate for permittee service area. *See instructions.* *Source:*	32	6.6%
	33	Unemployment rate for permitee's county (use if permittee's rate is unavailable). *See instructions* *Source:*	33	
	34	Average national unemployment rate. *See instructions.* *Source:*	34	7.2%
	35	Unemployment Rate Benchmark. *See instructions.*	35	Mid-Range

Schedule 6.
AFFORD
(FORM LTCP-EZ)

Schedule 6. AFFORD - CSO Affordability

➢ Attach to FORM LTCP-EZ

Attachment Sequence #

Community name shown on FORM LTCP-EZ	NPDES number	Date
Wilkins Township		5/31/13

Median Household Income	36	Median household income - permittee. *Copy from line 20.* *Source:*	36	$48,300
	37	Census Year national MHI. *See instructions.* *Source:*	37	$54,055
	38	MHI adjustment factor. *Copy from line 19.*	38	1.0000
	39	Adjusted national MHI. *Multiply line 37 by line 38.*	39	$54,055
	40	MHI Benchmark. *See instructions.*	40	Mid-Range
Financial Management Indicators	41	Full market value of real property. *Copy from line 29.*	41	$376,098,172
	42	Property tax revenues. *See instructions.*	42	$2,983,582
	43	Property tax revenues as a percent of full MPV. *Divide line 42 by line 41, then multiply by 100.*	43	0.79
	44	Property Tax Benchmark. *See instructions.*	44	Strong
Property Tax and Collection Rate	45	Property Taxes Levied. *See instructions.*	45	$3,329,574
	46	Property Tax Revenue Collection Rate. *Divide line 42 by line 45, then multiply by 100.*	46	89.61
	47	Collection Rate Benchmark. *See instructions.*	47	Weak

				Benchmark	Score
Matrix Score	48	Enter benchmark and corresponding score			
	a	Bond Rating. *From line 25.*	48a	Weak	1
	b	Net Debt. *From line 31.*	48b	Mid-Range	2
	c	Unemployment Rate. *From line 35.*	48c	Mid-Range	2
	d	Median Household Income. *From line 40.*	48d	Mid-Range	2
	e	Property Tax. *From line 44.*	48e	Strong	3
	f	Collection Rate. *From line 47.*	48f	Weak	1
	g	Sum. *Sum up scores.*	48g		11

	49	Permittee indicators score. *Divide line 48g by number of scores.*	49	1.83
	50	Permittee Financial Capability Indicators Benchmark. *See instructions.*	50	Mid-Range
	51	Residential indicator benchmark. *Copy from line 22.*	51	Mid-Range
	52	Financial Capability (High Burden, Medium Burden, or Low Burden). *See instructions.*	52	MEDIUM

CHESTER ENGINEERS