

# REGIONAL INFILTRATION/INFLOW CONTROL STANDARDS, GUIDELINES, PROCEDURES & POLICIES

---

## INTRODUCTION

### **Background**

In 1999, the King County Council approved the Regional Wastewater Services Plan (RWSP). This is a region-wide plan, supported by Local Agencies that established several key components, including: constructing new wastewater treatment facilities, completing collection system improvements, addressing combined sewer systems, considering water reuse, and addressing **infiltration and inflow (I/I)**. Specifically, the RWSP ordinance guided the County to work *cooperatively with component agencies to reduce the amount of I/I that flows into component agencies' local collection systems, thereby reducing the impact of I/I on the regional system's capacity.*

Addressing and reducing I/I effectively and efficiently is a complex task. I/I originates from a variety of sources including storm flow into manholes and pipes, groundwater that enters pipes through cracks, root intrusions and from private property. With few exceptions, property owners are prohibited from allowing groundwater and/or rainwater from entering the public sanitary sewer system. Direct connections of a property's roof and/or foundation drains to the public sewer system are called *illicit connections*. These do exist and they are known to cause problems. These problems can range from surcharged sewer lines, backflow of sewerage onto private properties, environmental and public health concerns and increased costs to convey and treat peak flows of sewage plus storm water.

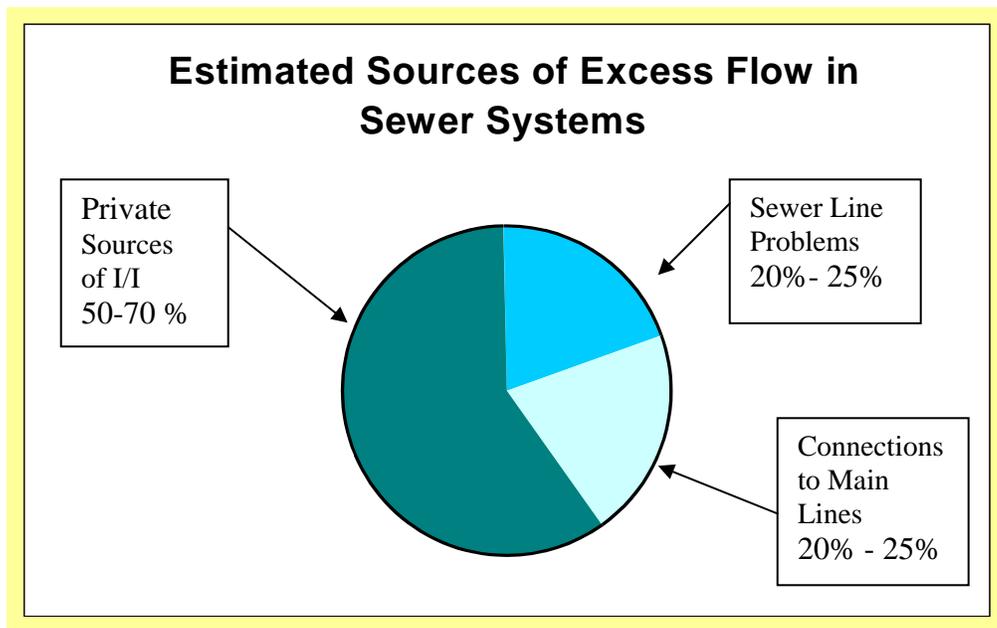
The amount of infiltration and inflow depends on the condition of the all the elements that constitute the sanitary sewer system. Elements such as the number of illicit connections, the physical condition of main lines and privately owned side sewers, the level of groundwater and the porosity of the soil affect the amount of I/I.

Reduction and control of I/I entering the public sanitary sewer system can be managed by proper design, appropriate choice of material, proper installation of sewer infrastructure (including connections and manholes), careful supervision during construction and consistent preventative maintenance.

Historic data from several sources around the country and from King County indicate that under peak wastewater flow conditions, as much as 75% of the area's wastewater flow is generated from I/I. As depicted below, recent surveys<sup>1</sup> indicate that 50% to 70% of I/I comes from private property sources.

---

<sup>1</sup> King County Infiltration & Inflow National Survey + Pages 11-13, Control of Infiltration and Inflow in Private Building Sewer Connection, Dillard, Wayne, Chair, the Sanitary Sewer Overflow Cooperative Agreement Workgroup of the Water Environment Federation, 1999.



An I/I problem eventually comes to the attention of the general public because of one or more of these conditions: sewer overflows, private sewer facility backups, equipment failures, permit violations, higher operating costs, public facility expansions and/or higher utility rates. Significant problems with I/I often occur in older areas where sewer systems were built using old standards and procedures or have deteriorated. Newer sewer systems also experience problems with excessive I/I because of faulty connections, improper pipe bedding or various construction deficiencies.

As stated, the RWSP gave direction to investigate, quantify, and devise a plan to address I/I concerns. From this an I/I Control Program was begun in 2000 that included technical, financial, and policy considerations.

## Purpose

Thirty-four politically and administratively independent Local Agencies discharge wastewater from their systems to King County's regional wastewater system. Wastewater flows within this vast service area have increased to the point that, in some cases, system capacity has been exceeded.

As part of I/I reduction efforts, the RWSP directed the County, in coordination with component agencies, to *develop model local conveyance systems' design standards, including inspection and enforcement standards, for use by component agencies to reduce I/I within their systems.* To meet target levels of I/I in the future, the RWSP also directed the County Executive to propose long-term measures that *include establishing new local conveyance systems design standards, implementing an enforcement program, developing an incentive based cost sharing program and establishing a surcharge program.*

This document contains proposals for Engineering Standards/Procedures, Guidelines and Standard Design Details designed to provide technical and policy tools to begin correcting the shortcomings in design, construction, inspection and testing of sanitary sewers – elements that can be responsible for infiltration and inflow. These Standards and Guidelines address only the features of the public and private sewer system associated with I/I. The document also contains proposed Policies that support these Standards and proposed Intergovernmental Agreement (IGA) clauses specifically tailored to the management of I/I reduction projects in this region. The final draft Standards, Procedures and Policies presented here are intended to augment and emphasize existing standards/procedures/policies previously developed by King County and Local Agencies. They will

be included in the Regional I/I Control Program Alternatives/Options Report and ultimately as part of the Executive's Plan.

## **Collaborative Approach**

A series of workshops attended by representatives of King County, Local Agencies and the consultant team have been held to review and formulate each part of the Regional I/I Control Program. It was agreed at I/I Control Program Workshop #6 that the process of developing I/I Control Program standards and contract language would be a consensus-based, iterative dialogue between King County and the Local Agencies. In mid 2001, with input from King County and Local Agencies, the Earth Tech consultant team began the process by drafting alternative standards, procedures, policies and intergovernmental agreement (IGA) clauses. In the fall of 2001, Local Agencies provided input on preliminary concepts presented therein. At Workshop #7, in January 2002, it was agreed that a subcommittee of the Municipal Water Pollution Abatement Advisory Committee (MWPAAC) be formed to guide development of the Standards, Procedures and Policies.

This MWPAAC RWSP Subcommittee, now known as the Engineering and Planning Subcommittee (E&P), met twice a month during the spring and summer of 2002, and their draft recommendations were published in October 2002. These draft Standards, Procedures and Policies were then used in pilot projects conducted in accordance with the RWSP statement: *This cooperative process will assess levels of I/I in local conveyance systems and construct pilot projects to demonstrate the cost-effectiveness and environmental costs and benefits of local collection system rehabilitation.* The pilot projects also facilitated testing of various technologies for I/I control. The Local Agencies had selected the ten basins, based on consensus criteria, in which the County conducted the pilot projects.

After the pilot projects had been completed, the Earth Tech consultant team evaluated the lessons learned and drafted revised Standards, Procedures, and Policies, which the E&P Subcommittee reviewed and finalized during two meetings in 2004 (see Appendices A & B). In this Final Draft Regional I/I Control Standards, Procedures, and Policies document, the E&P Subcommittee recommends that the proposed Standards, Guidelines, Procedures, Policies and IGA be used during the design and construction of I/I reduction projects.

## **Document Contents**

The second chapter of this document explains the purpose of the Standards and Procedures and presents each Standard and Procedure with information about its potential impacts. The Standards and Procedures focus on methods of design, construction, inspection and testing for use in new construction and rehabilitation projects. Included in the second chapter is an introduction to the engineering Guide Specifications, which are included in full in Appendix C.

The third chapter explains the purpose of the Policies that support the Standards and Procedures and presents each Policy with information about its potential impacts. The Policies provide guidance on issues, including funding, public education, access to private property, inspection, liability and storm water, that are associated with the application of the Standards and Procedures.

The fourth chapter explains the purpose of the IGA and presents a model IGA that can be adapted to a variety of I/I control situations.

This document has been reviewed by Local Agencies, MWPAAC members and King County I/I Control Program staff. It is provided as a final draft document for inclusion as part of the Alternatives/Options report and for further consideration in the Executive I/I Reduction and Control Plan.

### **Overview of How Standards, Procedures and Policies Fit into I/I Reduction Projects**

The chart on the next page illustrates the role played by each individual Standard, Procedure, and Policy element in identifying an I/I problem and its cause, developing a detailed design and scope of work, construction, contracting, warranty, inspection/verification, and long term evaluation.

