

# I/I Control Program Recommendation

The 6-year I/I control study culminates with the *Executive's Recommended Regional I/I Control Program* presented in this chapter. All recommended actions are based on consensus decisions made between King County and local wastewater agencies as represented through MWPAAC and its E&P Subcommittee.<sup>1</sup>

The chapter presents an overview of the recommended actions and then discusses the basis for the decisions that formed the recommendations. Both the overview and the discussions are grouped according to the three necessary components for a successful I/I control program: direct I/I reduction, long-term I/I control, and program administration and policy.

## 5.1 Overview of Recommendations

This section summarizes the recommended actions to reduce I/I in the regional system, to ensure the long-term viability of the reductions and to prevent future increases in I/I, and to put mechanisms and policies in place to properly manage and administer the regional I/I control program.

### **Recommendations for I/I Reduction:**

- Identify cost-effective I/I reduction projects on a project-specific basis, rather than on a regional basis or by the need to meet specific I/I reduction targets.
- Select two or three initial I/I reduction projects for implementation from the list of nine cost-effective projects presented in Chapter 4 of this report. The County and MWPAAC (through the E&P Subcommittee) would work cooperatively to select these projects.
- In the next 3 to 5 years, construct the selected initial projects to test planning assumptions and to gain more information about costs.
- Proceed with work on private property when a project calls for it. Experiences on initial projects would be documented in terms of public involvement activities, private property participation rates, costs, neighborhood impacts, groundwater effects, and special construction issues that arise.

#### **Recommendation Highlights**

King County and the local agencies would select, implement, and evaluate two or three "initial" I/I reduction projects to test the effectiveness of I/I reduction on a larger scale than the pilot projects.

After completion of the initial projects, recommendations would be made to the King County Council regarding long-term I/I reduction and control, including applicable changes to policy or code.

---

<sup>1</sup> MWPAAC = Metropolitan Water Pollution Abatement Advisory Committee.

- Fund initial projects through King County wastewater revenue that is dedicated to funding conveyance system improvement (CSI) projects in the regional conveyance system. For future I/I reduction projects, options to supplement King County funding may be considered. For example, local agencies could contribute funds to expand the project scope in order to take advantage of construction efficiencies, as was done in some pilot projects, or to move a project into the cost-effective category.
- Conduct pre- and post-project flow monitoring to test the ability of I/I reduction projects to reduce enough flow to delay, downsize, or eliminate the need for CSI projects.
- Reconvene the E&P Subcommittee when initial projects and post-project flow monitoring are completed to evaluate results of projects, adjust planning assumptions if appropriate, and further refine private property protocols or best practices to ensure that successful approaches are carried forward to future work.
- If the initial projects are deemed successful and future I/I reduction is approved, proceed programmatically to apply I/I reduction planning to all CSI project planning. Wherever an I/I reduction project is a cost-effective alternative to the planned CSI project, the County and local agencies would implement the I/I reduction project provided that it is environmentally and logistically feasible.



***Crew installing cured-in-place-pipe (CIPP) using air inversion method.***

### **Recommendations for Long-Term I/I Control:**

- Make use of existing local agency regulations to ensure that new development and redevelopment within the regional wastewater service area meet up-to-date construction standards for sewer conveyance lines and connections.
- Apply the standards, guidelines, procedures, and policies in final draft form to the initial I/I reduction projects. Once they have been tested on large-scale projects, the standards, guidelines, procedures, and policies would be reviewed and finalized by the local agencies and translated into King County policy in the form of an ordinance.
- Conduct a system flow audit of the regional and local systems every 10 years to track I/I levels. The County and local agencies would conduct the audits and use the information to cooperatively make decisions about how to adjust I/I control measures as may be necessary.
- Do not implement a surcharge on local agencies for flows that exceed targeted I/I reduction levels already established in the King County Code. The County and local agencies found

that implementing a surcharge, as contemplated in the King County Code, would be costly to administer and would pose difficulties in verifying violations.

**Recommendations for Program Administration and Policy:**

- Authorize King County to centrally manage the I/I control program, to administer public awareness approaches for the overall program, and to serve as a central clearinghouse for program inquiries and training.
- Conduct flow monitoring to assess effectiveness of I/I reduction over time.
- Wait until after the initial I/I reduction projects are completed before considering any amendments to agreements with local agencies or changes to the King County Code.

## 5.2 Discussion of I/I Reduction Recommendations

I/I reduction refers to cost-effective sewer system rehabilitation or replacement projects that can be done in a targeted basin to reduce I/I flows and alleviate immediate downstream capacity constraints. A key recommendation for I/I reduction is the implementation, over the next 3 to 5 years, of two or three initial cost-effective I/I reduction projects that can serve as a practical field test of the region’s ability to reduce I/I levels at a large enough scale to delay, downsize, or eliminate the need for a more expensive CSI project. This section discusses the recommended processes for selecting, implementing, and evaluating the initial projects. It also gives background on the decision-making processes used to apply planning assumptions, define and evaluate cost-effectiveness, reach funding recommendations, and determine whether to conduct and fund I/I work on private property.

### 5.2.1 Selecting, Implementing, and Evaluating Initial I/I Reduction Projects

The initial I/I reduction projects would be selected from the list of nine cost-effective I/I reduction projects listed in Chapter 4 of this report. Selection would be done in a consensus-based manner with MWPAAC’s E&P Subcommittee. Discussions would focus on prioritizing the projects for a number of factors, including the following:

- Input from local agencies
- Potential risk of overflows or backups (determines relative urgency of projects)
- Ability to time projects to be concurrent with other utility or public projects in the right-of-way (for example, work can be done ahead of planned street resurfacing to save the cost of street restoration for the I/I project)
- Project location and specific basin characteristics that might make certain projects more desirable than others

County staff would identify the prioritization factors for each project and present this information to the E&P Subcommittee for selection of initial I/I reduction projects. The E&P Subcommittee may wish to bring the decision to the full MWPAAC.

The initial projects would be implemented through the Wastewater Treatment Division's normal predesign, design, and construction processes as alternative solutions to the otherwise planned CSI projects. Depending on the projects selected and input from participating local agencies, the County and the participating local agencies may decide to enter into intergovernmental agreements to define who would serve as lead agency and to outline roles and responsibilities for permitting, inspection, public involvement, and other project implementation activities.

The initial I/I reduction projects would be evaluated after completion to determine (1) whether they were able to reduce I/I levels to a point where enough capacity was relieved to delay, downsize, or eliminate the need for downstream CSI projects, and (2) whether I/I reduction on this scale is cost-effective. Flow monitoring data collected for the I/I control study would be compared with flow monitoring data collected for each project basin after the initial projects are completed. The costs for the initial projects would be compared to the costs for planned CSI projects to determine if the resulting benefit-cost ratio is positive (1 or greater) and is in line with the pre-project planning-level benefit-cost ratio.

Other information would be documented from the initial projects, including issues related to working on private property; execution of roles and responsibilities of the County and local agencies involved in the projects; application of the draft standards, guidelines, procedures, and policies during the projects; and other logistical and construction-related activities.

The results of the post-project evaluations would be discussed with the E&P Subcommittee. The post-project evaluations and results of the discussions with the E&P Subcommittee, including a recommendation regarding whether to proceed with implementing additional I/I reduction projects over time, would be presented to the King County Council.



***Manhole with indications of settlement in the pavement that likely subject the cover to inundation during rainfall. The large number of pick holes in the lid also allows free flow of surface water into the manhole.***

## 5.2.2 Applying Planning Assumptions

The planning assumptions for I/I reduction that were used to conduct the benefit-cost analysis are conservative. These conservative assumptions were used to avoid overestimating benefits and underestimating project costs. For purposes of comparison, a sensitivity analysis was conducted using the initial planning assumptions developed from information gained from the I/I pilot projects. As discussed in Chapter 4, the initial planning assumptions result in greater projected benefits—a net savings of \$109.5 million for all identified cost-effective I/I reduction projects as opposed to a net savings of \$31 million using the more conservative assumptions. After constructing the initial I/I reduction projects and conducting post-reduction flow monitoring, costs and reduction effectiveness can be evaluated to test the accuracy of the planning assumptions. Adjustments can then be made to the assumptions to more closely match the experiences in these larger scale projects. Any adjustments would include input from the MWPAAC and the E&P Subcommittee.

## 5.2.3 Defining and Evaluating Cost-Effectiveness

To determine whether I/I reduction was cost-effective, a formula for calculating a benefit-cost ratio was developed and applied to individual I/I reduction projects. The formula, as described in Chapter 4, was developed as a means to respond to the RWSP policy that calls for reducing I/I whenever the costs of rehabilitation is less than the costs of conveying and treating that flow. Cost-effective projects are those for which the capital savings that result from I/I reduction exceed the costs of constructing the I/I project. When an I/I reduction project delays, downsizes, or eliminates the need for a conveyance facility improvement, the savings achieved (benefit) must be higher than the cost of the I/I reduction project (cost) to arrive at a positive benefit-cost ratio.

Through discussions with the local agencies, consensus was reached that cost-effectiveness would be considered on an individual project basis in order to maximize cost savings from I/I reduction and to implement only the most cost-effective projects with specific downstream conveyance system benefits. This preferred alternative for evaluating I/I cost-effectiveness was one of three alternatives considered in the *Alternatives/Options Report*. The other two alternatives—reducing I/I by 30 percent in the regional system and evaluating projects on a regional basis—were deemed infeasible after conducting benefit-cost analyses on each alternative.

### Cost-Effectiveness Formula

$$\frac{(\text{CSI Project Savings After I/I Reduction})}{(\text{Cost of Proposed I/I Reduction Project})} > 1$$

When an I/I reduction project delays, downsizes, or eliminates the need for a conveyance facility improvement, the savings achieved (benefit) must be higher than the cost of the I/I reduction project (cost) to arrive at a positive benefit-cost ratio. Projects with a benefit-cost ratio of greater than 1 are considered as cost-effective.

Local agencies expressed concern early in the development of the program that any reduction goal, such as the 30-percent reduction goal in the RWSP, would be too arbitrary and that trying to meet the goal would lead to overspending on I/I removal without tying I/I reduction to some

measurable collection system and cost saving benefit for the region. To determine the feasibility of the 30-percent reduction goal, a benefit-cost analysis was conducted for removing 135 million gallons per day (mgd) of I/I from the regional collection system, which is 30 percent of the region's total estimated 450 mgd of I/I. The results of the analysis indicated that the benefit (\$116 million) to cost (\$398 million) ratio for achieving 30 percent I/I reduction would be 0.29, which is considerably below the benefit-cost ratio of greater than 1 that was set for cost-effectiveness.

Analysis of the feasibility of using a third alternative—evaluating the cost-effectiveness of I/I reduction on a region-wide basis—indicated that projects would be implemented at great expense for the sake of I/I reduction alone without necessarily producing any downstream conveyance system benefit. Using this method would essentially result in a break-even situation in which as much is spent on I/I removal as otherwise would have been spent on CSI projects. The benefit-cost analysis for this alternative identified 13 I/I reduction projects with benefit-cost ratios ranging from a high of 3.3 to a low of 0.48. While several projects on the list were not cost-effective, the savings from the other projects were spread out to produce an average benefit-cost ratio of 1.02, essentially a break-even ratio. To pursue this alternative, approximately \$132 million (cost) would be spent on I/I reduction to achieve \$134 million in savings (benefit).

### 5.2.4 Funding I/I Reduction Projects

The initial I/I reduction projects would be funded with King County wastewater revenue that is dedicated to funding CSI projects in the regional conveyance system. Spending a smaller amount of money to reduce capacity demands through I/I reduction in lieu of spending money on a more expensive CSI project benefits both the regional wastewater system and ratepayers. King County would also fund future cost-effective I/I reduction projects; alternatives for supplementing this funding would be considered for each project.

Four funding alternatives were considered for the regional I/I control program during development of the *Alternatives/Options Report*. In the early stages of development of these alternatives, the County and local agencies agreed that a project must be considered cost-effective for the region in order to be eligible to receive regional public funds (King County wastewater revenue) and that King County should fund I/I projects that are cost-effective.

The four funding alternatives and the feasibility of their application to future cost-effective I/I projects are as follows:

- **King County funds the entire project.** King County would fund I/I reduction projects that are cost-effective as determined by criteria used in the cost-benefit analysis.
- **King County and the local agencies share costs.** If an I/I reduction project has a benefit-cost ratio less than 1, a local agency may contribute its own funds to the project to make the project cost-effective for the region. A local agency may receive incidental benefits from an I/I reduction project and therefore may choose to contribute funds.

The local agency's contribution could make the I/I project cost-effective for King County

while at the same time providing the agency with a system upgrade that is partially funded by the County. For example, a \$10 million CSI project may have a corresponding \$10.5-million I/I reduction project that could eliminate the need for the CSI project. While not cost-effective for the County to pursue, this I/I reduction project could be made cost-effective if the local agency perceived a benefit to its system of \$2 million and was therefore willing to contribute this \$2 million to the project funding. The local agency's contribution would reduce the County's contribution to \$8.5 million, which is below the projected savings that would be achieved by eliminating the need for the \$10 million CSI project.

- **Private property owners participate.** Private property owners may participate in and fund rehabilitation projects for work on their property. However, it is unlikely that this option would be used unless a property owner is being required to disconnect an improperly connected downspout, sump pump, or other stormwater/groundwater drainage to the sewer. King County has agreed to fund all cost-effective I/I reduction work, including work on private property. Equity concerns would arise if some I/I work on private property was publicly funded while other work was left to the property owner to fund. (See the discussion later in this chapter on issues related to I/I reduction work on private property.)
- **Related project costs are funded as part of another agency's multipurpose project.** An I/I reduction project that is not cost-effective as a stand-alone project could become cost-effective if other funding sources pay for related project costs (for example, resurfacing the street). This type of situation could occur when another agency's multipurpose project already includes funding for transportation, stormwater, and/or water improvement and an I/I reduction project can coincide with that work to capture efficiencies and cost savings.

While any I/I reduction project should try to take advantage of concurrent work being done by other utilities in the same right-of-way, it is not recommended that this consideration be given high priority in project selection and planning. It would be rare that projects could take advantage of this type of cost savings because of the complexity of trying to plan projects across multiple jurisdictions or agencies whose funding depends on availability of other financing sources. I/I reduction projects require tightly coordinated planning, budgeting, and construction schedules. A significant scheduling change for an I/I reduction project to accommodate a multipurpose project would require reevaluation of the cost-effectiveness of the I/I project.

### 5.2.5 Implementing I/I Reduction Projects on Private Property

One major consideration for a regional I/I control program has been how to manage I/I when it originates on private property. Valuable information was gained from the work conducted during the I/I control study about the origins of I/I and about working with private property owners, voluntary participation rates, costs, risks, property restoration issues, and special construction considerations.<sup>2</sup>

---

<sup>2</sup> Pilot project experiences are discussed in detail in the *Pilot Project Report*.

Flow monitoring, modeling, and pilot projects found that a majority of I/I originates on private property via defective side sewers or improperly connected storm drains, and that significant I/I flow reduction can be achieved in basins where I/I reduction work is conducted on laterals and side sewers.<sup>3</sup> Four of the ten I/I pilot projects focused repairs on private property and achieved the highest levels of I/I reduction. I/I pilot projects that focused repairs only on the public portion of the system achieved measurable I/I reduction but not as much as those that were located predominantly on private property.



**Relining a side sewer on private property.**

Given the high costs and disruption of rehabilitating laterals and side sewers, property owners have little incentive to undertake corrective actions on their own. The owners would not directly benefit from the actions unless they were experiencing chronic root intrusion and side-sewer blockage. Moreover, cost estimates for such work must include not only the costs for repairing or replacing sewers but also the costs to restore surface improvements such as yards, landscaping, and pavement. To address these concerns, work on private property that was done as part of the pilot projects was funded by King County with contributions by local agencies. Because there was no cost to the participating property owners, the voluntary participation rate in the pilot projects was 95 percent.

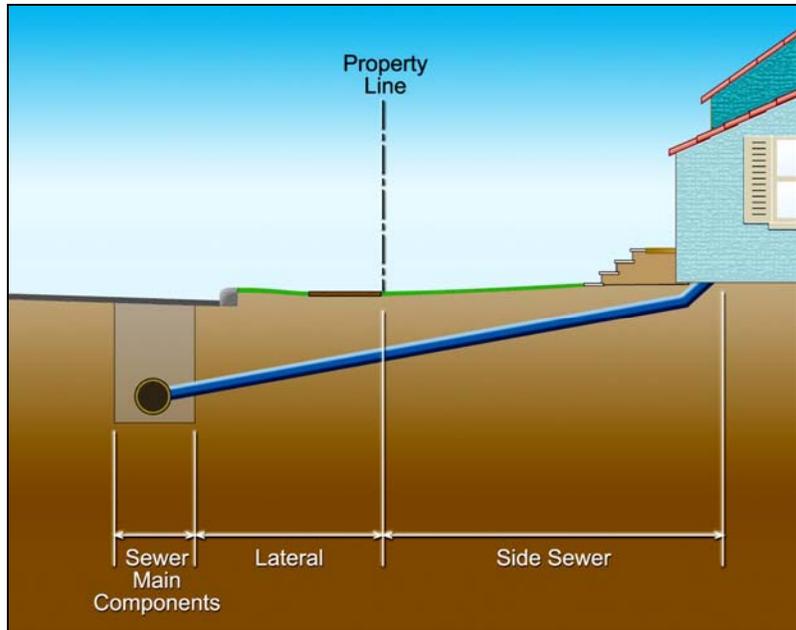
All of the nine cost-effective I/I reduction projects would entail work on private property to achieve the projected I/I reductions. In the benefit-cost analysis, these projects were deemed cost-effective inclusive of the costs and potential risks of private property work. It was therefore recommended that King County and local agencies proceed with work on private property as called for in the scope of work for selected initial projects and that King County fund the work on private property done as a part of these projects. If the initial two or three projects demonstrate the feasibility of working on private property on a larger scale than the pilot projects, repairs on private property can be included as part of the overall I/I reduction strategy in the planning and design of capacity-related CSI projects.

Before finalizing the recommendations that cost-effective I/I reduction work be done on private property and that this work be funded with public funds, it was necessary to address the question of the legality of the use of public funds on private property. This question was explored thoroughly by the King County Prosecuting Attorney's Office (PAO) in 2004 as part of development of the *Alternative/Options Report*.

---

<sup>3</sup> For a more detailed discussion of how system components are determined to be I/I contributors in a basin, see the *Benefit/Cost Analysis Report*.

The primary concern about the legality of the use of public funds for I/I reduction on private property comes from the Washington State Constitution, Article VIII, Sections 7 and 10. Section 7 prohibits the gift or loan of public funds to private entities.<sup>4</sup> However, Section 10 gives specific authority to the County to loan sewer utility revenues to private property owners to finance I/I repairs provided that an “appropriate charge back” is made. Further reading of Section 10 indicates that this constitutional provision would not preempt a program that directly funds I/I repairs on private property without repayment of funds.



**Side sewer: the portion of the sewer pipe that extends from a building to the public right-of-way.**

Considering Sections 7 and 10 of Article VIII together, the PAO found that expenditures of public funds on private property for I/I would not constitute an unconstitutional gift of public funds under Article VIII, Section 7, provided that the public benefit is demonstrated and documented to outweigh the cost of other approaches to managing I/I or providing the sewer capacity and that any private benefit is incidental and not intended to be a gift.

These findings are based on the reasoning in the Supreme Court case *City of Tacoma v. Taxpayers of the City of Tacoma*.<sup>5</sup> This was an electrical utility case in which conservation expenditures on private property to achieve cost savings for the electrical utility were held not to be unconstitutional gifts of public funds. The PAO cautioned that although this electrical utility case provides a useful precedent, it is not perfectly analogous to conducting I/I reduction work to provide more capacity in the sewer conveyance system. However, the PAO believed that as long as I/I reduction could be shown to be cost-effective (that it could be shown to have a public benefit that outweighs the cost), the expenditure of public funds for this purpose would be legally defensible and would not be a violation of the Washington State Constitution provisions on the subject.

<sup>4</sup> Appendix A of this report provides references to the legal documents reviewed for the analysis of the use of public funds for I/I reduction work on private property.

<sup>5</sup> *City of Tacoma v. Taxpayers of the City of Tacoma*, 108 Wash. 2d. 679, 743 P.2d 793 (1987). (*City of Tacoma*).

## 5.3 Discussion of Long-Term I/I Control Recommendations

In addition to cost-effectively removing enough I/I from the collection system to delay, downsize, or eliminate some otherwise needed CSI projects, measures must be in place to maintain I/I levels long-term and to prevent future increases in I/I throughout the regional system. Recommendations for controlling I/I levels in the regional system are of equal importance to recommendations for I/I reduction. If the collection system degrades at an accelerated rate over time, I/I levels will take up more and more of the regional system's capacity to convey wastewater. Long-term I/I control includes policy, administrative, financial, and technical measures that promote an ongoing program of review, maintenance, and repair of the collection and conveyance system.

Anticipating the need for development of long-term I/I control measures, the RWSP gave direction to include or consider components such as regional inspection standards, design standards, and a surcharge to enforce target I/I levels (also referred to as I/I thresholds) that exist in the King County Code. The following are the RWSP policies that relate to long-term I/I control:

**I/IP-2.2:** By December 31, 2002, the county, in coordination with component agencies, shall develop model local conveyance systems' design standards, including inspection and enforcement standards, for use by component agencies to reduce I/I within their systems.

**I/IP-2.4:** No later than December 31, 2004 (now 2005)<sup>6</sup>, utilizing the report described in subsection 3, the executive shall recommend target levels for I/I reduction in local collection systems and propose long-term measures to meet the targets. These measures shall include, but not be limited to, establishing new local conveyance systems design standards, implementing an enforcement program, developing an incentive based cost sharing program and establishing a surcharge program. The overall goal for peak I/I reduction in the service area should be thirty percent from the peak twenty-year level identified in the report.

**I/IP-3:** King County shall consider an I/I surcharge, no later than June 30, 2005 (now 2006), on component agencies that do not meet the adopted target levels for I/I reduction in local collection systems. The I/I surcharge should be specifically designed to ensure the component agencies' compliance with the adopted target levels. King County shall pursue changes to component agency agreements if necessary or implement other strategies in order to levy an I/I surcharge.

In response to these RWSP policies, the *Alternatives/Options Report* identified several options for the long-term I/I control component of the program. Options were presented for addressing pre-1961 pipes in the local and regional collection systems, which were specifically exempted

---

<sup>6</sup> Because of the need to conduct flow monitoring for two years, the I/I program deliverable schedule was extended by one year for all dates. (See Chapter 3 of this report for more details.)

from threshold and surcharge provisions in some of the service agreements with the local agencies; establishing an I/I threshold; providing financial incentives or disincentives such as variable rates or surcharges; developing standards, guidelines, procedures, and policies; educating and involving the public; and addressing other administrative issues.

The four recommendations for long-term I/I control are as follows:

- Make use of existing local agency regulations to ensure that new development and redevelopment within the regional wastewater service area meet up-to-date construction standards for sewer conveyance lines and connections.
- Apply the standards, guidelines, procedures, and policies in final draft form to the initial I/I reduction projects. Once they have been tested on large-scale projects, the standards, guidelines, procedures, and policies would be reviewed and finalized by the local agencies and translated into King County policy in the form of an ordinance.
- Conduct a system flow audit of the regional and local systems every 10 years to track I/I levels. The County and local agencies would conduct the audits and use the information to cooperatively make decisions about how to adjust I/I control measures as may be necessary.
- Do not implement a surcharge on local agencies for flows that exceed targeted I/I reduction levels already established in the King County Code. The County and local agencies found that implementing a surcharge, as contemplated in the King County Code, would be costly to administer and would pose difficulties in verifying violations.

These recommendations represent the consensus reached by the County and local agencies after numerous meetings throughout the 6-year program development process. Knowledge gained from flow monitoring, modeling, pilot projects, and the benefit-cost analysis has contributed to these recommendations. The following sections describe the processes that were used to arrive at each of the recommendations.

### 5.3.1 Local Development Regulations for I/I Control

During the development of this I/I control program recommendation, all the local agencies provided information that demonstrated that their development codes include language that applies to both new construction and redevelopment work in their respective jurisdictions. This development code language specifically identifies up-to-date procedures and materials that are to be used for developing sewer pipes and connection points to local agency conveyance pipes. Additionally, the local agencies have established material and construction standards for expansion and upgrade of their collection systems. These local standards provide the regulatory tool necessary to ensure that both the privately and publicly owned portions of the collection system are upgraded and operate efficiently over time.

### 5.3.2 Standards, Guidelines, Procedures, and Policies

In response to RWSP policy direction, King County presented local agencies with a draft set of design and inspection standards that could be used to reduce and control I/I. The draft standards were based on engineering judgments of best practices. Some of the subjects covered in the standards are as follows:

- Establishing proper construction practices and materials for I/I repair and rehabilitation projects
- Encouraging appropriate inspection and testing prior to acceptance of new or rehabilitated sections of sewer
- Developing inspection and repair standards for new and existing structures on private property
- Encouraging appropriate system maintenance
- Providing appropriate predesign, investigation of I/I conditions, inspection of construction, and enforcement of standards

At an I/I program workshop in 2001, local agencies delegated the review of this document to the E&P Subcommittee, whose membership was expanded for this review process to include representation from several agencies. In a series of 16 review meetings, the County and local agencies worked via consensus to refine the document. During the first round of review, some “standards” were changed to “guidelines” via subcommittee consensus and were kept as such in the final review sessions that took place after the pilot projects.

The draft standards, guidelines, procedures, and policies document that came out of this process was submitted to the King County Council by the deadline specified in RWSP policy. The Council accepted the document as a draft until more information could be learned from pilot projects. The draft document was then applied during the pilot projects in 2003. Lessons learned from the projects were documented and brought before the E&P Subcommittee. The current final draft document has remained the same since the last Subcommittee review in summer 2004.<sup>7</sup>

On October 11, 2005, at the request of the E&P Subcommittee, a workshop was held with local agencies to review the contents of the final draft document and to reach consensus on how it should be presented as part of the I/I program recommendation. Consensus was reached that the document should stay in final draft form and that the standards, guidelines, procedures, and policies should be applied and tested during planning, design, and construction of the two or three selected initial I/I reduction projects. The County and local agencies agreed that the applicability and practicality of the standards, guidelines, procedures, and policies needed to be tested on large-scale I/I reduction projects before they could be finalized. Once they are finalized by the County and local agencies, the standards, guidelines, procedures, and policies would be brought back to the County Council for adoption as policy and the local agency development codes and policies would be updated to include them as necessary.

---

<sup>7</sup> The final draft of the standards, guidelines, procedures, and policies are included as Appendix B of this report.

### 5.3.3 Flow Audit of Regional and Local Systems

It is recommended that a flow audit be conducted jointly by the County and local agencies every 10 years beginning in 2010. The purpose of the audits is to track progress in controlling I/I levels over time.

The audits would be similar to the flow monitoring conducted as part of the I/I control study. They would include all 34 local agencies and would encompass the entire regional conveyance and treatment system. The County and local agencies would share all information gathered in the audits and would cooperatively make decisions about how to adjust I/I control measures and make any necessary improvements to local agency or regional systems.

The following types of information would be gathered in system audits:

- Peak flow and base flow volumes in local agency collection systems and the regional conveyance and treatment system
- Precipitation data
- Land use and development information necessary to identify and map expansion of local agency systems and the regional collection and conveyance system
- Other information that the County and local agencies deem as necessary at the time of each audit

### 5.3.4 Whether to Implement an I/I Surcharge

Existing King County Code 28.84.050K contains detailed provisions for the structure and level of the surcharge to be assessed to flows defined as “excess flow” by a formula described in Chapter 2 of this report. However, these provisions have not yet been enforced and it is recommended, as a part of this I/I program recommendation, that they not be implemented. Calculation and enforcement of thresholds and surcharges have proven to be impractical because the code provisions are complicated, language in agreements with local agencies is not uniform concerning exemptions for pipes built before 1961, and the annual costs to cover equipment and staffing for continuous flow monitoring is prohibitive.

Because excess flow as defined in the code is based on a 30-minute period, the volume measured would be small. The code states that in order for the surcharge to approximate the cost of providing additional capacity, the excess flow will be adjusted as if it were occurring for a 24-hour period. The formula to arrive at this adjustment is cumbersome and would require continuous flow monitoring at every connection point to the regional system so that a daily surcharge could be assessed for the period of time the flow is exceeding the threshold.

Another option for determining threshold exceedance was offered during the I/I control study as a way to reduce flow monitoring costs. In this option, the need for continuous metering would be eliminated and the number of flow meters would be reduced by placing flow meters at the model basin level only and basing peak flows and threshold exceedance levels on modeling

calculations. This option would cost approximately \$2 million annually and would have to be adopted uniformly in all local agency agreements. Given the strong concerns that local agencies expressed about the implementation of any type of threshold or surcharge program, achieving uniform adoption of this approach in the agreements is unlikely. Further, if it were adopted, enforcement of threshold exceedance based on modeled flow calculations would be difficult to defend.

Local agencies were concerned that any kind of threshold or surcharge provision would be pointless because the regional program has already agreed to pay for identified cost-effective I/I reduction. The agencies would prefer that regional dollars be spent on I/I reduction only where cost-effective to do so. Additionally, local agencies were concerned about the high cost of monitoring to enforce such provisions and took the position that long-term I/I control measures should be rate neutral. Some local agencies felt that surcharges would represent “unfair double-dipping,” because the wastewater rate pays for the capacity required to convey I/I. The agencies also argued that a surcharge would impose a financial burden on them and would reduce the funds that local agencies would otherwise have available for investments in I/I reduction and control in their systems. Finally, local agencies do not want the County to take on a regulatory role that would expend rate dollars on enforcement and monitoring activities. Instead, local agencies would prefer to voluntarily adopt uniform standards and procedures to ensure proper construction, inspection, and maintenance of system components to prevent future increases in I/I.

### 5.4 Discussion of Program Administration and Policy Recommendations

A third element of the I/I control program involves administrative and policy aspects of program implementation and management. Administrative and policy recommendations mutually agreed on by the County and local agencies are as follows:

- **Program management.** The I/I control program would be centrally managed by the Comprehensive Planning and Technical Resources (CPTR) unit of King County’s Wastewater Treatment Division. CPTR would organize and manage follow-through of agreed-on action items and would coordinate and communicate program implementation activities. Program management would also encompass planning, analysis, and integration of I/I control measures and conveyance needs.
- **Public education and involvement.** Administration of public awareness approaches, including public education and involvement, for the overall program would be centrally administered by King County. King County would develop public education materials in cooperation with the local agencies and would produce and provide the materials to the agencies. Local agencies would distribute these materials to their customers. Project-specific responsibilities and protocols would be decided between the County and the participating local agencies. Project-specific public education and involvement decisions may be left to individual intergovernmental agreements, as was the case with the pilot projects. The roles and responsibilities for administration of the public involvement aspects of working on

private property would also be jointly agreed on by the County and the participating local agencies.

- Flow monitoring and ongoing system assessment.** As part of a long-term I/I control program, ongoing or periodic system flow monitoring would be conducted to assess progress made at reducing I/I levels and maintaining the levels over time. CPTR staff are working to determine the frequency and scale of the flow monitoring effort. The decision would be based in part on the need to coordinate the planning and system monitoring needs of all Wastewater Treatment Division programs. The division uses flow monitoring data to continually update and check the modeling that is used to plan for adequate capacity in the regional collection and treatment system. To assess I/I reduction levels, flow monitors could be placed at the local agency level, model basin level, or mini basin level and data could be collected annually or less frequently. Various levels of data collection with levels of associated cost would be brought to the E&P Subcommittee for open discussion. The ensuing frequency and scale of flow monitoring may change over time and at different periods depending on the needs of the Wastewater Treatment Division.

**How do we reduce or eliminate Infiltration/Inflow?**

*To reduce or eliminate I/I, sewer components can be replaced or rehabilitated. Rehabilitation methods are less invasive, because repairs can be made from inside the pipe or manhole, or only a small excavation is needed to expose the pipe. Examples of I/I control techniques are listed in the following table.*

SEWER COMPONENT	HOW TO FIX I/I	I/I CONTROL METHODS
<b>Pipelines (side sewers, laterals, mains)</b> Side sewers and some laterals are on private property. Most mains are on public property. 	Replace or repair sewer pipes.	<b>Replacement</b> <ul style="list-style-type: none"> <li>• Dig and replace</li> </ul> <b>Rehabilitation</b> <ul style="list-style-type: none"> <li>• Pipe grouting – cement based grout is injected from the inside of a pipe to fill a hole or crack</li> <li>• Pipe relining – flexible liner is inserted into a pipe either by pulling it through an existing pipe or inverting it using water pressure – like a sock turned inside out</li> <li>• Pipe bursting – existing pipe is expanded with a bursting tool and a new pipe is pulled through</li> <li>• Spot repairs – problem pipe is exposed and replaced or a repair sleeve is attached</li> </ul>
<b>Manholes</b> Locations: Most are on public property.	Replace or repair existing manholes.	<b>Replacement</b> <ul style="list-style-type: none"> <li>• Dig and replace</li> </ul> <b>Rehabilitation</b> <ul style="list-style-type: none"> <li>• Coat or grout exterior</li> <li>• Line interior</li> <li>• Install lid gans</li> <li>• Raise or replace lids and frames</li> <li>• Divert surface water from manhole</li> </ul>
STORMWATER COMPONENT	HOW TO FIX I/I	I/I CONTROL METHODS
<b>Building Connections</b> Most are on private property.	Disconnect and reroute to separate stormwater system or remove and allow water to soak into the ground.	<b>Stormwater system disconnection</b> <ul style="list-style-type: none"> <li>• Roof drains</li> <li>• Downspouts</li> <li>• Yard drains</li> <li>• Catch basins</li> </ul> <b>Groundwater control system disconnection</b> <ul style="list-style-type: none"> <li>• Foundation drains</li> <li>• Sump pumps</li> </ul>

King County Wastewater Treatment Division - Regional Infiltration and Inflow Control Program Page 3

**Sample page from public outreach brochure explaining how to reduce or eliminate I/I.**

As discussed in the section in this chapter on long-term I/I control, it is recommended that the County in partnership with the local agencies conduct an audit of system-wide flow every 10 years starting in 2010. The audits would include monitoring of regional and local system components, similar to the level of effort expended for the monitoring conducted for the I/I control study. Information gathered would be used for evaluating system needs and updating I/I degradation and cost-effectiveness assumptions.

- Regional clearinghouse for I/I control information and training.** One of the program policies in the final draft standards, guidelines, procedures, and policies calls for King County to act as a central clearinghouse for responding to inquiries about the regional I/I control program and for King County in conjunction with the local agencies to provide training opportunities on best practices for I/I control and reduction.

- **Amendments to the wastewater disposal agreements and the King County Code.** No amendments to the wastewater disposal agreements with local agencies or to the King County Code are recommended at this time. However, there may be a need to do so after completion of initial I/I reduction projects to reflect the final direction and elements of a long-term I/I control program. Amendments could relate to elements of any of the three major program components discussed in this recommendation: I/I reduction, long-term I/I control, and program administration.