



King County

Department of Natural Resources and Parks

Wastewater Treatment Division

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**Professional Services for Evaluation of Inflow and Infiltration (I/I)
Reduction Concepts, Phase 2**

Task 6000

Regional Best Management Practice (BMP) Development

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Project 150258

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Table of Contents

1.0	Introduction	1
1.1	Infiltration and Inflow Control Program Overview	1
1.2	Project Background	2
1.3	Purpose	3
2.0	Regional BMP Development Approach.....	4
2.1	Summary of Approach.....	4
2.2	Goal	4
2.3	Objectives.....	4
2.4	Success Factors.....	5
2.5	Toolkit Approach	5
3.0	Side Sewer BMP Listing.....	6
3.1	Side Sewer I/I Prevention BMPs.....	8
3.2	Proactive Side Sewer Maintenance BMPs.....	15
3.3	Other Private Property I/I Source Identification and Mitigation BMPs.....	23
4.0	BMP Key Consideration and Refinement.....	26
4.1	Key Considerations and Initial Recommendations	26
4.2	I/I Task Force Survey Results	29
5.0	Side Sewer BMP Recommendations	31
5.1	Equity Key Considerations for Recommended BMPs.....	41
5.2	MWPAAC Recommendation Considerations.....	42
6.0	Next Steps	43
	Appendix A: Side Sewer Best Management Practices Toolkit.....	A-1
	Appendix B: I/I Task Force BMP Survey Results	B-1
	Appendix C: MWPAAC Recommendation Letter to WTD.....	C-1

List of Tables

Table 3-1. Side Sewer I/I Prevention BMPs	9
Table 3-2. Proactive Side Sewer Maintenance BMPs	16
Table 3-3. Other Private Property I/I Source Identification and Mitigation BMPs	24
Table 4-1. Matrix of BMPs by Key Considerations for Side Sewer I/I Prevention.....	27
Table 4-2. Matrix of BMPs by Key Considerations for Proactive Side Sewer Maintenance and Private Property I/I Source ID and Mitigation.....	28
Table 5-1. Summary of Side Sewer BMP Recommendations.....	41

List of Figures

Figure 3-1. I/I Sources on Public and Private Property	6
Figure 3-2. Example: Sanitary Lateral Lining Checklist–Liner Preparation (BMP A.3).....	12
Figure 3-3. Example: Side Sewer at Ditch Detail (BMP A.6).....	13
Figure 3-4. Example: Deep Side Sewer Detail (BMP A.9).....	14
Figure 3-5. Example: Courtesy Notice of Sewer Lateral Root Intrusion (BMP B.3).....	18
Figure 3-6. Example: Website Content (BMP B.4)	19
Figure 3-7. Example: Side Sewer Use and Maintenance Educational Material (BMP B.5).....	20
Figure 3-8. Example: Prior to the Closing of a Property Transaction Educational Flyer (BMP B.5)	21
Figure 3-9. Example: Side Sewer Responsibilities Educational Flyer (BMP B.5).....	22
Figure 3-10. Example: Sump Pump and Downspout Disconnection Education Material	25
Figure 5-1. Example: SPU Side Sewer Responsibilities.....	34
Figure 5-2. Example: Los Angeles County Public Works Informational Webpage	36
Figure 5-3. Example: SPU Side Sewer Maintenance Webpage.....	38
Figure 5-4. Example: King County’s Private Property I/I Source Disconnection Webpage	40

1.0 Introduction

This technical memorandum (TM) presents options for regional inflow and infiltration (I/I) best management practices (BMPs) for King County's separated sewer system to be developed by the King County Wastewater Treatment Division (WTD) under its I/I Control Program. This TM describes and then evaluates each option for benefits and applicability to local agencies. The TM also presents additional considerations that may influence whether an option is ultimately chosen for implementation, as well as any work that may need to be completed prior to implementing the selected option.

This TM—Task 6000, Regional BMP Development—is part of a broader effort to reduce I/I entering the County's separated sewer system through the *Evaluation of Inflow and Infiltration Reduction Concepts* project. The task builds on work documented in the following TMs:

Task 410	<i>Verify 2004 King County Final Draft Regional I/I Control Standards, Procedures, and Policies</i> , October 2017
Task 420	<i>Assessment of Existing Local Agency Sewer and Side Sewer Standards</i> , October 2017
Task 430	<i>Approach to Achieve Common Sewer and Side Sewer/Lateral Standards</i> , February 2019
Task 510	<i>Evaluation of Current Inspection Programs at Cities and Sewer Districts</i> , October 2017
Task 520	<i>Outline for a Standardized Regional Inspection Training Program</i> , February 2019
Task 600	<i>Private Side Sewer Program Identification and Relevance to the King County Wastewater Service Area</i> , April 2019
Task 600	<i>Evaluation Process, Findings, and Outcomes</i> , April 2019
Task 4100	<i>Draft Program Development Plan</i> , April 2020

1.1 Infiltration and Inflow Control Program Overview

Reducing I/I is an ongoing activity required by all wastewater utilities to effectively manage the collection system and control rate payer costs. I/I is defined as rainwater, surface water, and groundwater that flows directly and indirectly into sanitary sewers. I/I may also originate via unauthorized stormwater connections to the sanitary sewer system. This additional flow takes up capacity that would otherwise be used to convey wastewater. The additional operating costs that result from the need for larger pipes, maintenance structures, and pump stations to accommodate higher flows are spread across all local agencies and their customers through WTD's utility rates, fines, and cleanup costs associated with an increase in sanitary sewer overflow (SSO) events and annual wastewater treatment costs.

In 1999, as part of the Regional Wastewater Services Plan, WTD established the I/I Control Program. This program was designed to reduce the amount of peak wet weather flow entering the County's separated sewer system whenever such actions were determined to be cost-effective. Currently, the I/I Control Program focuses on portions of the conveyance system that have capacity deficiencies. Specifically, the I/I Program has developed methods to collect data to assess where localized I/I reduction might be a more cost-effective solution than increasing pipe and/or pump station capacity. To date, the I/I Control Program has been effective in select areas of the regional system by addressing localized I/I with this method.

Working in tandem with the I/I Program, WTD's Conveyance System Improvement (CSI) Program functions to develop separated conveyance system projects to accommodate the projected flows from WTD-supported service populations. King County provides wholesale wastewater conveyance and treatment services for 17 cities, 16 local sewer utilities, and one Indian tribe in King, Snohomish, and Pierce counties (local

agencies).¹ These local agencies own and operate independent collection systems that include pipelines and pump stations to collect and convey wastewater from their respective service areas to King County's regional conveyance system for treatment and disposal.

CSI Program planning has identified conveyance system needs in the separated system where the existing capacity does not meet the current or projected flows. These flows include assumptions for future population growth and future I/I deterioration rates. CSI Program projects are proposed to address each conveyance system capacity need. A timeline and estimated project cost have been established based on a set of nine prioritization criteria² that include such factors as available capacity (as defined by level of service), operations and maintenance issues, and local agency input.

Per King County's conveyance system policies (King County Code 28.86.060), WTD uses the 20-year peak wastewater flow as the design standard for the separated portion of the regional wastewater system to accommodate increased flows and protect against SSOs. To meet this standard, facilities are designed to convey the peak flow that can be expected on an average of once every 20 years (i.e., a 20-year return interval). Under peak flow conditions, as much as 75 percent of the peak flow in the separated sewer system is estimated to be the result of I/I flows in the conveyance system.³

Based on national I/I surveys and historic King County I/I reports, a significant source of that I/I originates on private property, particularly from side sewers. As service areas are built out, and as the local collection system ages and deteriorates, the WTD conveyance system can expect to see increased flow from I/I. Consequently, conveyance system rehabilitation may be required sooner than expected.

1.2 Project Background

In 2015, the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAAC) I/I Task Force (I/I Task Force) was created as an ad hoc group to formulate ideas for I/I programs that could benefit the regional wastewater system by looking at long-term solutions to significantly reduce and remove I/I from the sewer system as a whole. The I/I Task Force developed a list of recommended options for future regional I/I Control Program actions. That list provided the basis for the current work being performed as part of the Evaluation of Inflow and Infiltration Reduction Concepts project. This project is expected to compliment ongoing rehabilitation and repair as part of normal operations and maintenance as well as location specific I/I reduction efforts completed by component agencies and the County.

The goal of the project is to identify implementable, long-term solutions to decrease future I/I throughout King County's regional wastewater collection system. The work, to date, has been divided into the following phases:

- Phase 1, conducted from 2017 to 2019, reviewed a wide variety of program concepts and identified three I/I reduction concepts for further consideration:
 - Regional sewer and side sewer BMPs
 - Regional inspector training and certification program
 - Private side sewer inspection program with financial assistance

¹ The Muckleshoot Indian Tribe owns all sewer mains and side sewers within its service area. See Phase 1 Task 420 TM for more information.

² King County Department of Natural Resources and Parks Wastewater Treatment Division. Conveyance System Improvement Program, Program Update. 2017.

³ King County Metro. Wastewater 2020 Plus Infiltration/Inflow Existing Conditions. February 1994, pg. 13; and King County. Pilot Project Report. October 2004, pg. 1-3.

- Phase 2, initiated in 2019 and continuing through 2021, builds on the Phase 1 work and provides descriptions and considerations for those three identified programs to support discussions on scope and implementation. Discussion of the private side sewer inspection program was moved out of the I/I Program work and into the Clean Water Plan due to its complexity. Results of Phase 2 are not yet known, but may include recommendations on side sewer BMPs for a web-based regional toolkit and recommendations on regional inspector training and certification program content and expectations.

There are an estimated 475,000± sanitary sewer accounts in the King County WTD sewershed. Assuming 50 to 75 feet per side sewer (account), that is potentially 23,750,000 to 35,625,000 feet (4,500–6,750 miles) of pipe that is generally not maintained at the same rate as publicly owned and operated sewers, and their condition is generally unknown. Establishing BMPs and developing an inspector training program as part of this evaluation of I/I reduction concepts contract will help raise awareness of the need for increased, proactive attention that side sewers require to achieve project goals. Specific goals are identified in each of the Task 6000, 7000, and 8000 TMs.

1.3 Purpose

This TM documents the approach taken during Phase 2 to define implementable BMPs for regional I/I prevention and mitigation that may limit the increase and/or reduce the overall I/I levels in King County's regional wastewater service area. All BMPs recommended for consideration for regional adoption are side sewer and private property-based. The BMPs recommended in this TM are feasible to adopt and implement, and relevant to most local agencies. Implementation of the recommended BMPs is very likely to result in I/I prevention and long-term reduction efforts on the local level throughout the WTD service area. Throughout this TM, these BMPs will be referred to as "side sewer BMPs."

Opportunities for adopting BMPs were first presented in the Phase 1 Task 410 *Verify 2004 King County Final Draft Regional I/I Control Standards, Procedures, and Policies* TM. They were also discussed in the Task 420 *Assessment of Existing Local Agency Sewer and Side Sewer Standards* TM (Task 420 TM). In that TM, BMPs used by each local agency were reviewed and compared to current local and national BMPs. The Task 420 TM also describes I/I prevention, source identification, and mitigation best practices implemented by local agencies and sewer utilities with successful I/I reduction programs, which were not included in the 2004 King County standards, but might be considered for regional adoption.

The Phase 2 Task 4000 *Draft Program Development Plan* TM provided an overview of the approach that would be taken under Task 6000 to develop regional BMPs (Task 4000 TM). Concepts presented in the Task 4000 TM that helped define the regional BMPs include:

- Goals, Objectives, and Success Factors
- Implementation Risks and Barriers
- Outreach Considerations

As part of the Task 6000 Regional BMP Development planning process, the Consultant team worked with MWPAAC, primarily via the reconvened I/I Task Force, to develop the following elements presented later in this TM:

- Program Definition (Section 2)
- Benefits of BMP Adoption and Implementation (Section 3, Tables 3-1, 3-2, and 3-3, and Section 4)
- Review of Key Considerations (Section 4)

2.0 Regional BMP Development Approach

This section discusses the goals, objectives, success factors, and approach to developing regional BMPs. The Phase 1 efforts undertaken by WTD and MWPAAC helped to identify the initial set of side sewer BMPs.

2.1 Summary of Approach

In general, the approach taken to identify regional side sewer BMPs consisted of the following steps:

- Evaluate the list of BMPs developed in Phase 1.
- Identify 19 BMPs that appear to have high potential for I/I reduction and/or prevention (based on available information), which would be implementable by most local agencies and would address side sewer-related issues.
- Survey six local agencies and request feedback on the 19 side sewer BMPs from I/I Task Force Members.
- Further reduce list of side sewer BMPs to those that appear to be easiest to implement and have the highest potential for I/I reduction and/or prevention.
- Consider next steps for side sewer BMP implementation.
- Document findings and side sewer toolkit elements in this Task 6000 TM.

2.2 Goal

The overall goal for this effort, as described in the Task 4100 TM, is to achieve consistent regional use of three to five BMPs with a high potential to reduce I/I in sewer basins by all WTD's component agencies. This goal was developed by MWPAAC through Phase 1 and 2 input. By adopting and implementing regional BMPs that have a high potential for preventing and/or reducing I/I related to side sewers, WTD, and its component agencies within the WTD service area, are likely to realize various benefits over time. These benefits include:

- Reduction in flow to treatment plants that is attributed to I/I, or lack of increased flow even with community growth and development
- Reduced occurrences of sanitary sewer overflows, including basement backups
- Reduced resource expenditures in responses to service requests related to side sewers
- Increased awareness of side sewer maintenance responsibilities
- Gradual increase in overall collection system structural integrity

2.3 Objectives

The following are objectives as agreed upon by the I/I Task Force:

- Identify BMPs that can be implemented by all (or most) agencies, as applicable (see Section 3).
- Select three to five BMPs that appear to have the greatest I/I reduction potential.
- Develop selected BMP standards and materials for use.
- Coordinate with MWPAAC agencies to support BMP application and/or BMP adoption (see Section 5).
- Integrate equity and social justice (ESJ) measures into program development and implementation, as applicable.

These objectives were developed by MWPAAC through Phase 1 and 2 input.

2.4 Success Factors

The preliminary success factors for the Regional I/I BMP program are defined as:

- Able to demonstrate a measurable reduction or lack of increase in flow to treatment plants.
- Achieve 100 percent participation in the application of selected BMPs in all agencies.

These success factors were developed by the I/I Task Force through early Phase 2 input prior to final BMPs being identified. It was recognized that the success factors may be 'stretch' factors that will require time and attention to achieve rather than being immediately achievable. Based on the final BMP recommendation, 'measurable' I/I reduction is not expected in the downstream regional sewer system from voluntary BMPs, however there will be examples of beneficial I/I reduction that occur. Also, short term percent participation rates for voluntary implementation of BMPs are expected to be lower than 100%. Revisions to these success factors could occur separately from this TM and be determined by MWPAAC. The use of common standards throughout the King County service area will increase transparency and provide confidence that all component agencies are doing their part to reduce I/I.

2.5 Toolkit Approach

To achieve the goal, a Side Sewer BMP Toolkit approach was proposed to include guides and examples, forms, public education materials, and other resources for each recommended BMP. This TM includes the elements of the toolkit described in Section 5 and **Appendix A**. Exact or specific language to be implemented is not provided. This information could be used by MWPAAC agencies to tailor the BMPs and implement preventive and/or mitigative measures that are most appropriate and impactful to their local service areas. This approach has the potential to provide benefits to both the local sewer system where BMPs are implemented as well as the regional sewer system. Over time, other BMPs may be identified, evaluated, and standardized for regional use.

3.0 Side Sewer BMP Listing

This section discusses the various types of side sewer BMPs that can be adopted and provides specific local and national examples of each type. **Figure 3-1** illustrates methods by which I/I can enter sanitary sewer mains. I/I sources within the public right-of-way include cracked or broken pipes, deteriorated maintenance holes, faulty maintenance hole covers or frames, and direct connections to stormwater conveyance facilities. Private property sources include yard, roof, and footing drains, broken side sewers, and faulty lateral connections to the sewer main.

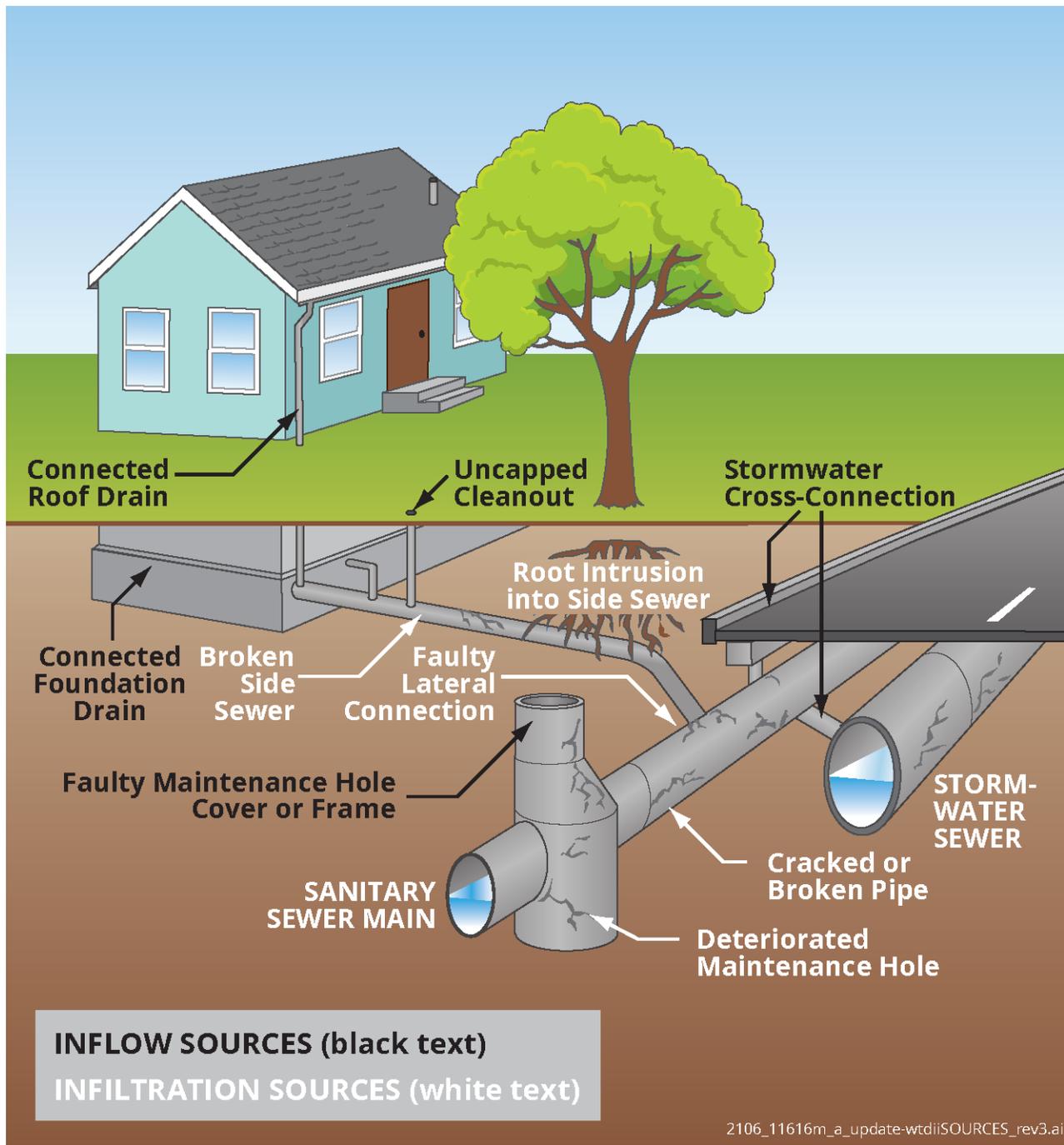


Figure 3-1. I/I Sources on Public and Private Property

Levels of I/I vary within the WTD service area. Some local agencies do not experience high levels of I/I as evidenced by low wet weather-related SSO and surcharge occurrences. Other agencies that experience high I/I rates typically develop capital improvement projects to address I/I sources as they are identified, for example, by rehabilitating defective sewer mains and maintenance holes.

When considering I/I BMPs that would most benefit all agencies over the long-term, BMPs that address I/I sources related to side sewers, versus public rights-of-way, are expected to have a higher potential for more local agencies to achieve reduction goals. For this reason, BMPs related to public sewers were set aside for this project, recognizing that I/I reduction in public sewers with high I/I is important and should be addressed outside this project. Another benefit of targeting side sewer BMPs is to help to reduce the expenditure of local agencies' time and resources on problems that are the responsibility of private property owner or occupant. From most local agencies' experience, when property owners/occupants are unaware of the responsibility to maintain their portion of the side sewer, misunderstandings arise regarding who will resolve backups and how soon. For example, backups caused by root intrusion in the privately-owned portion of side sewers can draw significant time and staffing resources from local agencies, which are ultimately not responsible for the root problem but are responding to the backups. The Phase 1 efforts undertaken by WTD and MWPAAC helped to identify the initial set of BMPs considered.

Side sewer BMPs can be classified into the following three categories:⁴

- **Side sewer I/I prevention BMPs:** prevent I/I from entering side sewers and connections at sewer mains due to construction, repair, and rehabilitation-related issues.
- **Proactive side sewer maintenance BMPs:** encourage residential property owners to maintain their side sewers to prevent defects that could lead to I/I entering the collection system and/or cause backups into homes.
- **Identifying and/or mitigating I/I sources on private property BMPs:** identify and/or mitigate non-structural side sewer-related private property I/I sources.

This section describes BMPs related to I/I prevention and mitigation, as well as approaches for local agencies to reduce side sewer-related expenditures that are actually incurred by private property owners and occupants. National and local examples are provided for each side sewer BMP category to illustrate actual implementation in the context of a sewer utility. Then more detailed information on the purpose/benefits, examples, and potential stakeholders involved is provided for each individual BMP.

Due to the limitations that some local agencies (special purpose districts) have with modifying legal authorities, some of the BMPs presented in this TM may not be implementable on a regional basis. However, those BMPs are included because of the important role they may play in long-term I/I reduction in specific instances (e.g., side sewers installed in steep slopes).

National Example BMPs. Since the inception of its Backup Prevention Program (BUPP), Johnson County Wastewater (JCW, Olathe, Kansas) has served as a national example for a comprehensive private property program focused on reducing the impact of sewer system-related surcharges. JCW's *Private I/I Removal Program Procedures Manual*, originally developed in 1998 and refined through the years while the program was in place, provides utilities across the country with various examples on which to model resolutions,

⁴ It should be noted that magnitude of impact that the implementation of each of these side sewer BMPs is not assessable over any given timeframe. However, addressing I/I at the source, such as at the private sewer lateral, will significantly reduce the magnitude of any downstream improvements including any capacity upgrades at the wastewater treatment plant. In addition to the capital costs associated with downstream improvements such as pumping, storage attenuation, or capacity upgrades, these improvements also have long-term operation and maintenance costs each year, which will be avoided.

enforcement programs, letters, minimum standards for I/I source disconnection, testing procedures, and product approval processes.⁵

Local Example BMPs. During the Phase 1 *Task 420 Assessment of Existing Local Agency Standards Sewer and Side Sewer Standards* efforts, many local agencies were found to have I/I prevention BMPs already in place. One agency, the Skyway Water & Sewer District (Skyway) in the West Hill area of unincorporated King County, could serve as a local example for the organization and implementation of various recommended BMPs. Skyway has developed a comprehensive Side Sewer Program that is outlined in their *2011 Side Sewer Regulations*, which provides a variety of information on side sewer installation including:

- Obtaining a side sewer permit
- Contractor licensing and insurance
- Contracting with property owners
- Minimum installation requirements (includes general and gravity- and pressure-specific information)
- Inspection and testing requirements
- Maintenance and repair
- Penalties

The document is available for download as a PDF at <https://www.skywayws.org/forms.php>.

3.1 Side Sewer I/I Prevention BMPs

Opportunities to prevent I/I from entering the sewer system from side sewers involve identifying and implementing the following:

- Strict sewer connection policies and applicable/appropriate local design guidelines
- Construction standards and specifications that incorporate best available technologies and materials
- State-of-the art inspection technologies and methods
- Property owner/occupant outreach and education

Table 3-1, on the following pages, summarizes those BMPs that have been identified based on their ability to meet the above requirements. These side sewer-related BMPs were identified as part of the Phase 1 *Task 430 Approach to Achieve Common Sewer and Side Sewer/Lateral Standards* effort.⁶ The purpose/benefits, examples, and potential stakeholders involved are listed for each BMP. Whenever possible, local agency examples are provided but are not exhaustive of all local agency examples available. If a local agency example is not available, a suitable national alternative is shown.⁷

⁵ A copy of the JCW I/I Procedures Manual (2012) and other related resources can be downloaded from the Water Environment Federation's Private Property Virtual Library at <http://www.wefppvl.org/WEF-PPVL-library/?p=53>

⁶ See the Phase 1 Task 430 TM for a complete listing of potential I/I BMPs related to sewer mains in rights-of-way and side sewers.

⁷ It is noted that most examples are from sewer utilities with fully separated service areas; however, portions of some utilities' service areas, including Seattle Public Utilities' and the city of Columbus (Ohio), also contain combined and partially separated sewers. However, all sewers that convey wastewater (combined, partially separated, and fully separated systems) should be designed and constructed to be watertight.

Table 3-1. Side Sewer I/I Prevention BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
A.1 Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers	<ul style="list-style-type: none"> Addresses key issues that could lead to I/I due to construction and installation practices. 	<ul style="list-style-type: none"> Alderwood Water and Wastewater District, Standards and Specifications 3-2.050 and S-10: require watertight provisions for side sewer construction, including the use of ductile iron pipe in easements and right-of-way. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD
	<ul style="list-style-type: none"> Ensures cap is not removed by third parties for other reason (such as yard drainage). 	<ul style="list-style-type: none"> City of Mercer Island, Standard Details: requires a locking cleanout cap (Standard Detail S-19). 	
	<ul style="list-style-type: none"> Nationally recognized high performing guidance document. 	<ul style="list-style-type: none"> National Association of Sewer Service Companies (NASSCO) specification guidelines for lateral/renewal repairs.⁸ 	
A.2 New side sewer construction inspection and product-specific inspection requirements	<ul style="list-style-type: none"> Ensure Contractor meets material and construction requirements for side sewer installation, including gravity side sewers and grinder pump side sewers. 	<ul style="list-style-type: none"> Skyway Water and Sewer District, <i>Side Sewer Regulations</i>, Article X-10.03 and 10.04: includes comprehensive provisions for side sewer inspection and testing for new construction. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD
		<ul style="list-style-type: none"> City of Algona, Public Works Standards 7.4.D.4: "Side sewer shall be inspected by the City's Representative/Inspector prior to backfilling. Side sewer shall be plugged and tested in the presence of the City Inspector by filling with water to obtain 4.5 psi or 10 feet of head. Leakage rate shall not exceed 0.31 gal/hr. for 4-inch pipe and 0.47 gal/hr. for 6-inch pipe, per 100 feet of pipe." 	
A.3 Repair/rehabilitation, and replacement inspection requirements	<ul style="list-style-type: none"> Ensures work performed on existing side sewers meet material and construction requirements. 	<ul style="list-style-type: none"> NASSCO's suggested standard specification for Pressure Testing and Grouting of Sewer Laterals, Laterals, and Lateral Connections Using the Packer Method with Solution Grouts. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD
		<ul style="list-style-type: none"> City of Columbus, Ohio, Sanitary Lateral Lining Inspector Checklist (see Figure 3-2) 	
A.4 Side sewer contractor prequalification	<ul style="list-style-type: none"> Ensures contractors who work on side sewers are registered, licensed, insured, and bonded. Reduces risk of non-qualified contractors performing work on side sewers. 	<ul style="list-style-type: none"> City of Redmond Side Sewer Roster: provides a list of side sewer contractors who have met the eligibility requirements and are authorized to perform side sewer work within the City of Redmond.⁹ 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD
		<ul style="list-style-type: none"> Seattle Public Utilities (SPU) also maintains a Side Sewer Roster and requires contractors to pass a written exam prior to authorization.¹⁰ 	

⁸ https://www.nassco.org/resources/manufacture-specifications?field_specification_topics_tid=251

⁹ <https://www.codepublishing.com/WA/Redmond/municode/Redmond13/Redmond1305.html>

¹⁰ <http://www.seattle.gov/sdci/codes/licensing-and-registration/side-sewer-contractor-registration>

Table 3-1. Side Sewer I/I Prevention BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
<p>A.5 Unauthorized connection¹¹ prohibition¹²</p>	<ul style="list-style-type: none"> • Clearly states unauthorized connections must be removed and provides appropriate enforcement mechanism to ensure disconnection. • Ensures only one side sewer connection from each structure is made to the main sewer, and that side sewer is directly connected to the appropriate draining fixtures within the structure.¹⁴ 	<ul style="list-style-type: none"> • Soos Creek Water and Sewer District, Side Sewer Standards 10 and 11: outline unauthorized connections and the monetary and other penalties associated with an illicit connection. It also states that the driver for these enforcement actions is inflow and infiltration prevention.¹³ • City of Auburn, Engineering Design Standards Section 7.08.3(4): requires that during construction in areas with more than one side sewer per structure, Contractors must test each connected structure to verify which side sewer is used by that structure. The test involves flushing every toilet or running every sink or tub on each floor of each structure and directly observing from which side sewer the effluent discharges. Only those side sewers can be connected. All others are to be abandoned in place. 	<ul style="list-style-type: none"> • Property owner • Contractor • Local agency • King County WTD
<p>A.6 Side sewer design guidelines that address crossing surface water conveyance/management/flood-prone areas</p>	<ul style="list-style-type: none"> • Ensures water tightness, and maintains structural integrity of the side sewer that runs under a ditch, rain garden, or other areas where high instances of surface water drains into the soil. • Failure of a cleanout at this location has a high potential to result in a sewer overflow that reaches a surface water body. 	<ul style="list-style-type: none"> • City of Pacific, SS-Side-Ditch Sanitary Sewer Side Sewer at Ditch Detail Drawing: requires a cleanout to be installed at a minimum of 18 inches from the outside ditch slope. Additionally, if the cleanout is located within a driving surface, a load bearing casting and cover is required in lieu of a round valve box (see Figure 3-3). 	<ul style="list-style-type: none"> • Property owner • Contractor • Local agency • King County WTD • King County Department of Natural Resources and Parks (DNRP) • Washington Departments of Fish and Wildlife (DFW) and Ecology (DOE) • Floodplain managers • Transportation departments or others responsible for ditch maintenance

¹¹ An “**authorized connection**” is a single sewer connection from a legally permitted unit or structure that conveys only sanitary sewer flow; any other connections are considered “unauthorized.” Unauthorized (also commonly called “illegal”) connections are typically defined as direct connections of clear water sources such as roof leaders, area drains, surface drains, window well drains, driveway drains, sump pumps, foundation drains, etc.

¹² There are three unique issues in play here: 1) clear water source connections (I/I sources located when on private property), 2) multiple structures connected to the main line via one sewer connection that may result in maintenance-related challenges, and 3). multiple service connections for one structure (potential for I/I sources grow with each connection to the mainline). The BMP A.3 Soos Creek example addresses issues #1 and #2 and the BMP A.5 Auburn example speaks to issue #3. This is also an important issue when rehabilitating main line sewers and live service connections must be reinstated.

¹³ A copy of Soos Creek Water and Sewer District’s Side Sewer Standards can be found online at: <https://www.sooscreek.com/for-developers/standard-specs-and-details>.

¹⁴ The requirement for only one sewer connection from each structure may apply to townhouses, apartments, shared side sewers, houses with accessory dwelling units, or similar, depending upon the local agency’s legal authority. Note – each local agency will need to evaluate the BMPs and adapt them to local conditions prior to implementation. The definition of authorized and unauthorized can be made jurisdiction-specific during implementation.

Table 3-1. Side Sewer I/I Prevention BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
<p>A.7 Lake line guidelines and lakefront property provisions</p>	<ul style="list-style-type: none"> Ensures water tightness in areas where shallow side sewers are installed near surface water bodies. Protects structures from mainline surcharges due to high inflow. 	<ul style="list-style-type: none"> Cross Valley Water District, Side Sewer Specifications Article VI, 6.29 and 7.04: describe provisions developed for side sewers within lakefront property. City of Bellevue, Sewer Engineering Standards S5-20 Lake Line Clean-Out: describes provisions for lake line side sewer clean-outs above and below the hydraulic gradient. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD DNRP DFW and DOE
<p>A.8 Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)</p>	<ul style="list-style-type: none"> Reduces the possibility of high inflow levels related to failures in vessel to shore connections. 	<ul style="list-style-type: none"> SPU correspondence: SPU shared an instance where a developer used U.S. Coast Guard regulations and recommendations for vessel to shore sewer connections when designing a sewer system for a new group of floating homes. A unique feature that should be considered is a flexible coupler that can accommodate a rising and lowering tide. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD DNRP DFW and DOE U.S. Coast Guard Port Authorities
<p>A.9 Side sewer design guidelines in steep areas and/or deep elevations</p>	<ul style="list-style-type: none"> Ensures that side sewers are sufficiently anchored in place, which reduces the potential for damage from ground movement. Ensures that the material used to construct side sewers at significant depth is strong enough to handle additional loads encountered 	<ul style="list-style-type: none"> SPU, <i>Design Requirements for Side Sewers DR2011-4 H.8.</i>: “Surface mounting of side sewers using ductile iron pipe with restrained joints, PE pipe, or solvent welded PVC Schedule 40 or 80 pipe and anchoring may be allowed for those situations in which trenching and backfilling are inappropriate such as in steep slope areas. Anchoring systems must be designed and stamped by a licensed professional engineer.” City of Pacific, SS-SS Deep Side Sewer Detail Drawing: a 6-inch diameter ductile iron Class 52 sewer pipe (see Figure 3-4) is required for deep side sewer installations. 	<ul style="list-style-type: none"> Property owner Contractor Local agency King County WTD Washington State Department of Natural Resources (Landslide Hazard Program)
<p>A.10 Side sewer disconnection, reconnection, and demolition requirements</p>	<ul style="list-style-type: none"> Side sewer disconnection, if performed improperly, may result in mainline damage and potential entry of I/I flows, similar to an area drain. Disconnection, reconnection, and demolition all impact the structural integrity of the sewer main or side sewer, so lateral connections must be carefully performed to prevent inflow into the system. 	<ul style="list-style-type: none"> City of Bellevue, 2017 Sewer Engineering Standards S2-04.3 Sanitary Sewer General Plan Notes and S6-15, demolition requirements: “<i>Side sewer demolitions must be performed prior to the removal of a building foundation. The side sewer for each building must be excavated and removed from the house connection to the edge of the public right-of-way, or property line. Contractors are required to cap the end of the side sewer to remain in place. Side sewer demolition must be performed in the presence of the City of Bellevue Sewer Maintenance Engineering Technician.</i>” SPU correspondence: SPU Engineering has contacted service providers to install mechanical plugs at sewer connection using robotic technology inside sewer mains. This reduces the risk of structurally damaged lateral piping causing voids/ roadway failures. 	<ul style="list-style-type: none"> Property owner Contractor Realtors Local agency King County WTD Local departments of planning and development

<input type="checkbox"/>	<p>Verify resin/catalyst and felt liner materials are consistent with the approved materials.</p>
<input type="checkbox"/>	<p>Verify appropriate seasonal resin mix is being used (i.e., summer vs. winter mixes).</p>
<input type="checkbox"/>	<p>Check production date of resin/catalyst to ensure that it is within the recommended shelf life.</p>
<input type="checkbox"/>	<p>Verify that the resin/catalyst has been stored in the proper containers and at the appropriate temperatures.</p>
<input type="checkbox"/>	<p>Verify liner material cut to length, including 1' for CIPP sample and 1' for test liner used to note resin activation.</p> <p>Note time resin preparation (mixing) is initiated.</p>
<input type="checkbox"/>	<p>Verify resin application during wet-out process, i.e., full saturation of liner material with no spotting or dry patches noted.</p> <p>Note time wet-out process completed.</p>

Figure 3-2. Example: Sanitary Lateral Lining Checklist–Liner Preparation (BMP A.3)

Source: City of Columbus, Ohio, Sanitary Lateral Lining Inspector Checklist

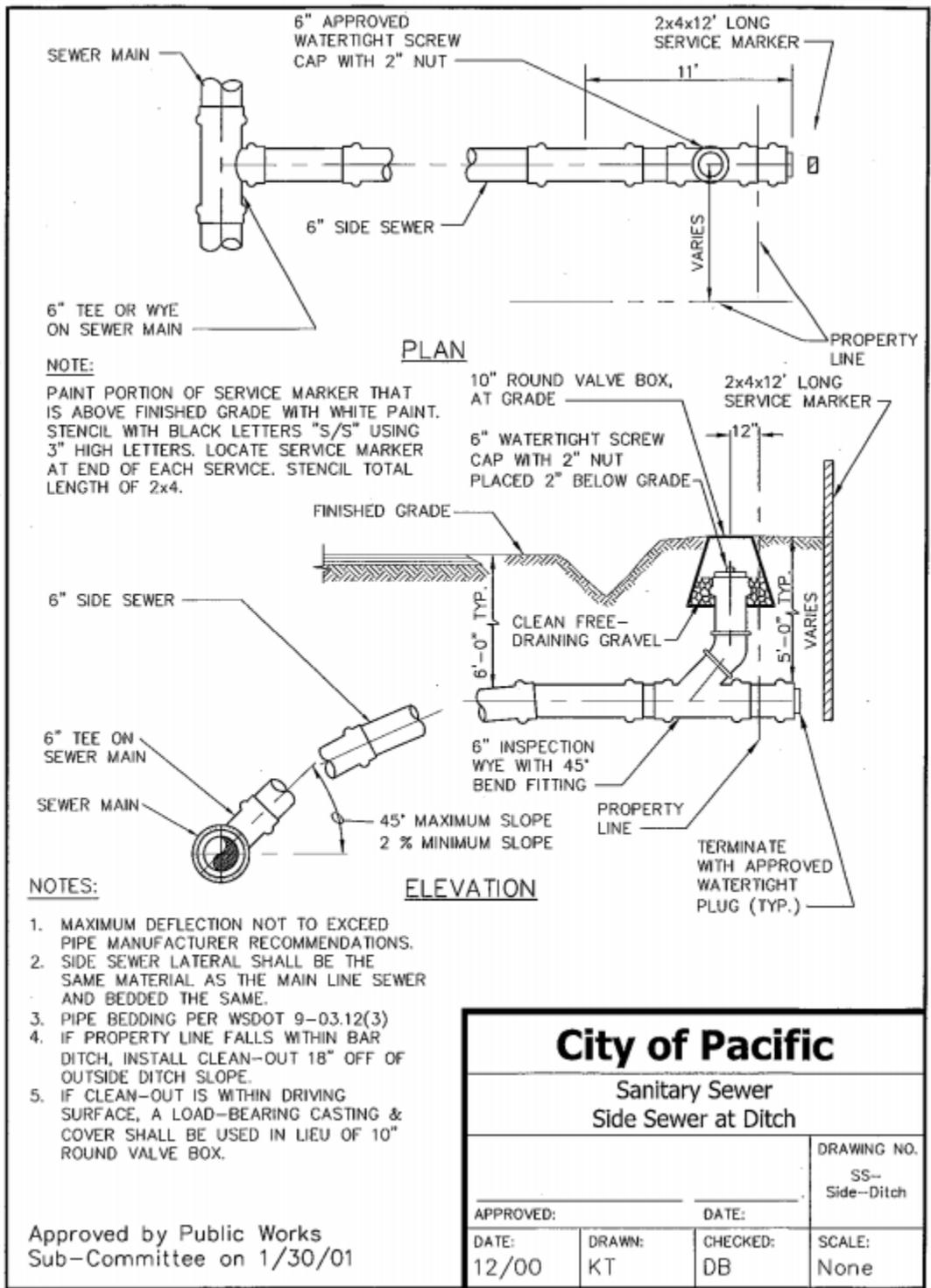


Figure 3-3. Example: Side Sewer at Ditch Detail (BMP A.6)

Source: City of Pacific, Washington Sanitary Sewer Detail Drawings

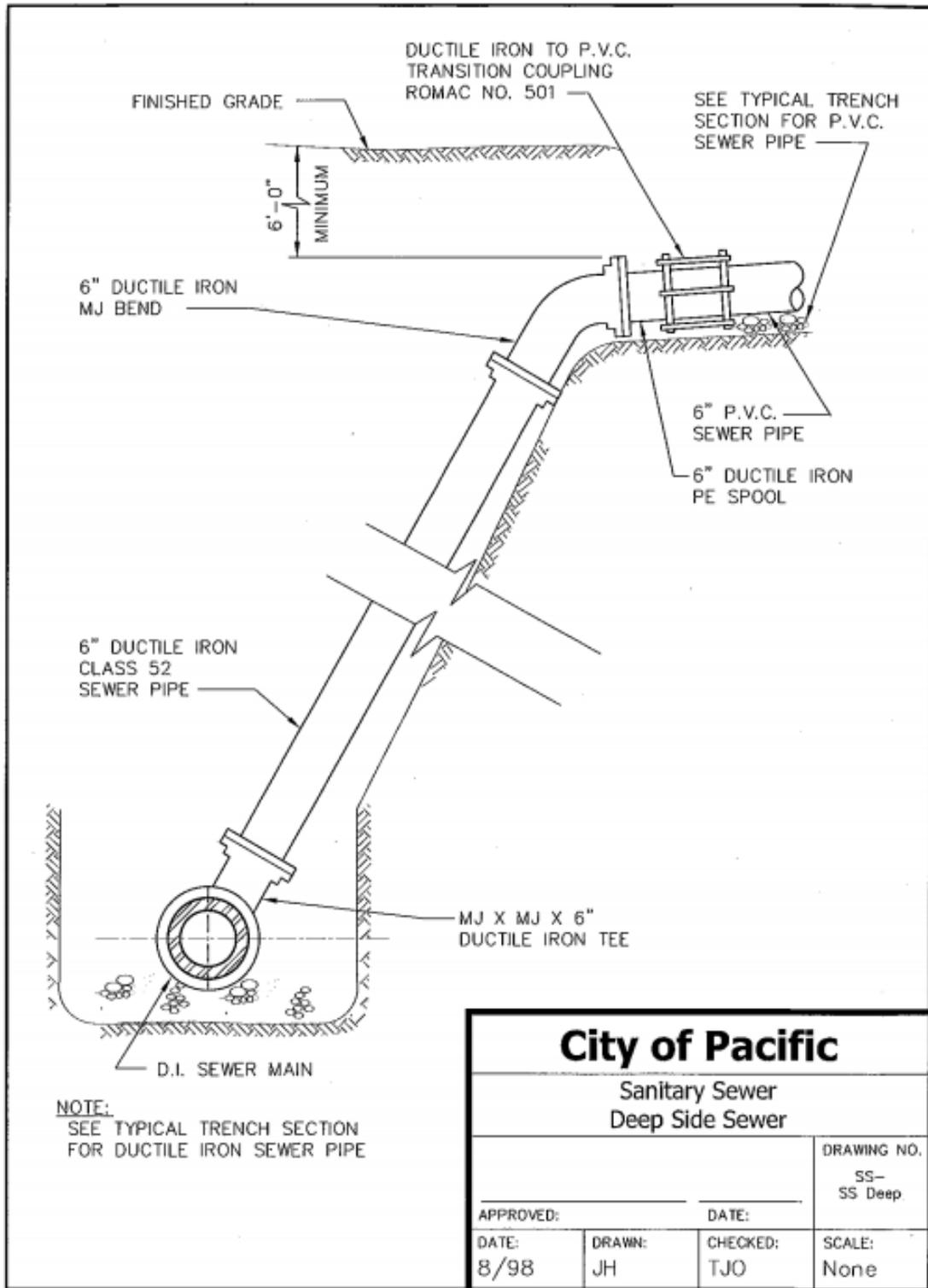


Figure 3-4. Example: Deep Side Sewer Detail (BMP A.9)

Source: City of Pacific, Washington Sanitary Sewer Detail Drawings

3.2 Proactive Side Sewer Maintenance BMPs

Property owners in King County WTD’s service area are responsible for maintaining at least a portion of or the entire length of their side sewers, as indicated previously, except for those served by the Muckleshoot Public Works Division. In this section, side sewer maintenance is defined as inspection, proper use, and repair, including replacement, of faulty side sewers.

Most local agencies do not have a regular maintenance program for side sewers. During the Phase 1 local agency interviews, only the Highlands Sewer District was found to require that private side sewers be inspected every 5 years.¹⁵ Without regular inspections included in a maintenance program, it is difficult to identify defective side sewers until a major event occurs (e.g., sanitary sewer overflow, sewage backup into a property owner’s home, or a void forming under a street or sidewalk). Faulty side sewers are often discovered when these major events are investigated. When sewer main lines are internally inspected as part of a capital improvement project, defects are noted at side sewer connections and/or during side sewer inspections conducted through closed-circuit television (CCTV) camera lateral launches.

In addition to initial construction-related problems, side sewer defects can be caused by a range of other unrelated factors such as tree root intrusions, seismic activity, and other damage-causing incidents.

Property owners have little incentive to maintain their side sewers for several reasons including limited financial assistance to cover the costs of side sewer maintenance, a lack of education regarding owner responsibilities, and, in the absence of experiencing a sewer backup, difficulty identifying direct benefits of investing in maintenance.¹⁶ Conversely, property owners who do maintain their side sewers reduce the risk of failures that may result in a backup and expensive side sewer repair or replacement.

There are many examples of local agencies that have taken measures to encourage residential property owners to maintain their side sewers. **Table 3-2**, on the following pages, summarizes these types of proactive BMPs, including their respective purpose/benefits, examples, and potential stakeholders. Whenever possible, local agency examples are provided.

¹⁵ For more information on side sewer ownership and maintenance responsibilities, see the Phase 1 Task 420 TM, page 2.

¹⁶ Gonwa, W., Simmons, T. F., and Schultz, N. U. (2004). *Development of Milwaukee MSD's Private Property Infiltration and Inflow Control Program*. Milwaukee, WI: Collection Systems 2004 - Innovative Approaches to Collection System Management.

Table 3-2. Proactive Side Sewer Maintenance BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
<p>B.1 Side sewer maintenance responsibility declaration and enforcement mechanism</p>	<ul style="list-style-type: none"> Reduces the risk of loss of service and property damage. Reduces the risk of sewer overflow from cleanout or structure that reaches a surface water body. 	<ul style="list-style-type: none"> Cross Valley Water District: clearly delineates sewer maintenance responsibilities in its Specifications for Side Sewer Construction (SSSC) Article XIV.14.01, as stated below: <i>“All costs and expense incidental to the installation, connection, maintenance and repair or replacement of the inside and outside sewers shall be borne by the owner or occupant of the premises served by the side sewer.”</i> Progressive enforcement actions and penalties for violations of the District’s side sewer requirements are defined in SSSC Article XVII – Penalties. 	<ul style="list-style-type: none"> Property owner Local agency King County WTD
<p>B.2 Tree/sewer main separation requirement</p>	<ul style="list-style-type: none"> Reduces the risk of root intrusion by requiring a minimum separation distance between trees and sewer mains; the practice also helps reduce the risk of root intrusion at the service connection. 	<ul style="list-style-type: none"> City of Redmond, Water and Wastewater Design Requirements, state: <i>“Trees shall not be located within eight (8) feet horizontally of the pipe {sewer main}”</i> (Section V.7.g). 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Local foresters
<p>B.3 Courtesy notice to property owner/occupant regarding roots observed in lateral connection</p>	<ul style="list-style-type: none"> Provides property owners with advance notice of a side sewer problem before a major event such as a blockage or backup occurs. Provides good customer relations and opportunity to share educational material. Reduces crew time expended to respond to service requests in future. 	<ul style="list-style-type: none"> County of Los Angeles Department of Public Works: provides property owners with a courtesy Notice of Sewer Lateral Root Intrusion when roots are observed during mainline CCTV inspections (see Figure 3-5). 	<ul style="list-style-type: none"> Property owner Local agency King County WTD
<p>B.4 Web content for local agencies</p>	<ul style="list-style-type: none"> Effectively educates the public about local agencies operations and programs, including identifying who is responsible for maintaining side sewers. 	<ul style="list-style-type: none"> Florida Rural Water Association: model content was developed for sewer agencies to use on their websites; this material is part of an overall Sewer Toolkit geared for smaller sewer utilities (see Figure 3-6).¹⁷ 	<ul style="list-style-type: none"> Property owner Local agency King County WTD

¹⁷ Florida Rural Water Association, Sewer Toolkit: A guide for sanitary sewer maintenance policies and procedures

Table 3-2. Proactive Side Sewer Maintenance BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
<p>B.5 Side sewer maintenance guidance documents</p>	<ul style="list-style-type: none"> Provides good customer relations and opportunity to share educational material. Ensures property owners are aware of side sewer maintenance responsibility. 	<ul style="list-style-type: none"> King County WTD “Know Your Sewer Card” (see Figure 3-7): provides important information on how to prevent sewer overflows by properly using and maintaining side sewers. 	<ul style="list-style-type: none"> Property owner Local agency King County WTD
		<ul style="list-style-type: none"> City of Tacoma, Private Contractor Inspection Information: requires real estate professionals to provide the “Before you buy or sell a property” educational flyer to buyers and sellers they are representing prior to the closing of a property transaction (see Figure 3-8). 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Realtors
		<ul style="list-style-type: none"> City of Tacoma, Private Contractor Inspection Information: tip sheet provides useful information on how to find an inspection contractor, expected costs, and how to know if repairs should be made (see Figure 3-9). 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Plumbers Side sewer contractors
		<ul style="list-style-type: none"> City of Tacoma, <i>Side Sewer Condition Assessment and Repair Recommendations Manual</i>: manual was developed to educate property owners about common problems found in side sewers, to explain when it is recommended to perform repairs, and to describe repair/replacement processes.¹⁸ 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Plumbers Side sewer contractors

¹⁸ A copy of Tacoma’s manual can be downloaded from this webpage: https://www.cityoftacoma.org/government/city_departments/environmentalservices/wastewater/wastewater_system/private_side_sewers



COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREDMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1311
Telephone: (626) 458-3100
http://dpw.lacounty.gov

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91803-1460

IN REPLY PLEASE
REFER TO FILE: SM-1

April 19, 2012

Current Property Owner
1234 Spring Creek Road
Rancho Palos Verdes, CA 90275

Dear Property Owner:

**SEWER LATERAL ROOT INTRUSION
1234 SPRING CREEK ROAD, RANCHO PALOS VERDES, CALIFORNIA 90275**

As the agency responsible for the maintenance of the sanitary sewer system in your area, the County of Los Angeles Consolidated Sewer Maintenance District (District) is providing you with this courtesy notice informing you that the sewer lateral serving the property located at 1234 Spring Creek Road, Rancho Palos Verdes, California 90275, requires maintenance per County Code 20.24.080 Maintenance of Sewer Laterals.

"All house laterals, industrial connection sewers, septic tank outlet connections to STEP system, and appurtenances thereto existing as of January 23, 1953, or thereafter constructed, shall be maintained by the owner of the property served in a safe and sanitary condition, and all devices or safeguards which are required by this Division 2 for the operation thereof shall be maintained in good working order."

Using closed-circuit television (CCTV) camera technology, the District recently televised the sanitary sewer mainline and discovered the presence of roots in your sewer lateral connection. The intrusion of the roots from your lateral may block the flow of sewage in the mainline sewer causing a sanitary sewer overflow upstream of your property.

Since the CCTV inspection, the sewer mainline has been cleaned and blockages from root growth have been removed; however, the root blockage in your sewer lateral is still present. As the property owner, you are responsible for the entire length of the sewer lateral, which includes the portion that extends beyond the property line into the public right of way. We request that you contact a qualified plumbing contractor to service your sewer lateral within 90 days to remove roots and any other obstructions that may cause a sewage backup.

Current Property Owner
April 19, 2012
Page 2

Prior to your plumbing contractor servicing your lateral, please notify the District's sewer maintenance yard in your area at (323) 233-3330 to arrange for authorization to access the downstream manhole.

During your lateral service, your plumbing contractor must protect the District's sewer mainlines from dislodged roots and other debris by utilizing catcher baskets at the manhole downstream from your lateral connection.

After your lateral has been serviced, please notify Mr. Fernando Villaluna, Sewer Maintenance Division, at (626) 300-3380 or fvillaluna@dpw.lacounty.gov.

For your reference, we have enclosed photos of your lateral connection showing the presence of the root blockage. Also enclosed are some literature on ways of minimizing sewer overflows and damage to your home.

Thank you for helping the Department of Public Works keep the public's sewers clean and in good working order.

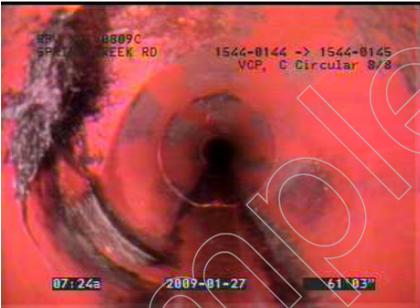
Very truly yours,

GAIL FARBBER
Director of Public Works

KEITH E. LEHTO
Assistant Deputy Director
Sewer Maintenance Division

HK:gy
Enc.

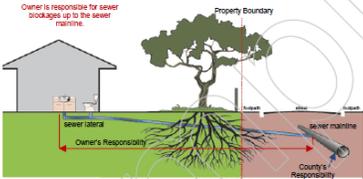
**1234 SPRING CREEK ROAD
RANCHO PALOS VERDES, CA 90275**
Roots at Lateral Connection




Minimizing Sewer Overflows and Damage to Your Home

The sewer system within the County of Los Angeles Consolidated Sewer Maintenance District (District) is comprised of a series of underground pipes. Many are publicly owned; however, the sewer laterals are entirely owned by the private property owner they serve. The laterals extend from the building to the mainline within the street (or within an easement at the rear of your home). The laterals are typically four inches in diameter while the District's mainline is typically at least eight inches in diameter. The private property owner is responsible for the entire length of the lateral, which includes the portion that may be located within the public right of way (under the asphalt and street landscaping).

SEWER LATERALS – AREAS OF RESPONSIBILITY



Sewer backups can cause tremendous damage to the interior of a home. In order to minimize these, the District provides continual maintenance services for the public sewer mainlines.

Unfortunately, sewer laterals are often not maintained by private property owners until a disaster strikes. "Out of sight, out of mind" is a typical approach to sewer lateral maintenance and operation by many. It is our hope that we can provide you various means of addressing these issues and thus minimize your risk of an overflow entering your home.

The three methods we suggest are:

1. Maintain your lateral through proper cleaning, repair, and replacement
2. Do not place improper items into the sewer or make improper connections to the sewer
 - a. Keep rainwater out of the sewer lines as it overwhelms the capacity of the sewer lines and may cause sewer spills.
 - b. Do not pour fats, oils, and grease in your drains as these products harden and stick to the inside of the sewer pipes, which build up and may eventually cause a blockage in the sewer pipe.
3. Install a backflow preventer and cleanout in your sewer lateral.

Figure 3-5. Example: Courtesy Notice of Sewer Lateral Root Intrusion (BMP B.3)

Source: County of Los Angeles Department of Public Works, California

<p style="text-align: center;">MODEL WEB CONTENT FOR CITY SANITARY SEWER DEPARTMENTS</p> <p><i>The following information is designed to be used in conjunction with the Sewer Toolkit, located in the Wastewater section of the Florida Rural Water Association website at www.frwa.net.</i></p> <p>Your city website can be an effective method of educating the public about city operations and programs. The sample website content below is designed to help you develop (or expand) web content about your city's sanitary sewer system. Keep in mind that these are only examples – the information should be customized in the way that most effectively shares your city's message and best meets your city's needs.</p> <p>If you don't find what you are looking for below, remember there are many cities in Florida that do a great job of sharing information on their web sites. Just enter www.google.com on your website browser, enter the name of a city and explore the information others have to offer about their sanitary sewer systems.</p> <p>SAMPLE ONE Contact Info City of Palm Falls Public Works Department Address Palm Falls, FL 00000 Telephone: (555) 555-5555 Fax (555) 555-5555 pubworks@ci.palm-falls.fl.us</p> <p>Sanitary Sewer Public works is responsible for inspecting and maintaining the collection system infrastructure and the sanitary lift stations and ensuring uninterrupted collection of wastewater.</p> <p>The City has _____ miles of sanitary sewer lines. Most of the lines are in the street. Some run through utility easements in grassy areas. Each year, the Public Works department cleans approximately one-third of the City's sanitary sewer lines. Lines requiring a higher level of maintenance are cleaned annually or semi-annually. This routine maintenance helps to prevent blockages and backups.</p> <p>The sanitary sewer lines are cleaned using high performance sewer cleaning equipment. A cleaning nozzle is propelled from one manhole to the next using water under high pressure. The nozzle is then pulled back to the starting manhole. As the nozzle is pulled back, water scours the inside of the sanitary sewer pipe. Any debris in the pipe is pulled back with the water. The debris is removed from the manhole with a vacuum unit. If roots are found, they are cut with a root cutter. This process is repeated on every sewer line cleaned.</p> <p>Keep Your Toilet Bowl Lid Down! Summer is the season for sewer cleaning. The City has _____ miles of sanitary sewer lines. Each year, the Public Works department cleans approximately one-third of the</p>	<p>City's sanitary sewer lines. The sanitary sewer lines are cleaned using high performance sewer cleaning equipment. A cleaning nozzle is propelled from one manhole to the next using water under high pressure. The nozzle is then pulled back to the starting manhole. As the nozzle is pulled back, water scours the inside of the sanitary sewer pipe. Any debris in the pipe is pulled back with the water. The debris is removed from the manhole with a vacuum unit. If roots are found, they are cut with a root cutter. This process is repeated on every sewer line cleaned.</p> <p>During cleaning of sanitary sewer lines, air occasionally vents into a home through the sanitary sewer service line and ventilation system. When this happens water in the toilet bowl can bubble or surge or, in rare cases, splash out of the bowl. The common causes of air venting into homes during sanitary sewer cleaning are: air movement from normal cleaning operations, the use of higher pressure necessary when cleaning sanitary sewer lines that have a steep slope, sewer lines running close to the building, a plugged roof vent, and the size and complexity of the home's waste and ventilation system. So, to minimize water splashing out of your toilet bowl, make it a habit to keep the lid down.</p> <p>Sewer Backups If you have a sewer backup and do not know where the blockage is, you should contact the City before contacting a drain cleaning company. You may be able to avoid an unnecessary charge if the problem is in the City's sewer line rather than in your property's service line. A Public Works employee will determine if the problem is in the City's line or in your property's service line. 555-555-5555 (Public Works) Monday – Friday 8:00 a.m. to 4:30 p.m.</p> <p>555-555-5550 After hours, weekends and holidays.</p> <p>The property owner is responsible for clearing any blockage in the service line between the home and the City sanitary sewer main. This includes debris and tree roots. The property owner is also responsible for cleaning and repairing any damage done to the property by the backup.</p> <p>The City is not automatically liable for blockages in the City's sanitary sewer system. The City is only liable for those damages if the backup was caused by the City's negligence.</p> <p>Most homeowner insurance policies exclude damage resulting from sewer backups. Many insurance providers do have insurance riders that can be purchased to insure loss due to sewer backups.</p> <p>Sanitary sewer line blockages are typically caused by roots, grease, and improper disposal of items. Tree roots can enter the sanitary sewer system at joints and cracks in the sewer service lines and mains. Grease can solidify in the sewer lines and restrict other waste from flowing through. The lines can be blocked by items like disposable diapers,</p>
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Figure 3-6. Example: Website Content (BMP B.4)

Source: Florida Rural Water Association

Keep yourself safe during a flooding event or sewage overflow

1. Evacuate if necessary – call 911 in emergencies
2. Stay out of flooded areas and avoid contact with any type of flood water
3. Safely turn off electricity to affected area
4. Stop using plumbing that drains to the sewer system
5. Prevent the spread of contaminants and odors: turn off furnaces, air conditioners, and close vents
6. If you have been exposed to floodwater or wastewater, change clothing and shoes and wash affected skin surfaces.
7. Contact your doctor at the first sign of illness or infection
8. Hire a professional service to clean up damaged areas of your home. You can find services listed in phone directories under “Water Damage Restoration”. Use caution if you choose to clean up the spill; wear boots, rubber gloves and properly dispose of contaminated material.



Learn more about responding to sewer spills at kingcounty.gov. Search “sewer spills.” Floods are a common emergency in our area. Learn how to prepare and respond at www.govlink.org/storm/

Alternative formats available
Call 206-263-6028 or 711 (TTY)

Printed on recycled stock. Please recycle.
1104_2088_SewerOverflowCard_rev1.indd sk, md 11/12/08
Produced by: King County DNRP, WLRD, GIS, Visual Comm. & Web Unit

Help prevent overflows

Protect sewer pipes, the treatment system and the Puget Sound



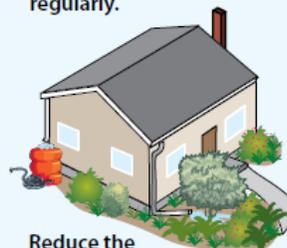
Inspect your side sewers and septic systems regularly.



Prevent tree roots from breaking sewer pipes.



Dispose of garbage and hair in the trash can, not the toilets.



Reduce the amount of rainwater entering the sewer system. Choose rain gardens, rain barrels, pervious pavement and green roofs.



Dispose of grease in the trash can or recycle it.



Prevent harmful chemicals from entering the wastewater system. Use simple, biodegradable household and personal products.



Prevent medicines from entering the wastewater system.

Return medicines to a pharmacy or dispose in the trash can.



Store hazardous materials in spill proof containers, dispose at hazardous waste facilities.



Keep storm drains clear

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

Figure 3-7. Example: Side Sewer Use and Maintenance Educational Material (BMP B.5)

Source: King County Department of Natural Resources and Parks Water Treatment Division

Before you buy or sell a property ... Get to know what's underground



Side sewer repairs or replacement can be expensive – averaging \$5,000 to \$15,000 – and can often come as a surprise to property owners when sewage starts coming out of sinks, toilets, bathtubs and other building drains. Property owners should plan for side sewer maintenance and repair just as they do for replacement of roofs, furnaces and other major working systems of the building or residence.

Side sewers are the pipe that connects a building's plumbing to the City-maintained sanitary sewer main. The sewer main carries wastewater from your side sewer to the City's treatment facilities.

To protect the value of your investment and avoid the surprise of costly repairs, the City of Tacoma recommends inspecting a building's side sewer if it is more than 25 years old and/or does not have plastic PVC pipe running from the building to the City sewer main.

Why does this matter to me?

- In Tacoma, property owners are responsible for repair and maintenance of their private side sewer.
- Buildings constructed prior to 1980 are likely to have side sewers made of clay or concrete pipes. These can crack, shift out of place, and/or be subject to intrusion by roots, causing leakage or blockage in the pipe.
- When your side sewer is blocked, sewage from your home can back-up in your pipes and surface through your sinks, toilets, bathtubs and other building drains, causing a health issue as well as a potentially expensive mess. Side sewer blockages are typically caused by failures in the pipe. Potential failures can be easily detected by a simple inspection before they cause a serious problem.
- Rainwater and groundwater that gets into the sanitary sewer system from leaky side sewers, and roof and foundation drains can cause overflows of untreated or partially treated wastewater (sewage) into streets, homes, businesses and local waterways. This rainwater and groundwater should be directed to the local surface water system.
- Just as groundwater can leak into a side sewer, sewage can leak out of a side sewer and become a public health hazard.
- If you know the condition of your property's side sewer, you can better prepare for repair or replacement instead of finding out about a problem when the sewer backs up.

How do I find out the condition and age of a side sewer? How do I know what it's made of? How do I know if there are sources of rainwater or groundwater getting into the side sewer?

1. Ask the current property owner if they have had any issues with slow-draining plumbing fixtures, sewage backups, or have performed any inspections or repairs on the side sewer.
2. The City has permit records for some, but not all, of the properties in Tacoma. To research City of Tacoma permit records, visit www.govme.org and click on Permit / Site History or call Environmental Services at (253) 591-5588.
3. Hire a side sewer inspection contractor or a drain cleaner to perform a video inspection of the side sewer and to inspect the building for sump pumps, drains, or other sources that may be allowing rainwater or groundwater to enter the side sewer.



Public Works
Environmental Services
Wastewater Management
www.cityoftacoma.org/sidesewer
(253) 591-5588

Figure 3-8. Example: Prior to the Closing of a Property Transaction Educational Flyer (BMP B.5)

Source: Tacoma Public Works Environmental Services Wastewater Management, Washington

Private Contractor Inspection Information

HOW DO I FIND SOMEONE TO INSPECT MY SIDE SEWER?

To find an inspection company, search the Internet or local yellow pages for “drain cleaners” or “sewer contractors” and call to inquire about video inspection services. Homeowners should ask for a Television Inspection that meets the City of Tacoma’s 2016 Side Sewer and Sanitary Sewer Availability Manual **section 3.3** available on Tacomapermits.org under **Resource Library - SANITARY SEWER & STORMWATER LIBRARY**.

HOW MUCH CAN I EXPECT AN INSPECTION TO COST?

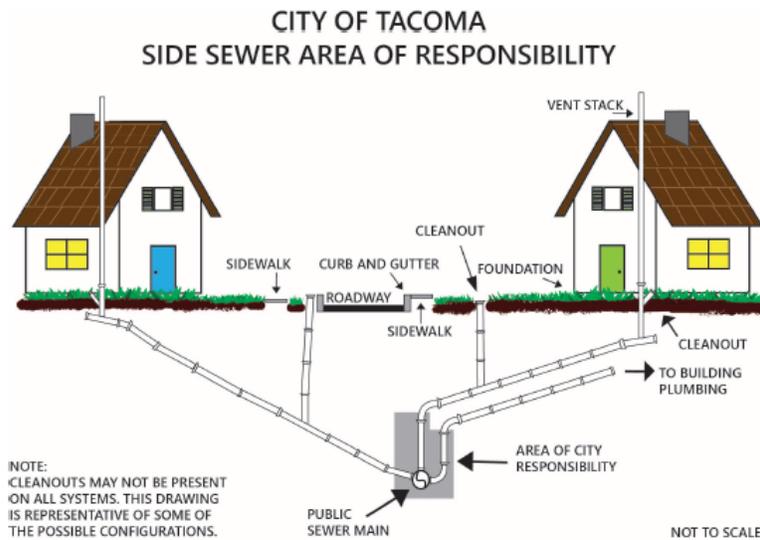
The cost of an inspection can vary depending on the length of the side sewer and how easy or difficult it is to access the side sewer. An average side sewer inspection costs \$200 to \$400. Costs may vary greatly from one company to the next. The Better Business Bureau is also a good resource for finding reputable companies: 253-830-2924. Since companies offer a wide range of prices, it’s a good idea to get at least three written bids before choosing a company.

WHAT SHOULD I EXPECT FROM AN INSPECTION?

An inspector will insert a video camera into the side sewer through a cleanout either outside or inside the building. If no cleanout is available, the inspector may need to install a cleanout or remove and replace a toilet to access wastewater plumbing. In some cases, plumbing vents on a roof can be used for video camera access. If you would like to receive a video recording of the inspection, ask about the inspector’s equipment capability prior to selecting a company.

HOW WILL I KNOW IF REPAIRS SHOULD BE MADE?

The inspector should be able to point out defects to you on the video as they are performing the inspection and provide you with recommendations on whether repairs or replacements may be needed. Although many side sewer inspection companies may also offer repair services and may provide you a quote, it is also a good idea to get a few more written bids before choosing a repair company. If you’re unsure about whether the repairs being recommended are necessary, you may also want to share the video inspection with another inspection company to receive a second opinion before agreeing to costly repairs. To read about the City of Tacoma’s recommendations regarding specific side sewer problems and repairs please refer to the **Side Sewer Condition Assessment & Repair Manual**. For a copy, go to <http://www.cityoftacoma.org/sidesewer> or call Site Development at 253-591-5760.



Note: This Tip Sheet does not substitute for codes and regulations. The applicant is responsible for compliance with all codes and regulations, whether or not described in this document.

More information: City of Tacoma, Planning and Development Services | www.tacomapermits.org (253) 591-5030

To request this information in an alternative format or a reasonable accommodation, please call 253-591-5030 (voice).

TTY or STS users please dial 711 to connect to Washington Relay Services.

S-201, 1/2016

Figure 3-9. Example: Side Sewer Responsibilities Educational Flyer (BMP B.5)

Source: Tacoma Public Works Environmental Services Wastewater Management, Washington

3.3 Other Private Property I/I Source Identification and Mitigation BMPs

There are additional sources of I/I that may be located on private property but that are not related to the structural condition of the side sewer, including connected downspouts, foundation drains/sump pumps, and missing cleanout caps (as shown in Figure 3-1). The BMPs described in this section involve identifying and mitigating these sources by disconnecting improper connections and redirecting stormwater away from the sewer system.

In many cases, if I/I sources are not properly disconnected and redirected, stormwater and groundwater will find its way into the sewer system through another entry point. For example, disconnected downspouts that discharge directly to the ground can cause stormwater to flood a foundation drain; if the foundation drain is connected directly (or via a sump pump) to the side sewer, stormwater will still enter the sewer system.

It is important to note that before these types of I/I sources are disconnected/redirected on private property, an adequate stormwater system must be in place to prevent redirecting drainage inappropriately to another property or causing ponding/flooding that may result in structural damage.

Table 3-3, on the following page, summarizes BMPs that involve identifying and/or mitigating non-structural side sewer-related private property I/I sources, including their respective purpose/benefits, examples, and potential stakeholders. Whenever possible, local agency examples are provided.

Table 3-3. Other Private Property I/I Source Identification and Mitigation BMPs

BMP	Purpose/Benefit	Local or National Example	Potential Stakeholders
C.1 Side Sewer CCTV Inspection Specification	<ul style="list-style-type: none"> Nationally recognized guidance document that has been refined over time to reflect advances in technology and lessons learned. Successfully used by utilities across the country to standardize CCTV inspection services. These inspection and testing methods are useful in identifying, locating, and quantifying sources of I/I on private property during post-construction verification and at any time in the future during periodic inspections. 	<ul style="list-style-type: none"> NASSCO specification guidelines for lateral inspection and dye testing/tracing.¹⁹ 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Plumbers Side sewer contractors
C.2 Rainfall Simulation/Dye Testing Specification			
C.3 Unauthorized private property I/I source disconnection public education materials	<ul style="list-style-type: none"> Provides good customer service and educational opportunity regarding unauthorized connections and proper sewer maintenance responsibilities. Disconnecting/redirecting downspouts and sump pumps reduce I/I entering sanitary sewers. Reduces peak flows in localized area. 	<ul style="list-style-type: none"> City of Kirkland Downspout Disconnection Program: a downspout disconnection fact sheet and do-it-yourself instruction guide are available on the City's program webpage.²⁰ 	<ul style="list-style-type: none"> Property owner Local agency King County WTD Plumbers Side sewer contractors
		<ul style="list-style-type: none"> Delaware County, Penn., Regional Water Quality Control Authority, <i>Disconnecting & Redirecting Your Sump Pump & Downspouts</i> brochure: Provides information on the County's rules and regulations, impact of inflow on the sewer system, and follow up actions that can be taken by property owners and residents (see Figure 3-10). 	
C.4 Cleanout cap replacement program	<ul style="list-style-type: none"> Address a commonly occurring source of inflow by replacing missing cleanout caps. 	<ul style="list-style-type: none"> Montgomery, Ala., Water Works & Sanitary Sewer Board, Cleanout Cap Replacement Program: clean out caps (PVC and brass) are kept on all sewer maintenance vehicles and whenever a missing cleanout cap is observed, it is replaced. 	<ul style="list-style-type: none"> Property owner Local agency King County WTD

¹⁹ https://www.nassco.org/resources/manufacture-specifications?field_specification_topics_tid=251

²⁰ http://www.kirklandwa.gov/depart/Public_Works/Utilities/Storm_Surface_Water/YardSmart/Types_of_Projects/Downspout_Disconnection.htm

Function of Sump Pumps & Downspouts

Rainwater can enter the basement through many sources. The job of a sump pump is to divert the water from inside your basement to a location outside of the house. A sump pump is usually installed in a sump pit which stores the water. When this water reaches a certain level, it triggers the sump pump which pumps the water back outside, away from the house. A downspout's purpose is to direct water from the roof gutters away from the house.

The Problem of Inflow

Inflow is caused by improperly connected foundation (footing) drains, sump pumps, and downspouts. Instead of directing the clear rain water outside and away from the house, it directs the water into the sanitary sewer system. Inflow is a problem because it creates an extra water burden for the sanitary sewer system, and when this system is overloaded, sewage can back up into our streets, buildings, and your home. It also means that our utility bills are higher because we are collectively paying for the unnecessary treatment of clean water!

Rules and Regulations

Inflow is a problem for all of Delaware County's communities and sanitary sewer systems. All municipalities have adopted ordinances which make it illegal to have improper connections to the sanitary sewer. Fees and other enforcement measures can be used to achieve compliance. To avoid fines make sure your sump pumps and downspouts discharge properly.

Homeowners have an impact on preventing or causing the problem of inflow. Your community and neighbors are relying on you to take responsibility for making sure that your connections are not contributing to the problem.

For more information regarding what is being done about inflow in your community, contact your local municipality or sewer author-



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 100 EAST FIFTH STREET
 CHESTER, PA 19013
 WWW.DELCORA.ORG
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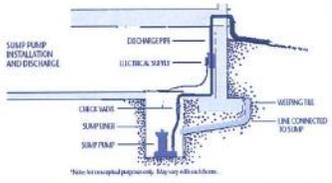
Disconnecting & Redirecting Your Sump Pump & Downspouts



In wet weather it only takes a few improperly connected sump pumps to cause a sanitary sewer backup into basements, streets and waterways.

How Do I Know If My Sump Pump is Improperly Connected?

Your sump pump is improperly connected to the sanitary sewer if it is connected to the drain or sink in your basement. Unless you are sure your basement drain is not connected to the sanitary sewer, your sump pump is probably improperly connected.



Note: In some jurisdictions, this may not be allowed.

Proper sump pump discharge connections are to the outside of the house only!

Disconnecting Your Sump Pump

If your sump pump discharges to the sanitary system in any way, the discharge must be re-directed out of the sanitary sewer system. The change could be as simple as directing the discharge outside the house through a hose. If you aren't familiar with the work, contact a plumbing professional, your local municipality, or your sewer authority for more information.

Each household or business that redirects their stormwater out of the sanitary sewer helps solve the problem of sewage backing up into basements, streets, and waterways.

Disconnecting Your Downspout

Disconnecting your downspout from the sanitary sewer is easy to do yourself.

1. Cut the downspout, leaving enough space to insert the elbow.
2. Tightly cap the end of the pipe sticking out of the ground that leads to the sanitary sewer.
3. Attach an elbow to the end of the downspout and use an appropriate extension to direct the water away from your home.



Where Should I Direct the Flow of My Disconnected Sump Pump and Downspout?

Water should be discharged away from your house or it may seep back into your basement. It should flow to an area where it can seep into the ground or be stored for later use. Direct flow to:






Never direct stormwater into a sanitary sewer or onto a neighboring property!

Figure 3-10. Example: Sump Pump and Downspout Disconnection Education Material

Source: Delaware County Regional Water Control Authority, Pennsylvania

4.0 BMP Key Consideration and Refinement

This section describes the process undertaken to refine the list of BMPs to a recommended list, including consideration of potential issues that could impact BMP applicability and effectiveness.

4.1 Key Considerations and Initial Recommendations

The overall objectives of Task 6000 (listed in Section 2.3 of this TM) were strongly considered during the evaluation of the BMPs presented in Section 3. While it is understood that each local agency has its own definition of side sewer responsibilities and legal authorities, it is also important to note that not all local agencies currently experience high rates of I/I in their collection systems. Therefore, given that no broad regulatory requirements are in place to motivate change, the effort level required for some local agencies to adopt and implement certain BMPs may not be time- or cost-efficient at this time. Each BMP was evaluated by the project team with the following key considerations in mind:

- Applicability to local agencies/districts—Is the BMP applicable to all King County WTD component agencies? Is the BMP applicable to both cities and sewer districts?
- Assumed ability to be implemented by all (or majority of) local agencies—Can the BMP be implemented by all King County component agencies?
- High potential for I/I reduction (or prevention)—Does the BMP have a high assumed potential for I/I reduction relative to the degree of effort required for implementation?²¹
- Assumed ease/difficulty of implementation—Is the BMP assumed to be easy, medium, or difficult to implement?

Several I/I prevention BMPs are applicable to only certain local agencies and districts (e.g., A.6, A.7, A.8, A.9, and B.2). While these BMPs may not apply to the environmental and other conditions in all local agencies and districts, they could be valuable components of long-term I/I mitigation for the relevant agencies.

Some of the BMPs are effective measures to take to prevent, reduce, or mitigate the impacts of I/I that apply to local agencies and districts that are experiencing high rates of I/I (either now or in the future). These include BMPs B.1, B.4, C.1, C.2, and C.4. Also, some BMPs related to I/I prevention, such as common side sewer specifications and inspection/testing requirements, may be better defined if a private side sewer inspection program is developed in the future. It may be premature to invest the significant amount of time and resources required for consensus of the local agencies regarding the specifics of these preventive measures. These include BMPs A.1, A.2, A.3, A.4, and A.10. These BMPs may be more appropriate to include in later efforts to expand King County's Side Sewer BMP Toolkit.

Tables 4-1 and **4-2**, on the pages below, present a summary of all BMPs evaluated based on relevant issues discussed above. These key considerations supported discussions and did not make absolute choices between the BMPs.

²¹ Although there are uncertainties regarding how to measure/quantify the possible I/I prevention or reduction potential resulting from each side sewer BMP, it is noted that each of the proposed side sewer BMPs have some degree of potential I/I reduction and/or prevention, and that some BMPs have more potential than others.

Table 4-1. Matrix of BMPs by Key Considerations for Side Sewer I/I Prevention

BMP Type	Side Sewer I/I Prevention									
	A.1	A.2	A.3	A.4	A.5	A.6	A.7	A.8	A.9	A.10
BMP Number, Category, and Summary Description	Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers	New side sewer construction inspection and product-specific inspection requirements	Repair/rehab. and replacement inspection requirements	Side sewer contractor prequalification	Unauthorized connection prohibition ^b	Side sewer design guidelines that address flood-prone areas	Lake line guidelines and lakefront property provisions	Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)	Side sewer design guidelines in steep areas	Side sewer disconnection, reconnection, and demolition requirements
Able to be implemented by majority of local agencies	◆	◆	◆		◆					◆
Applicable to only certain local agencies				◆		◆	◆	◆	◆	
Highest potential for I/I reduction (or prevention)	◆	◆	◆		◆	◆	◆	◆		◆
Able to be implemented by majority of local agencies without extreme challenges	◆	◆	◆							◆
Effective for local agencies experiencing high rates of I/I	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Applicable to possible private side sewer inspection program ^a	◆	◆	◆	◆						◆

a. Indicates applicability to future development of possible private side sewer inspection program.

b. Indicates this BMP was initially recommended to the I/I Task Force for consideration.

Table 4-2. Matrix of BMPs by Key Considerations for Proactive Side Sewer Maintenance and Private Property I/I Source ID and Mitigation

BMP Type	Proactive Side Sewer Maintenance					Other Private Property I/I Source ID and Mitigation			
	B.1	B.2	B.3	B.4	B.5	C.1	C.2	C.3	C.4
BMP Number, Category, and Summary Description	Side sewer maintenance responsibility declaration and enforcement mechanism	Tree/sewer main separation requirement	Courtesy notice to property owner/occupant regarding roots observed in lateral connection ^b	Web content for local agencies	Side sewer maintenance guidance documents ^b	Side Sewer CCTV Inspection Spec.	Rainfall Simulation/ Dye Testing Spec.	Unauthorized private property I/I source disconnection public education materials ^b	Cleanout cap replacement program
Able to be implemented by majority of local agencies	◆		◆	◆	◆			◆	◆
Applicable to only certain local agencies		◆							
Highest potential for I/I reduction (or prevention)	◆		◆			◆	◆	◆	◆
Able to be Implemented by majority of local agencies without extreme challenges			◆	◆	◆	◆	◆	◆	◆
Effective for local agencies experiencing high rates of I/I	◆		◆	◆	◆	◆	◆	◆	◆
Applicable to Regional Side Sewer Implementation Program ^a									

a. Indicates applicability to future development of possible private side sewer inspection program.

b. Indicates this BMP was initially recommended to the I/I Task Force for consideration.

As a result of this evaluation, the following BMPs were included in the initial technical recommendations forwarded to the I/I Task Force for consideration:

- A.5 Unauthorized connection prohibition
- B.3 Courtesy notice to property owner/occupant regarding roots in lateral connection
- B.5 Side sewer maintenance guideline documents
- C.3 Unauthorized private property I/I source disconnection public education materials

To support discussion among the I/I Task Force, details were provided regarding the various BMP components that could be included in the Side Sewer BMP Toolkit (see Section 5.0 for more information).

4.2 I/I Task Force Survey Results

King County and the Consultant team presented the initial recommendations for side sewer BMPs to the I/I Task Force during a meeting held July 20, 2020. Members of the I/I Task Force were asked to complete a web-based survey regarding the applicability and feasibility of the BMPs, as well as the preferences of their respective sewer districts. The survey was intended to start the discussion on side sewer BMPs and not to necessarily choose the BMPs to recommend. The survey results were shared and discussed. A copy of the survey results is included in **Appendix B**.

The following side sewer BMPs were selected by all survey respondents when asked which BMPs they would propose to include in a Side Sewer BMP Toolkit:

- A.1 Watertight side sewer specifications, standard drawings, and proper methods for new and repaired side sewers
- A.2 New side sewer construction inspection and product-specific inspection requirements
- A.3 Repair, rehabilitation, and replacement inspection requirements
- A.5 Unauthorized connection prohibition

“Which BMPs would you propose to include in a Side Sewer BMP Toolkit as best meeting the goals and objectives of the Regional BMP development?”

A majority of survey respondents (75%) identified the following BMPs as those to include in a Side Sewer BMP Toolkit to best meet goals and objectives:

- A.6 Side sewer design guidelines that address flood-prone areas
- A.10 Side sewer disconnection, reconnection, and demolition requirements
- B.2 Tree and sewer main separation requirement

Only one BMP was not identified as not best meeting goals and objectives²² and two BMPs were identified as being difficult or extremely challenging to implement. These BMPs were removed from further consideration:

- A.4 Side sewer contractor prequalification (implementation challenges)
- C.2 Rainfall simulation and dye testing specifications (would only be applied by local agencies with I/I programs and the majority of local agencies do not have active I/I programs)
- C.4 Cleanout cap replacement program (implementation challenges)

²² Note: BMP C.4, Cleanout cap replacement program, was inadvertently omitted from this survey.

Results of the survey were presented and discussed during the next I/I Task Force meeting held on October 19, 2020, along with next steps to make a recommendation on BMPs. This was prior to a draft technical memo being available. Task Force feedback included:

- Some I/I Task Force members indicated that more details are needed regarding the Consultant's recommended BMPs before they would be willing to support the recommendations.
- Some requested information, such as the projected I/I reduction (e.g., percentage, volume, etc.) associated with a specific BMP.
- Desire to see costs and benefits associated with the BMPs. The cost/benefit of implementation is not available because the contract scope of work assumed a regional cost benefit evaluation would not be undertaken for BMP development. It is assumed that costs to voluntarily participate in implementing recommended BMPs will be considered by each local agency as part of the next steps and prior to implementation.
- Other issues raised, such as the specific wording used in example legal authority language or guidance documents, could not be addressed without further developing details of the proposed BMPs. Additionally, it is anticipated that local agencies and districts will modify the example language or guidance documents as needed to reflect local conditions prior to adoption and implementation.
- Recognized that all of the BMPs should be used to reduce I/I and that not including them in the toolkit now did not signify the BMPs were not useful. In the future additional BMPs could be added to the Side Sewer BMP Toolkit, e.g., those related to a private side sewer inspection program and/or those related to lake line guidelines (BMP A.7), being developed by another group of local agencies outside of this project.

Task Force input received both through the survey and discussions held during Task Force meetings were considered and reflected in producing this Task 6000 TM.

5.0 Side Sewer BMP Recommendations

This section describes recommendations for side sewer BMPs based on the outcome of continued discussions with the I/I Task Force and MWPAAC. When coupled with Appendix A to this TM, this section, is considered to be the Side Sewer BMP Toolkit.

One of the objectives of this effort was to identify BMPs that are the most effective in preventing or mitigating I/I. Information is not currently available to assess that criteria across all BMPs evaluated. The amount of potential I/I removed per BMP is something that will never be known as it depends on a number of factors from the level of local agency and private owners/occupants participation to the level of side sewer integrity, deterioration, and subsequent I/I flows entering the sewer system. However, the four recommended BMPs appear to be the most easily implementable with the least immediate impact on component agency resources, while still providing a promising value to mitigate excessive I/I.

The adoption of these BMPs by the component agencies will be a good first step in building regional collaborative efforts to address the long-term impacts of I/I. Once these BMPs are established, additional BMPs can be considered in the future.

The four BMPs recommended by MWPAAC and supported by King County for inclusion in the Side Sewer BMP Toolkit are:

- Unauthorized connection prohibition
- Courtesy notice to property owner/occupant regarding roots in lateral connection
- Side sewer maintenance guideline documents
- Unauthorized private property I/I source disconnection public education materials

A copy of the MWPAAC recommendation letter to WTD is provided in Appendix C. A summary of each side sewer BMP is presented in the subsections below.

BMP: Unauthorized Connection Prohibition

This BMP provides example language for adoption of legal authority, which clearly states that unauthorized sewer connections must be removed and provides appropriate enforcement mechanisms to enforce proper disconnection. Additionally, the example language includes provisions to ensure only one side sewer connection from each structure is made to the main sewer, and that the side sewer is directly connected to the appropriate draining fixtures within the structure.

Though most local agencies and districts have language in their legal authorities regarding unauthorized connections, in many instances this language could be strengthened to state the details more clearly. The legal authorities should clearly state that the local agency or district has the authority to perform tests on private property to identify unauthorized connections and to establish the following: what happens when unauthorized connections are found (who is responsible for disconnecting and redirecting clear water flow to an appropriate stormwater conveyance system), what timeframes are allowable to complete the work, and what penalties can be incurred if compliance is not met.

When adopting this BMP, each local agency should review its legal authorities, including its current unauthorized connection prohibition and available enforcement response mechanism, to identify areas that the language could be strengthened. This may require the involvement of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.).

Before implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in to prevent unintended consequences, and foster continued long-term success. A review of the strengthened ordinance's impact on agency resources should be conducted. The local agency can then identify and resolve resource barriers or challenges, which may include:

- Staffing requirements, roles, and responsibilities (note: this may include resources from outside agencies if private property inspections are performed by others)
- Customer education and communication plan, including notice of changes in legal authority, enforcement response plan, and resources available for proper unauthorized connection disconnection/ redirection compliance procedures
- Budget and funding impacts
- An information management system to track appropriate implementation-related data (e.g., education and communication plan) with data management tools such as Microsoft Excel™ or Access™
- Standard/acceptable means and methods to address unauthorized connections (including disconnection/ redirection practices)
- Performance criteria to measure effectiveness (including an adaptive management approach to modify the prohibition if certain elements are not as effective as intended)

A written standard operating procedure (SOP) or documented work flow should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation. As previously indicated in **Table 3-1**, there are several local examples of strong and enforceable prohibitions on unauthorized connections from which example language may be developed. In addition Appendix A, Side Sewer Best Management Practices Toolkit, provides information on each recommended BMP.

There is no suggested performance criterion for this BMP, but local agencies are encouraged to identify criteria that reflect any outcomes anticipated as a result of BMP implementation. For example, if a local agency is undertaking I/I reduction efforts that address private property I/I sources, it may want to track various elements associated with unauthorized connection identification, customer notification, and compliance enforcement processes.

BMP: Courtesy Notice to Property Owner/Occupant Regarding Roots Observed in Lateral Connections

This BMP provides an example notice for local agencies' private property owner education and outreach. Roots in laterals and service connections (side sewer connections) are commonly observed during routine sewer main CCTV inspections²³ performed by many sewer utilities and their CCTV inspection contractors. By notifying property owner/resident of this finding, the property owner can also be made aware of their responsibility for maintaining the side sewer, including the need to hire a plumber to clear roots. In all but one local agency/district service areas, property owners are responsible for maintenance of their side sewer on their property. In some local agency/district service areas, including SPU's, the property owner is also responsible for maintaining the portion within the right-of-way (see **Figure 5-1**). Many local agencies and districts take responsibility for performing repairs on service connections and side sewers within rights-of-way.

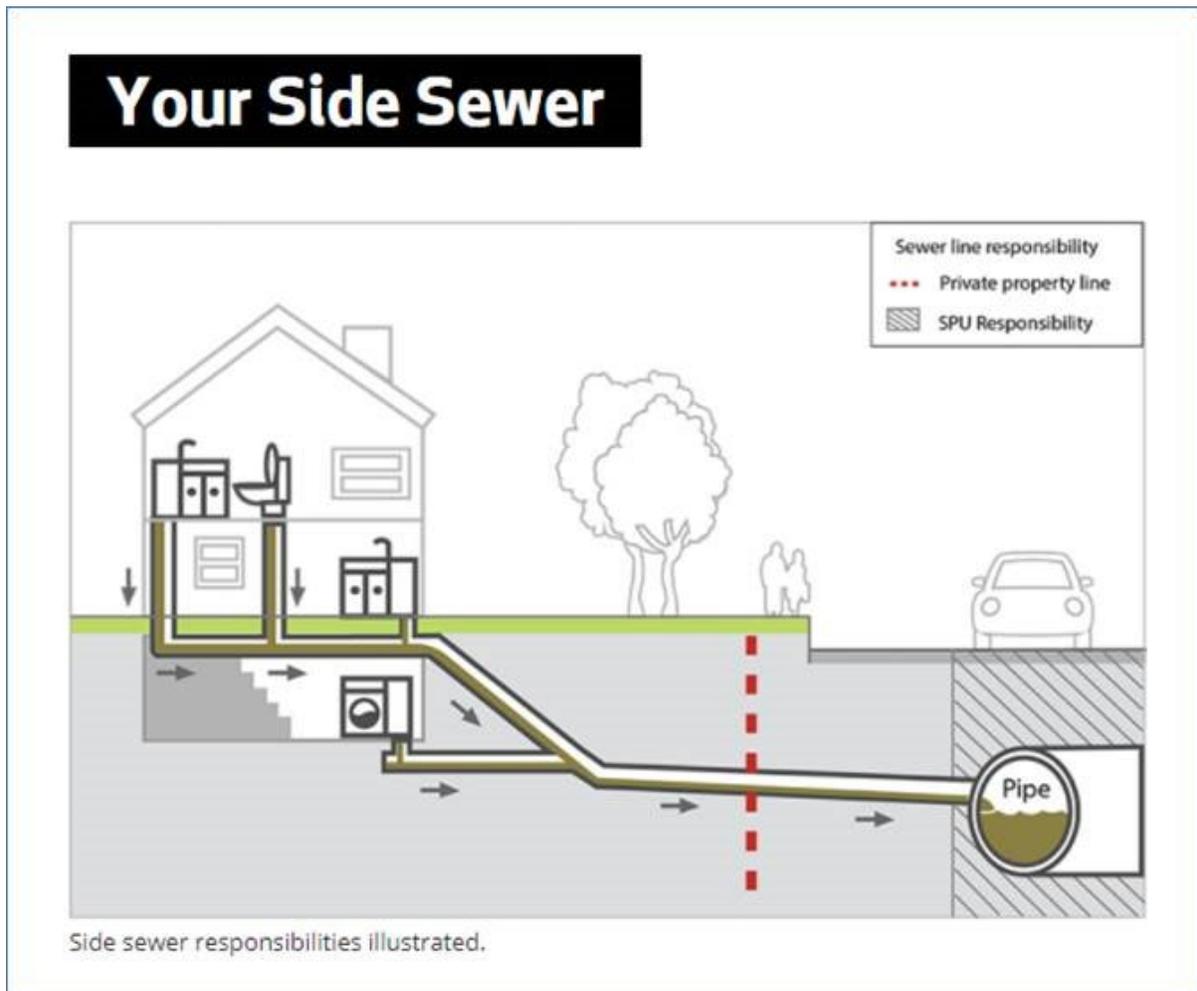


Figure 5-1. Example: SPU Side Sewer Responsibilities

Source: SPU, <http://www.seattle.gov/utilities/your-services/sewer-and-drainage/side-sewers>

²³ Note: this observation is commonly made during routine sewer main CCTV inspections using a typical pan and tilt camera; a side sewer (or lateral) launch from the mainline is not advised when visible roots are observed in a service connection as the lateral camera may become entangled in the root mass

When proactively cleaning the side sewer, a plumber will notify the property owner/occupant of a defect and address it immediately to prevent the likelihood of a backup (or SSO from cleanout) and to reduce infiltration into the sewer system. Additionally, if the side sewer defect is located within the right-of-way, the appropriate party (utility or property owner) can address the defect before a backup or SSO occurs, or a void develops. These actions reduce the number of backup-related service requests and emergency repair work that would eventually arise for the utility. The Consultant team has worked with sewer utilities' maintenance crews across the country who experience significant productivity delays due to side sewer/lateral issues that could have been avoided by this type of proactive approach.

When adopting this BMP, each local agency should review its legal authorities, including its current sewer use regulations, to gain a full understanding of the agency's legal responsibilities and the private property/private system owners' legal responsibilities for side sewer inspection, maintenance, and repair. This may require the involvement of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, a written policy may be drafted to clearly delineate the limits of each party's responsibilities.

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster continued success of this BMP. A review of the impact on each agency's resources should be conducted for instances when property owner/occupants are notified of roots observed in side sewers during mainline sewer inspections. The local agency can then identify and resolve resource barriers or challenges, which may include:

- Staffing requirements, roles, and responsibilities (note: this may include resources from outside agencies if sewer main inspections are performed by others)
- Customer education and communication plan, including standard responses (scripts) to customer inquiries and resources available for property/private system owners to learn more about their responsibilities and options for addressing problems
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer notifications, dates, etc.) with data management tools such as Microsoft Excel or Access
- Acceptable means and methods to address roots in lateral occurrences (note: this may require involvement of local plumbers and side sewer contractors)
- Performance criteria to measure effectiveness (including applying an adaptive management approach to modify the notification process if certain elements are not as effective as intended)

A written SOP or work process document should be developed that clearly delineates roles and responsibilities, timing, and other critical aspects of BMP implementation. For this BMP, the workflow will begin at the point when a "roots in connection" defect is identified during a sewer main CCTV inspection.

A suggested performance criterion, indirectly related to I/I prevention or reduction, involves the number of service requests (backups and/or slow service) that field personnel must respond to where roots had previously been observed in side sewer connections. This type of emergency service request is often an overwhelming burden on operations and maintenance personnel that could be avoided by taking proactive measures.

As previously described, a copy of the Sewer Lateral Root Intrusion Courtesy Notice sent by the County of Los Angeles, California, Department of Public Works is provided in **Figure 3-5**.

Figure 5-2 provides an example of the related County of Los Angeles webpage showing links to information available to property owners.

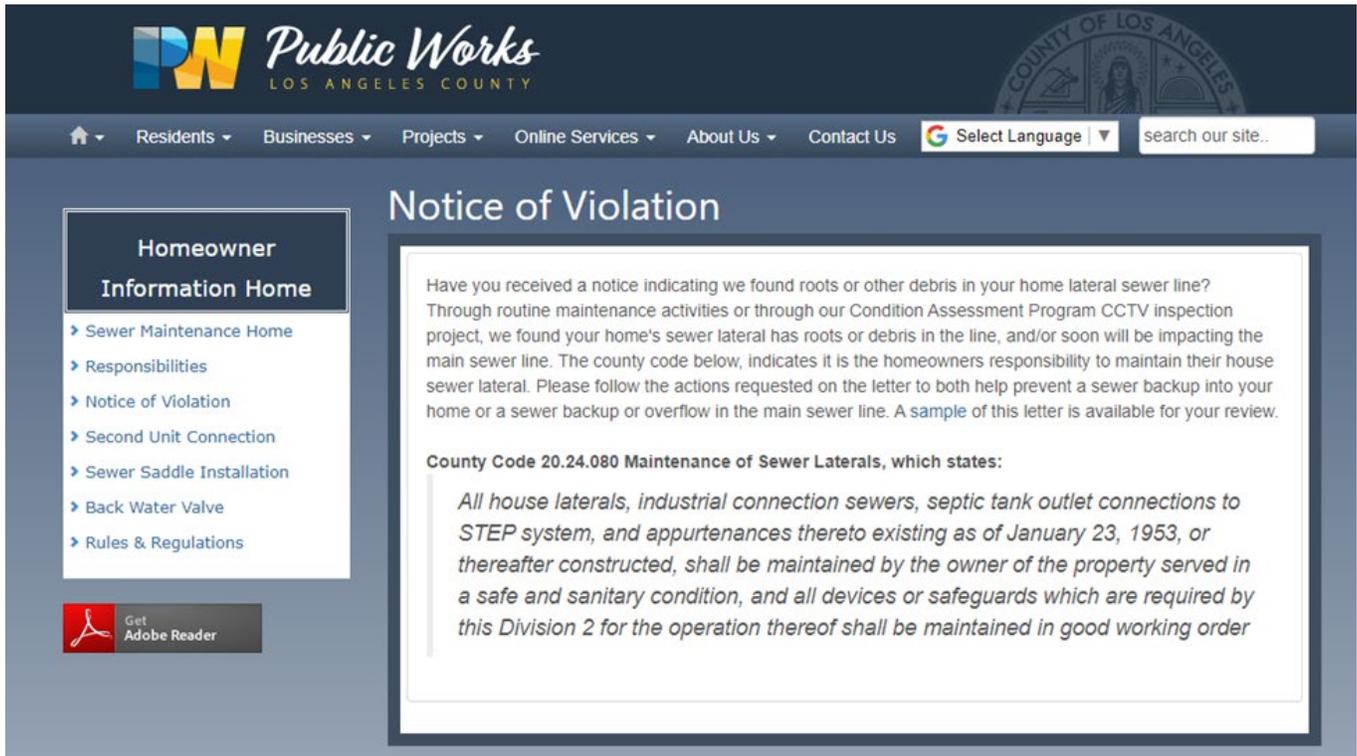


Figure 5-2. Example: Los Angeles County Public Works Informational Webpage

Source: County of Los Angeles Consolidated Sewer Maintenance District, https://dpw.lacounty.gov/SMD/homeowner/Page_06.cfm

BMP: Side Sewer Maintenance Guidance Documents

This BMP provides example documents for local agencies' private property education and outreach related to side sewer maintenance. Comprehensive and easily accessible side sewer maintenance guidelines are extremely important in educating property owners on their responsibilities for maintaining, inspecting, and repairing their side sewers. As side sewers age and deteriorate, it is increasingly important that the appropriate parties work to maintain the side sewer's structural integrity and prevent I/I entry to the sanitary sewer.

When adopting this BMP, each local agency should review its legal authorities, including its current sewer use regulations, to gain a full understanding of the agency's legal responsibilities and the private property/private system owners' legal responsibilities for side sewer inspection, maintenance, and repair. This may require the involvement of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, a written policy may be drafted to clearly delineate the limits of each party's responsibilities.

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster long-term success of this BMP. A review of the impact on agency resources should be conducted for when side sewer maintenance guidance documents are made available to its customers. The local agency can then identify and resolve resource barriers or challenges, which may include:

- Staffing requirements, roles, and responsibilities
- Customer education and communication plan, including standard responses (script) to customer inquiries and resources available for customers to learn more about their responsibilities for side sewer maintenance
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer communication log, etc.) with data management tools such as Microsoft Excel or Access
- Acceptable means and methods for side sewer inspection, maintenance, and repair
- Performance criteria to measure effectiveness (including applying an adaptive management approach to modify the guidance documents if certain elements are not as effective as intended)

A written SOP or work process document should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation.

Suggested performance criteria for this BMP could be the number of webpage views and downloads of the side sewer maintenance guidance documents.

Information presented on SPU's side sewer maintenance webpage, shown in **Figure 5-3**, could be used as an example for other local agencies.


Seattle.gov
 Mayor Jenny A. Durkan

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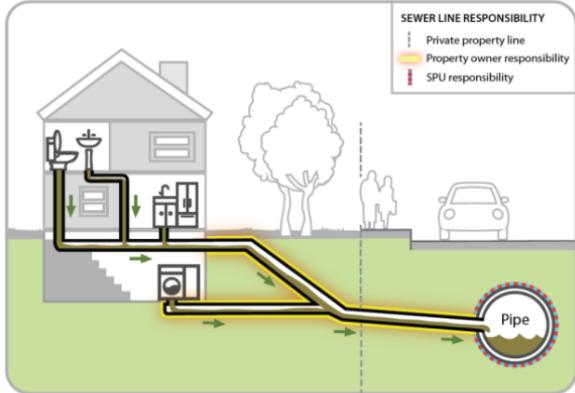
[Construction Resources](#) ▼

[Home](#) > [Your Services](#) > [Sewer & Drainage](#) > [Your Side Sewer](#) ▼

Side Sewers

- What to Flush
- Backups
- Maintenance
- Defects & Issues
- Repair Methods
- > Flooding Response
- Preventing Sewer Overflows
- Street Sweeping
- Green Stormwater Infrastructure

Side Sewer Maintenance



Graphic shows sewer line responsibility, which extends to the sewer mainline.

Contact

For repair permit information, [visit the Permits page](#)

For general questions: SideSewerRequests@Seattle.gov

Side Sewer Maintenance

A "side sewer" carries wastewater from a building's sinks, toilets and drains to the public sewer. Side sewers are sometimes called "sewer laterals" or just "sewer pipe."

Ownership

If you own your home or building, you own your side sewer until it connects to the public sewer pipe. Some properties share a side sewer.

Maintenance Steps

1. **Know where it is:** download your property's [side sewer information](#) from the Seattle Department of Construction and Inspections (DCI) website.
2. **Take care of it:** flush only toilet paper and properly dispose of grease. Learn more about [what happens to sewer pipes](#) when we flush items other than toilet paper.

Figure 5-3. Example: SPU Side Sewer Maintenance Webpage

Source: Seattle Public Utilities, <https://www.seattle.gov/utilities/your-services/sewer-and-drainage/side-sewers/maintenance>

BMP: Private Property I/I Source Disconnection/Redirection Public Education Materials

This BMP provides example materials for local agencies' private property owner education and outreach on I/I source disconnection and redirection. Although this BMP may not apply to all local agencies at this time, those that experience excessive peak I/I flows will most likely opt to address both public and private property sources of I/I. Private property I/I sources (roof leaders, area drains, window well drains, foundation drains, etc.) can contribute significantly to peak flows that occur during wet weather events. Making educational materials on I/I source disconnection/redirection available to customers served by these local agencies is extremely valuable, as it enables customers to better understand their responsibilities and how they are connected to the system. Even utilities that do not have I/I mitigation efforts underway may have this information available for their customers as a best practice.

When adopting this BMP, each local agency should review its legal authorities, including its current sewer use regulations, to gain a full understanding of the agency's legal responsibilities and the private property/private system owners' legal responsibilities for unauthorized connections. This may require the involvement of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, a written policy may be drafted to clearly identify types of unauthorized connections and how they are to be disconnected/redirected from the agency's sanitary sewer system.

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster long-term success of this BMP. A review of the impact on agency resources should be conducted for when I/I source disconnection/redirection public education materials are made available to its customers. The local agency can then identify and resolve resource barriers or challenges, which may include:

- Staffing requirements, roles, and responsibilities
- Customer education and communication plan, including standard responses (script) to customer inquiries and resources available for customers to learn more about their responsibilities for side sewer maintenance
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer communication log, etc.) with data management tools such as a Microsoft Excel or Access
- Acceptable means and methods for I/I source disconnection/redirection (note: this determination may involve other Departments or outside groups involved with building codes, code inspectors, etc.)
- Performance criteria to measure effectiveness (including an adaptive management approach to modify the public education materials if certain elements are not as effective as intended)

A written SOP or work process document should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation.

A suggested performance criterion for this BMP could be the number of page views or downloads from the webpages covering I/I source disconnection/redirection information.

King County has an example of I/I source disconnection/redirection information on its "Do your part on rainy days" webpage, shown in **Figure 5-4**.

King County

Home How do I... Services About King County

Wastewater services
Protecting Our Waters (CSO control)

About CSOs

- Why do CSOs happen?
- Controlling CSOs since 1979
- Natural drainage solutions
- Traditional infrastructure solutions
- Do your part on rainy days**

Home > Services > Environment > Wastewater services > Protecting Our Waters (CSO control) > About CSO
Do your part on rainy days

Do your part on rainy days

What you can do to Protect Our Waters

Pipe bursting breaks and replaces leaky side sewer lines.

Manage the rain on your property

Keeping the rain that falls on your property out of the combined sewer system reduces the chance of overflows in waterways. It can also help property owners control flooding in their own yards or businesses.

Disconnect downspouts

In some older Seattle neighborhoods, stormwater from roof drain downspouts and foundation drains flows into sewers. Homeowners can disconnect roof drain downspouts, yard drains, and sump pumps from the sewer system and redirect them to a separate stormwater system.

Install a rain garden, cistern, or rain barrel

Disconnected downspouts can be directed to a rain garden, rain barrel, or cistern. In some neighborhoods, homeowners are eligible for a rebate that can cover up to 100 percent of the cost of a professionally designed and built rain garden or cistern through the RainWise program.

Repair leaky side sewers

Groundwater seeps into sewer pipes through holes, cracks, and joint failures in

Related resources

- [Don't flush non-bio materials](#)
- [What do I do with...](#)
- [Choose safer house products](#)
- [Dispose of household waste properly](#)
- [Practice natural yard](#)
- [Use a rain barrel to](#)

Figure 5-4. Example: King County's Private Property I/I Source Disconnection Webpage

Source: King County WTD, <https://kingcounty.gov/services/environment/wastewater/cso/about/help.aspx>

Table 5-1 presents a summary of recommendations for the side sewer BMPs. Recommended BMPs are colored green, BMPs not recommended are in gray while BMPs that may be applicable in the future are not colored.

Table 5-1. Summary of Side Sewer BMP Recommendations

BMP	Recommendation
A.1 Watertight side sewer specifications, standard drawings, and proper methods for new and repaired side sewers	Revisit BMPs if private side sewer inspection program is implemented in future
A.2. New side sewer construction inspection and product-specific inspection requirements	
A.3. Repair, rehabilitation, and replacement inspection requirements	
A.4 Side sewer contractor prequalification	Not an I/I Task Force preferred BMP; do not pursue at this time
A.5 Unauthorized connection prohibition	Adopt and implement as appropriate to the local agency/district
A.6. Side sewer design guidelines that address flood-prone areas	Local agency/district specific – consider for future development by others
A.7 Lake line guidelines and lakefront property provisions	
A.8 Over-water structure connection provision and recommendation	
A.9 Side sewer design guidelines in steep area	
A.10 Side sewer disconnection, reconnection, and demolition requirements	Revisit BMPs if private side sewer inspection program is implemented in future
B.1 Side sewer maintenance responsibility declaration and enforcement mechanism	Consider for future BMP toolkit addition
B.2 Tree and sewer main separation requirement	Remove from consideration per I/I Task Force
B.3 Courtesy notice to property owner/occupant regarding roots in lateral connection	Adopt and implement as appropriate to the local agency/district
B.4 Web content for local agencies	Consider for future BMP toolkit addition
B.5 Side sewer maintenance guideline documents	Adopt and implement as appropriate to the local agency/district
C.1 Side sewer CCTV inspection specifications	Consider for future BMP toolkit addition
C.2 Rainfall simulation and dye testing specifications	Not an I/I Task Force preferred BMP; do not pursue at this time
C3. Unauthorized private property I/I source disconnection public education materials	Adopt and implement as appropriate to the local agency/district
C.4 Cleanout cap replacement program	Not an I/I Task Force preferred BMP; do not pursue at this time

5.1 Equity Key Considerations for Recommended BMPs

In December 2019, KC developed a TM, *FINAL DRAFT Review of King County’s Equity and Social Justice Tools and Opportunities for the Regional Infiltration and Inflow Control Program*. This TM provides guidance on incorporating ESJ into program options.

The vision for Equity and Social Justice is a King County where all people have equitable opportunities to thrive. The strategies as One King County to advance ESJ are to invest upstream and where needs are greatest; in community partnerships; in employees; and with accountable and transparent leadership. Our component agencies come to the table with a wide range of ESJ opportunities and needs. Some are well-resourced and generally able to provide equitable programming to their constituents, who themselves are better resourced than their neighbors in more vulnerable communities. Other agencies are not as well-

resourced and, as a result, are not able to invest in equitable outreach or support their constituents in controlling I/I. Thus, to achieve equity with the Side Sewer BMPs, investments could be made that make conditions more equitable for residents and agencies that need additional support.

The following lists key equity-related strategies associated with these recommended BMPs:

- **Unauthorized Connection Prohibitions** is a code update that strengthens illicit connection authority making rules clearer to customers.
 - Education related to this BMP could be included within Illicit Source Disconnection Public Education Materials.
- **Courtesy Notice to Property Owner Regarding Roots in Lateral Connections**, Side Sewer Maintenance Guideline documents, and Illicit Source Disconnection Public Education Materials are all outreach and education content that educate customers their responsibility to limit I/I.
 - Develop culturally responsive educational materials - A toolkit could be developed by the County or component agencies that would include information in multiple languages, be developed through transcreation with constituents, and embed a range of different community values.
 - Translate materials into languages as recommended through demographic and social vulnerability analysis, and provide interpretation, where warranted.
 - Share information equitably - Understand your target audience and how they get information and use those methods to share information and resources. That could include, for example, different types of social media, online open houses, living room meetings, Storymaps, and more. These tools could be developed by the County or a component agency and then made available to all partner agencies.
 - Identify opportunities to disseminate education materials through existing programs and partnerships that target priority communities.

5.2 MWPAAC Recommendation Considerations

In a letter to the WTD Director dated April 28, 2021, from the MWPAAC Chair, MWPAAC recommended an initial strategy of voluntary implementation of four side sewer BMPs by local agencies, beginning in 2021. These BMPs are described earlier in this TM. This letter, included in Appendix C, noted that the examples of customer information materials WTD provides to local agencies will need to be tailored to the resources available to individual local agencies. Without additional support from WTD, BMP implementation could be difficult for agencies that lack graphics resources, resulting in both inconsistent messaging and barriers to equitably deliver BMP information. To assist local agencies in a timely and consistent manner, MWPAAC requested WTD's assistance with the following:

1. Provide ready-to-publish customer notices and educational materials, to which the local agencies can add their respective logos and distribute to their customers.
2. Provide translations/transcreations of these notices and educational materials to reach underserved communities.
3. Identify state and local financial programs to assist qualifying property owners in making the necessary repairs or disconnections.

These requests are under consideration by WTD; items 1 and 2 will be addressed outside the Consultant contract while item 3 will be completed as part of Task 8000.

6.0 Next Steps

This section outlines the next steps to be taken to implement the recommended BMPs and to achieve the goal of consistent regional use of the BMPs by all WTD's component agencies. As a collaborative and voluntary effort, MWPAAC agencies have a significant role in supporting the successful implementation of the BMPs.

Next steps include promoting participation, participating through development, adoption, and implementation of BMPs, and tracking participation to understand level of regional consistency.

Promoting participation – WTD will post this TM and the Side Sewer BMP Toolkit on the I/I Control Program website for easy access by local agencies. MWPAAC may choose to promote participation through MWPAAC meetings or other means. Active peer to peer promotions may result in higher levels of voluntary participation. The number of local agencies interested in participating is unknown at this time.

Participating – Participating agencies will complete these voluntary actions:

- Plan and Develop—each participating component agency will review the Side Sewer BMP Toolkit, choose BMPs applicable to their service area, and develop and tailor examples to their individual utility.
- Adopt—Component agencies will adopt the side sewer BMPs deemed to fit their local service area.
- Implement—Component agencies will implement BMPs according to written recommendations.

Additional information to support development, adoption and implementation are included in Section 5. Requests made in the MWPAAC recommendation to WTD are under consideration by the County. Discussion around which local agencies plan on participating will occur with MWPAAC.

Tracking participation – MWPAAC, in coordination with WTD, may choose a method to track participation e.g., annual web-based survey at the beginning of each year (e.g., January 2022). Tracking participation will provide data for MWPAAC to understand if the overall goal is being met and determine if other actions are needed to improve participation.

Other regionally applicable, I/I-related BMPs may be identified and developed through the County I/I Control Program, County or local agency/district I/I projects, ad hoc information sharing, or other means, and may yield valuable information to add to the Side Sewer BMP Toolkit.

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Appendix A: Side Sewer Best Management Practices Toolkit

BMP: Unauthorized Connection Prohibition

BMP: Courtesy Notice to Property Owner/Occupant Regarding Roots in Side Sewer Connections

BMP: Side Sewer Maintenance Guidance Document

BMP: Private Property I/I Source Disconnection/Redirection Public Education Materials

For each of the BMPs, the following are provided:

- BMP Description
- Instructions to Local Agencies
- Example Website Landing Page Content
- Example BMP Content

BMP: Unauthorized Connection Prohibition

BMP Description: Unauthorized Connection Prohibition

This BMP involves developing and adopting language in the local agency's legal authority which clearly states that unauthorized sewer connections must be removed and provides appropriate enforcement mechanisms to enforce proper disconnection. Additionally, the example language includes provisions to ensure only one side sewer connection from each structure is made to the main sewer, and that the side sewer is directly connected to the appropriate draining fixtures within the structure.

Instructions to Local Agencies

Though most local agencies and districts have language in their legal authorities regarding unauthorized connections, in many instances this language could be strengthened to state the details more clearly. Your agency's legal authorities should clearly state that it has the authority to perform tests on private property to identify unauthorized connections and to establish the following:

- what happens when unauthorized connections are found (who is responsible for disconnecting and redirecting clear water flow to an appropriate stormwater conveyance system)
- what timeframes are allowable to complete the work, and
- what penalties can be incurred if compliance is not met.

When adopting this BMP, your agency should review its legal authorities, including its current unauthorized connection prohibition and available enforcement response mechanism, to identify areas where the language could be strengthened. This may require the involvement of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.).

Before implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in to prevent unintended consequences, and foster continued long-term success. A review of the strengthened ordinance's impact on your agency's resources should be conducted so that barriers or challenges can be identified and resolved. This review includes, but is not limited to, the following elements:

- Staffing requirements, roles, and responsibilities (note: this may include resources from outside agencies if private property inspections are performed by others)
- Customer education and communication plan, including notice of changes in legal authority, enforcement response plan, and resources available for proper unauthorized connection disconnection/redirection compliance procedures
- Budget and funding impacts
- An information management system to track appropriate implementation-related data (e.g., education and communication plan) with data management tools (e.g., Microsoft Excel or Access)
- Standard/acceptable means and methods to address unauthorized connections (including disconnection/redirection practices)

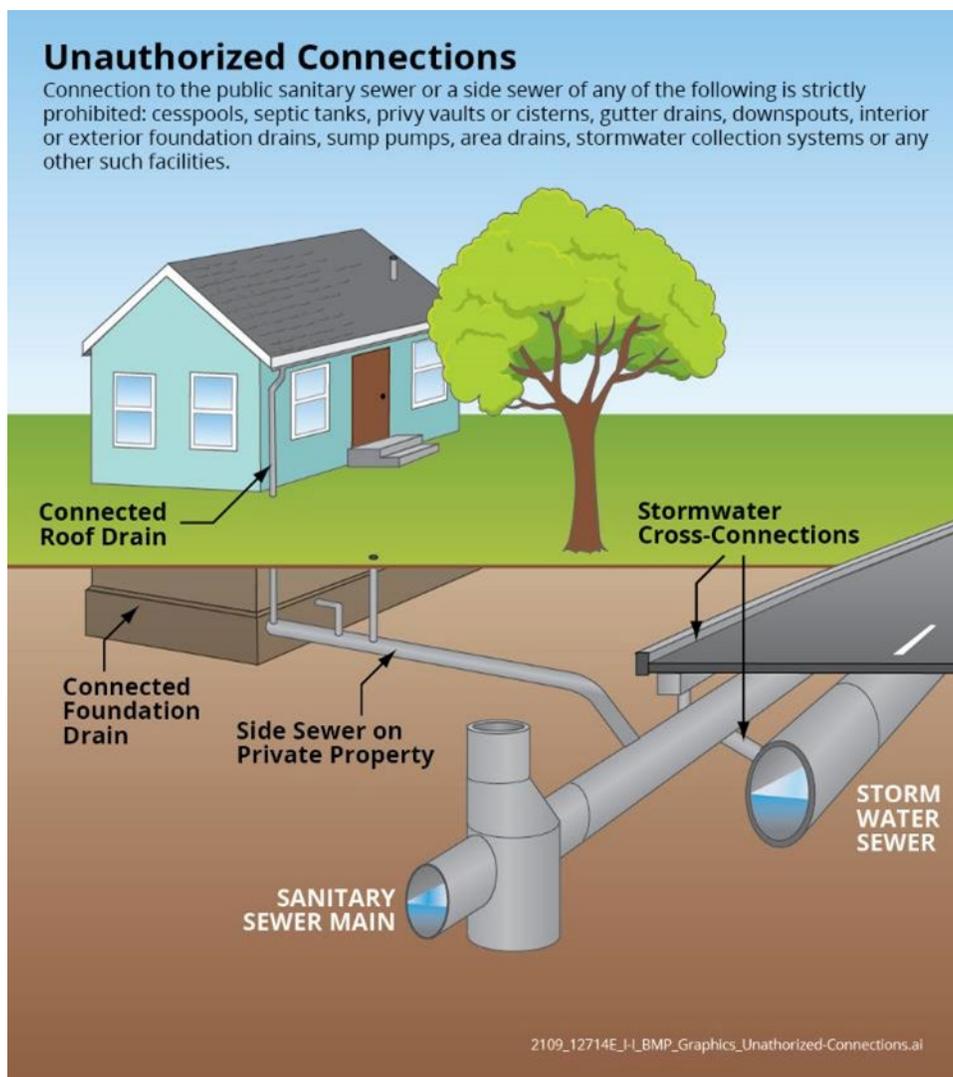
- Performance criteria to measure effectiveness (including an adaptive management approach to modify the prohibition if certain elements are not as effective as intended). There is no suggested performance criterion for this BMP, but your agency is encouraged to identify those criteria that reflect any outcomes anticipated as a result of BMP implementation. For example, if your agency is undertaking I/I reduction efforts that address private property I/I sources, you may want to track various elements associated with unauthorized connection identification, customer notification, and compliance enforcement processes.

A written standard operating procedure (SOP) should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation.

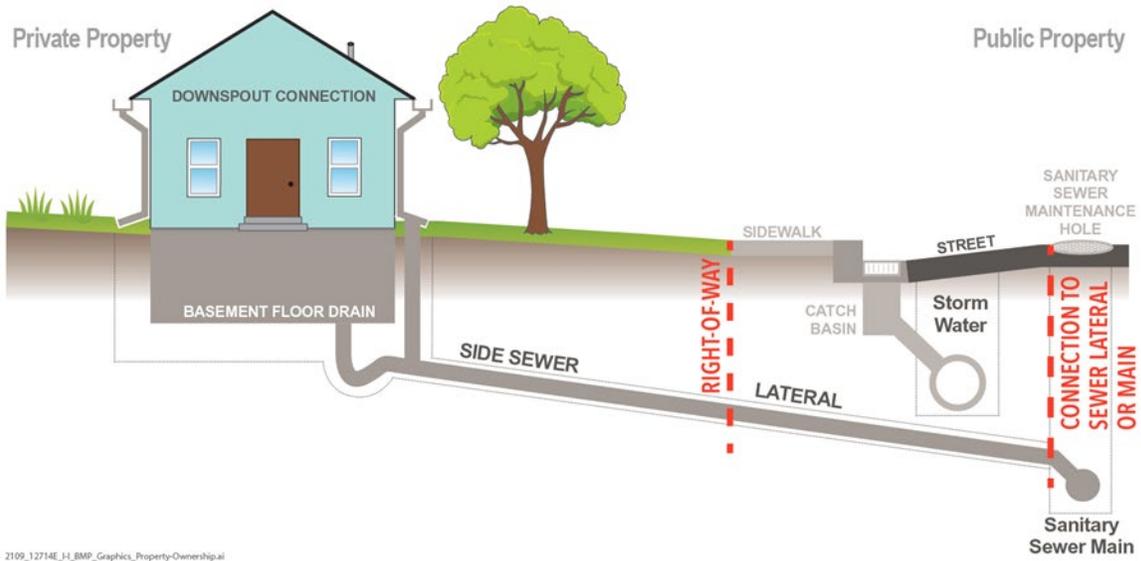
Example Website Landing Page Content

Unauthorized Sewer Connections

Your home may have only one connection from your side sewer to the main sewer, and your side sewer must be directly connected to the appropriate fixtures within your home. If your property contains a sewer connection that allows stormwater into the sewer system, you are responsible for redirecting the water flow to a stormwater drain or open drainage way (i.e., ditch or stream).



SIDE SEWER LINE OF OWNERSHIP VARIES BY SEWER AGENCY



Example BMP Content

Provided on the following pages.

Unauthorized Connections

Unauthorized Connections Prohibited

The introduction of stormwater, surface water, and groundwater into the sanitary sewer system by infiltration, inflow, discharge, or other means, has far-reaching impacts. It increases the costs of constructing and operating the sewer system, adversely impacts the effective treatment of wastewater, creates conditions that pollute waterways, and poses a direct threat to public health and safety by causing sewer backups, sewer bypasses, stream pollution, and groundwater pollution.

The connection of cesspools, septic tanks, privy vaults or cisterns, gutter drains, downspouts, interior or exterior foundation drains, sump pumps, area drains, stormwater collection systems, *<add other sources commonly identified in local agency's service area>*, or any other such facilities to the public sanitary sewer or a side sewer, is strictly prohibited.

This prohibition is necessary and advisable for the protection of the health, safety, and welfare of the people within the [LOCAL AGENCY] service area, and for compliance with the [LOCAL AGENCY]'s *<reference sewer service agreement with appropriate entity>* contract with *<appropriate entity>*, state, and federal laws, rules, and regulations. After *<legal authority effective date>*, this prohibition shall be applicable to all persons and properties located within the [LOCAL AGENCY]'s jurisdiction for which sanitary sewer facilities or services are available or utilized, including authorized contract service areas.

Notice and Renewal of Unauthorized Connections

Upon determination by the [LOCAL AGENCY] that a property has a connection not authorized by this *<cite legal authority>*, the property owner shall disconnect such unauthorized connection within *<timeframe such as thirty (30) days>* from the date of notice by the [LOCAL AGENCY].

Any notice given by hand delivery shall be effective at the time of delivery. Any notice sent by registered or certified mail, return receipt requested, shall be deemed given on the date of delivery shown on the receipt card, or if no delivery date is shown, the postmark thereon or two (2) business days after deposit in the United States mail, whichever is earlier. Notices delivered by an express courier that guarantees next-day delivery shall be deemed given one (1) business day after delivery of the same to the courier. If notice is received on a Saturday, Sunday, or legal holiday, it shall be deemed received on the next business day.

A property owner shall notify the [LOCAL AGENCY] at least *<timeframe such as twenty-four (24) hours>* in advance of the removal of an unauthorized connection to allow for inspection by the [LOCAL AGENCY]. *<state requirements for notifications given prior to weekends or holidays>*

Investigation, Testing, and Inspection Charge

A charge of *<state appropriate fee, such as \$xxx.00>* will be billed against any property found to have an unauthorized connection. This charge is to recover the cost of the [LOCAL AGENCY]'s investigation, testing, and inspection of an unauthorized connection, and to cover the costs of the [LOCAL AGENCY]'s inspection, investigation, and monitoring of the disconnection and redirection of flows from the sanitary sewer system attributed to the unauthorized connections.

In addition to the testing and inspection charge, the property owner will reimburse the [LOCAL AGENCY] for its actual reasonable costs, plus the [LOCAL AGENCY]'s normal overhead rate, for construction and/or repair by the [LOCAL AGENCY] determined by the [LOCAL AGENCY] to be necessary or proper to protect, correct, or repair the [LOCAL AGENCY] sanitary sewer system infrastructure because of an unauthorized connection.

Failure to remove an unauthorized connection within the time allotted herein shall result in an additional monitoring and enforcement charge of *<appropriate fee such as \$xxx.00>* per day. All charges in this *<cite legal authority>* shall be *<cite how the charges will be collected, such as additions to sewer use fee, lien against property, etc.>*.

Failure to remove an unauthorized connection within *<state timeframe, such as thirty (30) days>* from notice as provided herein may be grounds for termination of sewer service by the [LOCAL AGENCY] upon its determination that such action is reasonably necessary to correct an unauthorized connection, and after reasonable opportunity for a hearing before the [LOCAL AGENCY]. Notice of intent to terminate service shall be given to the *<appropriate parties, such as health department>*.

Property Owner, Contractor, Builder, Permit Suspension

In addition to the foregoing provisions, and supplemental thereto, if investigation by the [LOCAL AGENCY] determines that a property owner, contractor, or builder has willfully made an unauthorized connection, or has directed that an unauthorized connection be made, all rights under this *<cite legal authority>* shall be suspended.

No permits of any type will be issued to or for said property owner, contractor, or builder until any unauthorized connection has been removed, and all charges required by this Section have been paid. Suspension shall be effective after *<state timeframe, such as fifteen (15) days>* notice to be given in the same manner as described hereinabove for notice to property owners; provided, however, that the commencement of such suspension shall be stayed pending a hearing before the *<appropriate parties>* *<state when the hearing may be scheduled>*, if requested by the contractor in writing within the *<state timeframe, such as fifteen (15) days>* period.

Exemptions and Exceptions

The [LOCAL AGENCY] is authorized to issue exemptions or exceptions to the requirements of this *<cite legal authority>* for specific connections whenever, under application and review, the [LOCAL AGENCY] finds and determines that:

- A. The disconnection of a particular source or connection, prohibited by this *<cite legal authority>*, could seriously compromise the integrity of the dwelling, building, or structure; or
- B. The disconnection of a particular source or connection, or remediation of the disconnected stormwater, surface water, or groundwater, would not be cost effective; and,
- C. Continuation of the source or connection, otherwise prohibited by this *<cite legal authority>*, would not, in opinion of the *<state position, such as Chief Engineer>* of the [LOCAL AGENCY] or other [LOCAL AGENCY] appointed professional engineer, likely contribute to any sewer backup or bypass nor adversely impact the effective operation of the sanitary sewer system.

Compliance

The responsibility for the acts, omissions, compliance, or lack of compliance by property owners or their contractors performing side sewer installation pursuant to this *<cite legal authority>* shall be the property owner's. The [LOCAL AGENCY]'s duties and responsibilities pursuant to this *<cite legal authority>* shall exist to the general public, and not to any specific individual or entity.

The [LOCAL AGENCY]'s inspection is not an assurance and/or guarantee of the owner's or contractor's compliance. The [LOCAL AGENCY]'s employees' failure to properly inspect and/or enforce these provisions shall in no way relieve the property owner or contractor from their responsibility to strictly comply herewith.

Notice shall be given to the property owner of any side sewer that has been connected to the [LOCAL AGENCY]'s sewer system if it does not strictly comply with the provisions and standards of this *<cite legal authority>*. If such side sewer is not brought into compliance within thirty (30) days of such notice, the [LOCAL AGENCY], or its authorized representative, may enter the property and make such corrections as are necessary to bring the side sewer into compliance. The cost of such corrections shall be charged against the property owner, and shall be *<cite how the charges will be collected, such as additions to sewer use fee, lien against property, etc.>* pursuant to *<cite legal authority>*.

In the event correction cannot be made to a non-complying side sewer, and such side sewer could cause damage to the [LOCAL AGENCY]'s sanitary sewer system, the [LOCAL AGENCY] reserves the right to immediately disconnect such non-complying side sewer, without notice, as necessary to protect the [LOCAL AGENCY]'s sanitary sewer system. Notice shall be given to the property owner as soon as practicable.

If the [LOCAL AGENCY] disconnects a side sewer service connection, the [LOCAL AGENCY] will also notify the *<appropriate state or local authority such as a health department>*.

BMP: Courtesy Notice to Property Owner/Occupant Regarding Roots in Lateral Connections

BMP Description: Courtesy Notice to Property Owner/Occupant Regarding Roots in Side Sewer Connections

This BMP involves developing a notice for local agencies' private property owner education and outreach programs. Roots in laterals and service connections (side sewer connections) are commonly observed during routine sewer main closed-circuit television (CCTV) inspections performed by many sewer utilities and their CCTV inspection contractors.¹ By notifying the property owner/resident of this finding, the property owner can also be made aware of their responsibility for maintaining the side sewer, including the need to hire a plumber to clear roots.

When proactively cleaning the side sewer, a plumber will notify the property owner/occupant of a defect and address it immediately to prevent the likelihood of a backup (or sanitary sewer overflow [SSO] from cleanout) and to reduce infiltration into the sewer system. Additionally, if the side sewer defect is located within the right-of-way, the appropriate party (utility or property owner) can address the defect before a backup or SSO occurs or a void develops. These actions reduce the number of backup-related service requests and emergency repair work that would eventually arise for the utility.

Instructions to Local Agencies

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster continued success of this BMP. A review of the impact on your agency's resources should be conducted for instances when property owner/ occupants are notified of roots observed in side sewers during mainline sewer inspections. The agency can then identify and resolve resource barriers or challenges, which may include, but are not limited to, the following elements:

- Staffing requirements, roles, and responsibilities (note: this may include resources from outside agencies if sewer main inspections are performed by others)
- Customer education and communication plan, including standard responses (scripts) to customer inquiries and resources available for property/private system owners to learn more about their responsibilities and options for addressing problems
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer notifications, dates, etc.) with data management tools such as Microsoft Excel or Access
- Acceptable means and methods to address roots in lateral occurrences (note: this may require involvement of local plumbers and side sewer contractors)
- Performance criteria to measure effectiveness (including applying an adaptive management approach to modify the notification process if certain elements are not as effective as intended).

A suggested performance criterion, indirectly related to I/I prevention or reduction, involves the number of service requests (backups and/or slow service) that field personnel must respond to where roots had previously been observed in side sewer connections. This type of emergency service

¹ This observation is commonly made during routine sewer main CCTV inspections using a typical pan and tilt camera; a side sewer (or lateral) launch from the mainline is not advised when visible roots are observed in a service connection as the lateral camera may become entangled in the root mass.

Example BMP Content

The following section provides examples of content that could be branded by the [LOCAL AGENCY] and included in this BMP.

[LOCAL AGENCY LETTERHEAD]

<Date>

<Property Owner/Occupant>

<Address>

<City>, <State> <Postal Code>

Dear Property Owner/Occupant:

NOTICE OF ROOTS OBSERVED IN SIDE SEWER AT <ADDRESS>

This is a courtesy notice to inform you that the side sewer serving the property located at <Address> requires maintenance per [LOCAL AGENCY]:

[TEXT OF LOCAL AGENCY CODE]

The [LOCAL AGENCY] operates and maintains the sanitary sewer system that serves all properties within the [LOCAL AGENCY] service area. Recently, [LOCAL AGENCY] crews performed routine closed-circuit television (CCTV) inspections of the sewer mains in your area and discovered the presence of roots in the side sewer connection located on your property.

Below are images from the CCTV inspection that show the roots at the connection point of your side sewer and the [LOCAL AGENCY] sewer main. This indicates that there may be roots within in your side sewer.



CCTV INSPECTION IMAGE



CCTV INSPECTION MAGE

This root intrusion may result in a blockage of your side sewer, which can cause a sewage backup or overflow on your property or within your home. It may also result in a blockage in the main sewer line and cause a sanitary sewer overflow upstream of your property.

When a blockage occurs within a side sewer (the line that connects a home or business to the [LOCAL AGENCY]'s sewer line), the property owner/occupant is responsible for clearing the blockage. As the property owner/occupant, it is your responsibility to contact a qualified plumbing contractor to service your side sewer. We request that you do this within **90 days** to prevent an overflow or backup. You are also responsible to pay the costs associated with clearing any blockages located within the side sewer on the property.

Before a plumbing contractor services your side sewer, call [LOCAL AGENCY CONTACT] to authorize access to the downstream manhole. The plumbing contractor will need access to this area. During side sewer service, a plumbing contractor must protect the [LOCAL AGENCY'S] sewer mains by trapping any roots or debris dislodged from your side sewer line.

After your side sewer has been serviced, please notify [PERSON] at [CONTACT INFO].

If an overflow or backup occurs, take photos of the overflow/backup and affected area, and document your actions. You may need this information for insurance purposes. In the interest of your personal health and public health, make sure that any water, sewage, or other debris is cleaned up promptly and thoroughly. Wet areas should be thoroughly dried and disinfected. Failure to properly clean the entire contaminated area can result in adverse and sometimes serious health consequences. Information about proper cleaning after a sewer backup is enclosed.

If you have questions regarding the [LOCAL AGENCY'S] sanitary sewer maintenance program, sewer backup response, or a specific incident, contact the [LOCAL AGENCY] at [CONTACT INFO].

Sincerely,

[SIGNATURE]

[NAME/TITLE]

[CONTACT INFORMATION]

What to Do If You Experience a Sewage Backup

1. Report the sewer backup immediately by calling [LOCAL AGENCY] immediately at [PHONE NUMBER]. [LOCAL AGENCY] will work with you to identify the location of the blockage. If the blockage is in one of [LOCAL AGENCY'S] main sewer lines, they will attempt to clear the blockage.
2. If the blockage is in the side sewer connected to your property, you must contact a qualified plumbing contractor and make arrangements for the blockage to be cleared. Remember: you are responsible for scheduling and paying for service to clear such a blockage. Many local plumbers can provide this service. **Do not try to unclog a sewer pipe yourself.**
3. If you have homeowner's or other property insurance coverage, notify your insurance agent of the sewer backup to see if such a claim is covered. Take photos of the damage. Document the actions taken (calls, contacts, costs) in response to the sewer backup. Keep receipts for plumbing services and any items your insurance policy may cover.
4. After the [LOCAL AGENCY] or a plumbing contractor has cleared the blockage, clean the entire contaminated area in a safe and professional manner. **It is a good idea to use the services of a reputable company experienced in cleaning up after sewer backups.** If you clean the area yourself, here are some tips:
 - Restrict accidental access to the contaminated area until cleanup has been completed. If possible, remove vulnerable/sensitive family members from the home until cleanup is complete.
 - Wear protective clothing such as rubber boots, gloves, eye protection, and nose/mouth protection to prevent contact with waterborne bacteria, which can cause illnesses.
 - Be careful not to contaminate other areas/rooms by walking around with dirty shoes.
 - Remove any dry/uncontaminated items from the area.
 - Wash any walls, floors, and other surfaces that sewage may have come into contact with. Use a low-suds detergent and clean, hot water.
 - Wash/sanitize or dispose of any soft items that were contaminated (clothing, rugs, soft toys, etc.).
 - Remove any dirt or debris from surfaces.
 - Rinse surfaces with warm water after cleaning.
 - Sanitize all surfaces with a sanitizing solution.
 - Open any outside windows and doors to air out the space.

Storm Season increases risk of floods and sewer overflows

Know Your Sewer System. Know Who To Call.

1 Home With Septic
 Clean-up service* () _____
 Insurance () _____
 Septic service or plumber () _____

2 Home On Local Sewer System
 Clean-up service* () _____
 Insurance () _____
 Plumber
 () _____
 Local sewer agency**
 () _____

3 Maintenance Hole Overflows
 Local sewer agency**
 () _____

4 Storm Drain/Street Flooding
 City Public Works/Surface Water Utility**
 () _____

5 Regional System Overflows
 King County collects sewage for local agencies and is responsible for regional treatment. For overflows occurring in the regional system, (overflows from manholes that say "Metro" on the lid, or near King County pump stations), call the King County Wastewater Treatment Division at 206-263-3801 (in Seattle, Kenmore, Shoreline), or 206-684-2404 (all other areas).

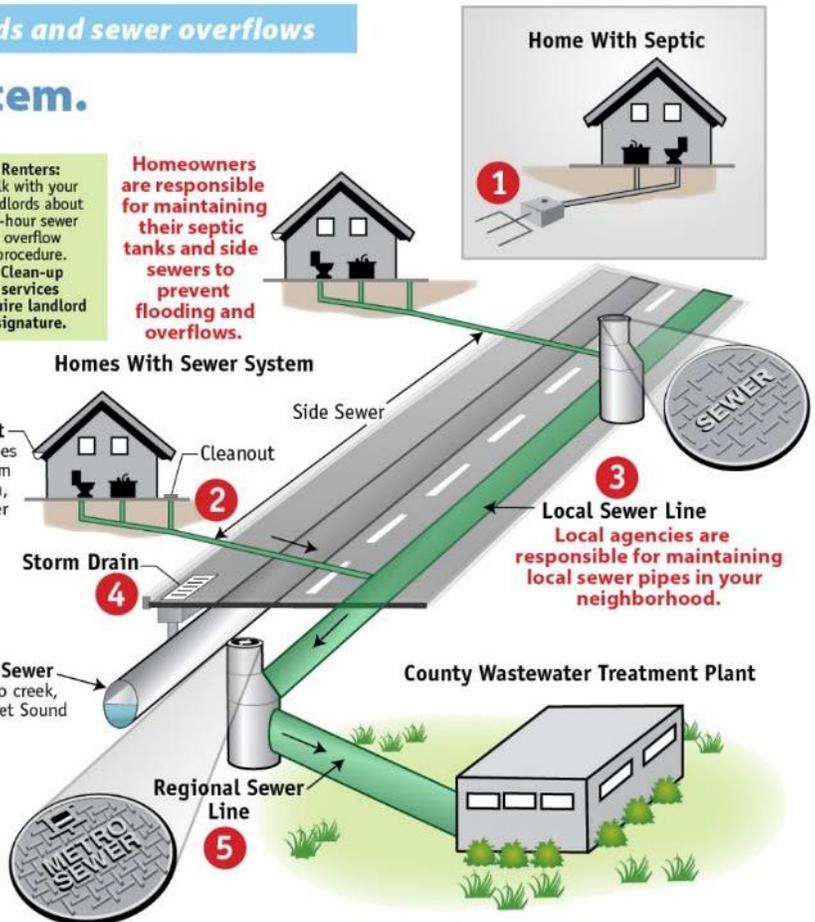
King County
 Department of
 Natural Resources and Parks
 Wastewater Treatment Division

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Renters:
 Talk with your landlords about 24-hour sewer overflow procedure. Clean-up services require landlord signature.

Homeowners are responsible for maintaining their septic tanks and side sewers to prevent flooding and overflows.

Downspout
 Rain water goes into the storm water system, not the sewer



Home With Septic

1

Homes With Sewer System

Side Sewer

Cleanout

Storm Drain

2

Storm Sewer
 Drains to creek, lake, Puget Sound

Regional Sewer Line

5

County Wastewater Treatment Plant

3 Local Sewer Line
 Local agencies are responsible for maintaining local sewer pipes in your neighborhood.

***Clean-up services: search "Water Damage Restoration" in the yellow pages**
****Find emergency contact numbers in your utility bill(s) or blue pages in the phone book**

Keep yourself safe during a flooding event or sewage overflow

1. Evacuate if necessary – call 911 in emergencies
2. Stay out of flooded areas and avoid contact with any type of flood water
3. Safely turn off electricity to affected area
4. Stop using plumbing that drains to the sewer system
5. Prevent the spread of contaminants and odors: turn off furnaces, air conditioners, and close vents
6. If you have been exposed to floodwater or wastewater, change clothing and shoes and wash affected skin surfaces.
7. Contact your doctor at the first sign of illness or infection
8. Hire a professional service to clean up damaged areas of your home. You can find services listed in phone directories under "Water Damage Restoration". Use caution if you choose to clean up the spill; wear boots, rubber gloves and properly dispose of contaminated material.



Learn more about responding to sewer spills at kingcounty.gov. Search "sewer spills." Floods are a common emergency in our area. Learn how to prepare and respond at www.govlink.org/storm/

Alternative formats available
Call 206-263-6028 or 711 (TTY)

Help prevent overflows

Protect sewer pipes, the treatment system and the Puget Sound



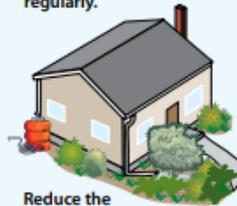
Inspect your side sewers and septic systems regularly.



Prevent tree roots from breaking sewer pipes.



Dispose of garbage and hair in the trash can, not the toilets.



Reduce the amount of rainwater entering the sewer system. Choose rain gardens, rain barrels, pervious pavement and green roofs.



Dispose of grease in the trash can or recycle it.



Prevent harmful chemicals from entering the wastewater system. Use simple, biodegradable household and personal products.



Prevent medicines from entering the wastewater system. Return medicines to a pharmacy or dispose in the trash can.



Keep storm drains clear



Store hazardous materials in spill proof containers, dispose at hazardous waste facilities.

Printed on recycled stock. Please recycle.

1104_2008_SewerOverflowCard_rev1.indd sk, mld
Produced by: King County DNR&P, WLRD, GIS, Visual Comm. & Web Unit



King County

Department of Natural Resources and Parks
Wastewater Treatment Division

BMP: Side Sewer Maintenance Guidance Documents

BMP Description: Side Sewer Maintenance Guidance Documents

This BMP involves developing private property owner education and outreach programs to clearly define side sewer maintenance responsibilities. Example content for educational materials (e.g., web content, bill stuffers, and brochures) for local agencies to use are included in this Side Sewer BMP Toolkit.

Comprehensive and easily accessible side sewer maintenance guidelines are extremely important for educating property owners about their responsibilities for maintaining, inspecting, and repairing their side sewers.

As side sewers age and deteriorate, it is increasingly important that property owners work to maintain the side sewer's structural integrity and prevent I/I entry to the sanitary sewer.

Instructions to Local Agencies

When adopting this BMP, you should review your agency's legal authorities, including the current sewer use regulations, to gain a full understanding of your agency's legal responsibilities and the private property/private system owners' legal responsibilities for side sewer inspection, maintenance, and repair. This may require the involvement of your agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, you may consider writing and adopting a policy that clearly delineate the limits of each party's side sewer maintenance responsibilities.

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster long-term success of this BMP. A review of the impact on your agency's resources should be conducted before side sewer maintenance guidance documents are made available to customers so that barriers or challenges can be identified and resolved. This review includes, but is not limited to, the following elements::

- Staffing requirements, roles, and responsibilities
- Customer education and communication plans, including standard responses (scripts) to customer inquiries and relaying available resources for customers to learn more about their responsibilities for side sewer maintenance
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer communication log, etc.) using data management tools such as Microsoft Excel or Access
- Acceptable means and methods for side sewer inspection, maintenance, and repair
- Performance criteria to measure effectiveness (including applying an adaptive management approach to modify the guidance documents if certain elements are not as effective as intended). The suggested performance criteria for this BMP could be the number of webpage views and downloads of the side sewer maintenance guidance documents if they are posted on your agency's website.

A written standard operating procedure (SOP) should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation.

Example Website Landing Page Content

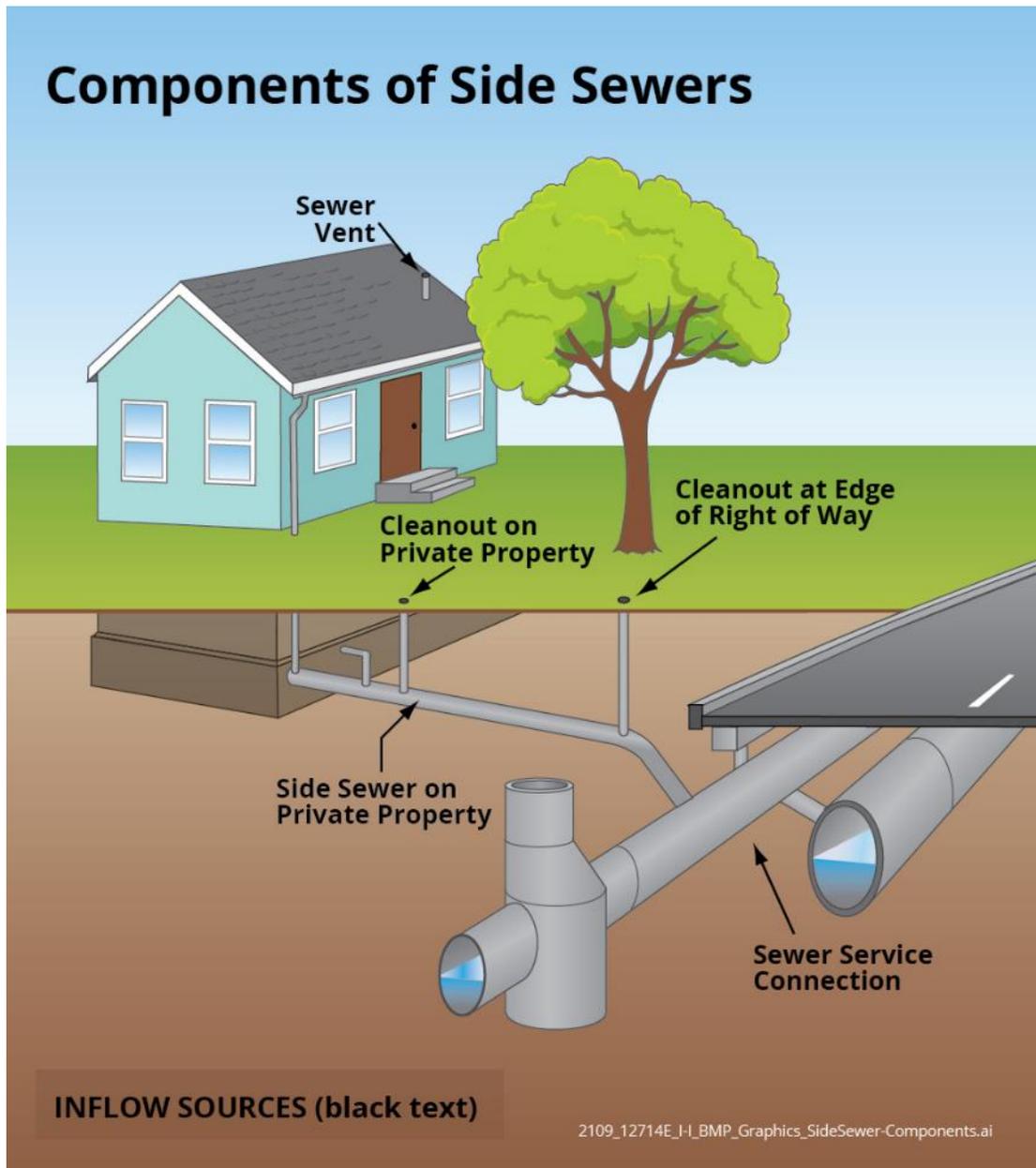
Side Sewer Maintenance Guidance

Over time, side sewers age and break down, which can allow stormwater to flow into the sewer system and overload the sewer pipes. Property owners also own the side sewer and are responsible for having the side sewer inspected, maintaining it, and repairing or cleaning it if needed. This can help prevent stormwater from entering the sewer pipes and causing bigger problems within the sewer system.

Example BMP Content¹

What is a side sewer?

A “side sewer” is the pipe that conveys wastewater from your house’s sinks, tubs, toilets, and other drains to the public sewer main. Usually there is a cleanout on the side sewer near your house, and one at the property line.



¹ Seattle Public Utilities has helpful information on its “Side Sewer Maintenance” webpage. The following website content template is taken partially from this webpage. Other content has been extracted from other sewer utilities’ webpages:

<https://www.seattle.gov/utilities/your-services/sewer-and-drainage/side-sewers/maintenance>

<https://www.portlandoregon.gov/bes/article/247465>

<https://www.wef.org/resources/for-the-public/public-information/fact-sheets/>

Who owns the side sewer on my property?

You own and are responsible for maintaining the side sewer on your property <describe limits of ownership>. [LOCAL AGENCY] owns and is responsible for <describe limits of ownership and maintenance responsibilities>. <If appropriate, discuss who is responsible for making side sewer repairs within the right-of-way>

What responsibilities do I have for my side sewer?

<Describe property owner's responsibilities for proper use, maintenance, inspection, repair and/or replacement>. <Then describe the LOCAL AGENCY's responsibilities for the side sewer and/or service connection>.

Many materials frequently flushed or poured down the drain can harm your side sewer, the [LOCAL AGENCY]'s sewer system, and the environment. You can help prevent this from happening by:

- Never pouring grease down sinks or toilets. Put cooking grease and food scraps into a can or the trash for disposal or composting (where available)
- Using baskets or strainers in sink drains to catch food scraps and other solids, and then emptying them into the trash

Toilets should be used to flush toilet tissue and human waste only; when anything else is flushed, it can result in costly blockages and sewage backups on your property, as well as problems in the [LOCAL AGENCY]'s sewer system. Few if any items marked as disposable can be safely flushed down the toilet. You should never flush the following items:

- Other-the-counter or prescription medicine
- Disposable menstrual products
- Baby wipes and diapers
- "Flushable" wipes
- Rags and towels
- Disposable gloves
- Syringes
- Toys
- Kitty litter
- Disposable toilet brushes

How do I get my side sewer inspected?

A licensed plumber or side sewer contractor can inspect your side sewer using a closed-circuit television (CCTV) camera that is typically inserted into your side sewer through a cleanout inside or outside of your house.

The inspection may reveal if there are structural problems with your side sewer (e.g., cracks, holes, etc.) or obstructions such as roots, grease, wipes, or other objects that may be preventing wastewater from freely flowing through the side sewer. The plumber or side sewer contractor can often clean your side sewer using high pressure water to dislodge roots and grease. In some cases, your side sewer may need to be repaired if material is built up on a crack or other defect, and is unable to be loosened and removed during cleaning.

Regular cleaning can prevent most costly repairs. However, over time, broken side sewers must be either repaired or rehabilitated to either prevent wastewater from backing up into your house or, to prevent groundwater from entering the sanitary sewer system.

What happens if I need to repair my side sewer?

<describe the LOCAL AGENCY's requirements for side sewer repairs, including permitting and inspection process.>

The Seattle Public Utilities (SPU) webpage on [Side Sewer Defects & Issues](#) provides helpful information on common side sewer defects. SPU's webpage on [Side Sewer Repair Methods](#) summarizes the types of structural repairs that may be appropriate to address these problems.

Contact *<contact name and contact information>* at [LOCAL AGENCY] if you have questions on *<agency type>*'s requirements for side sewer repairs.

What is a backwater valve, who owns it, and am I responsible to maintain it?

Some properties may have a backwater valve installed on the side sewer to help prevent sewage from flowing backward into your pipes and basement or crawl space. If you have this type of valve installed on your side sewer, you are responsible for its maintenance.

For more information on how to maintain the backwater valve, consult the information provided by [LOCAL AGENCY] when the valve was installed, or look on the valve manufacturer's website.

**BMP: Private Property Inflow/Infiltration Source Disconnection/Redirection
Public Education Materials**

BMP Description: Private Property Inflow/Infiltration Source Disconnection/Redirection Public Education Materials

This BMP involves developing private property owner education and outreach programs for inflow and infiltration (I/I) source disconnection and redirection. Example content for educational materials (i.e., web content, bill stuffers, and brochures) for local agencies to use are included in this Side Sewer BMP Toolkit.

Although this BMP may not apply to all local agencies at this time, those that experience excessive peak I/I flows will most likely opt to address both public and private property sources of I/I. Private property I/I sources (roof leaders, area drains, window well drains, foundation drains, etc.) can contribute significantly to peak flows that occur during wet weather events.

Making educational materials on I/I source disconnection/redirection available to customers served by your sewer agency is extremely valuable, as it enables customers to better understand their responsibilities and how they are connected to the system.

Instructions to Local Agencies

When considering this BMP you should review your agency's legal authorities, including current sewer use regulations, to gain a full understanding of your agency's legal responsibilities and the private property/private system owners' legal responsibilities for unauthorized connections. This may require the involvement of your agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, you may consider writing and adopting a policy that clearly identifies types of unauthorized connections and how they are to be disconnected/redirectioned from your agency's sanitary sewer system.

Prior to implementing this BMP, all elements of the initiative should be carefully considered to encourage stakeholder buy-in, prevent unintended consequences, and foster long-term success. A review of the impact on your agency's resources should be conducted before making I/I source disconnection/redirection public education materials available to customer, so that barriers or challenges are identified and resolved. This review should include:

- Staffing requirements, roles, and responsibilities
- Customer education and communication plans, including standard responses (scripts) to customer inquiries and relaying available resources for customers to learn more about their responsibilities for side sewer maintenance
- Budget and funding impacts
- An information management system to track appropriate data (e.g., customer communication log, etc.) using data management tools such as a Microsoft Excel or Access
- Acceptable means and methods for I/I source disconnection/redirection (note: this determination may require coordination with other Departments or outside groups involved with building codes, code inspectors, etc.)

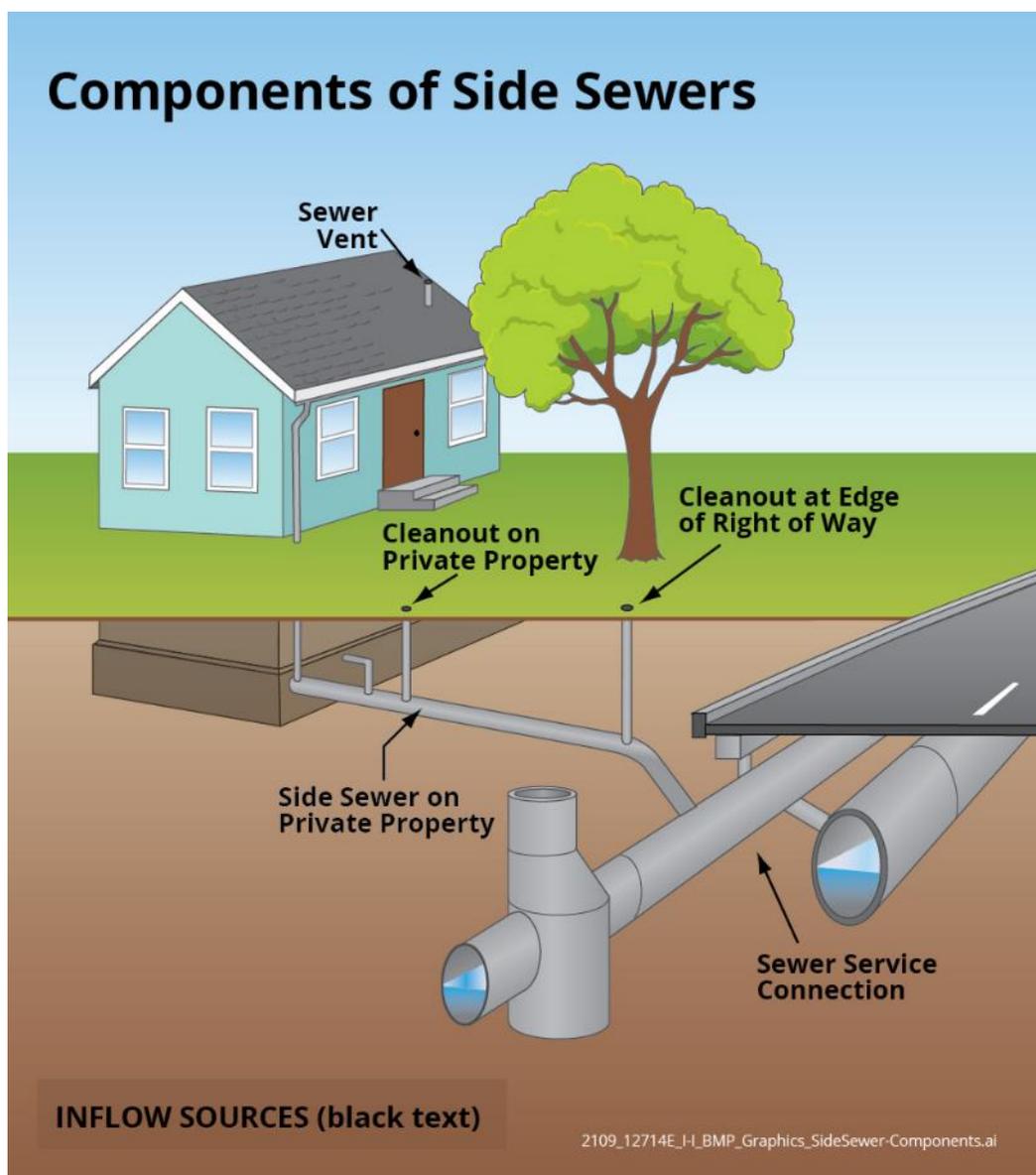
- Performance criteria to measure effectiveness (including an adaptive management approach to modify the public education materials if certain elements are not as effective as intended)
 - A suggested performance criterion for this BMP could be the number of page views or downloads from the webpages covering I/I source disconnection/redirection information.

A written standard operating procedure (SOP) should be developed to clearly delineate roles and responsibilities, timing, and other critical aspects of BMP implementation.

Example Website Landing Page Content

Keeping Stormwater Out of the Sewer

Wet weather events can cause stormwater to enter the sanitary sewer system and overload the sewer pipes. You can help prevent this by disconnecting your downspouts, roof leaders, window well drains, and sump pumps from the sewer system and redirecting them into a stormwater drain, rain garden, rain barrel, or cistern.



Example BMP Content ¹

What is inflow and infiltration?

Inflow and **infiltration** are terms used to describe how groundwater and stormwater enter the sanitary sewer system. The two terms are commonly referred to as I/I.

Inflow is stormwater or surface water that is piped directly into a sewer system or flows into it from runoff. As shown in the graphic below, these connections may include driveway and gutter drains, downspouts, interior or exterior foundation drains, sump pumps, and area drains, and should never be connected into a sanitary system designed to carry only wastewater.

Infiltration is excess water that enters the sewer system through open joints, cracks, and breaks in the pipes. These defects may allow constant infiltration of groundwater.

The design life of mainline and side sewer pipe is typically 50 years, depending on the material and quality of installation. In many cases throughout the region, collection system pipes and household laterals have gone much longer than that without inspection or repair and are likely to be cracked or broken.

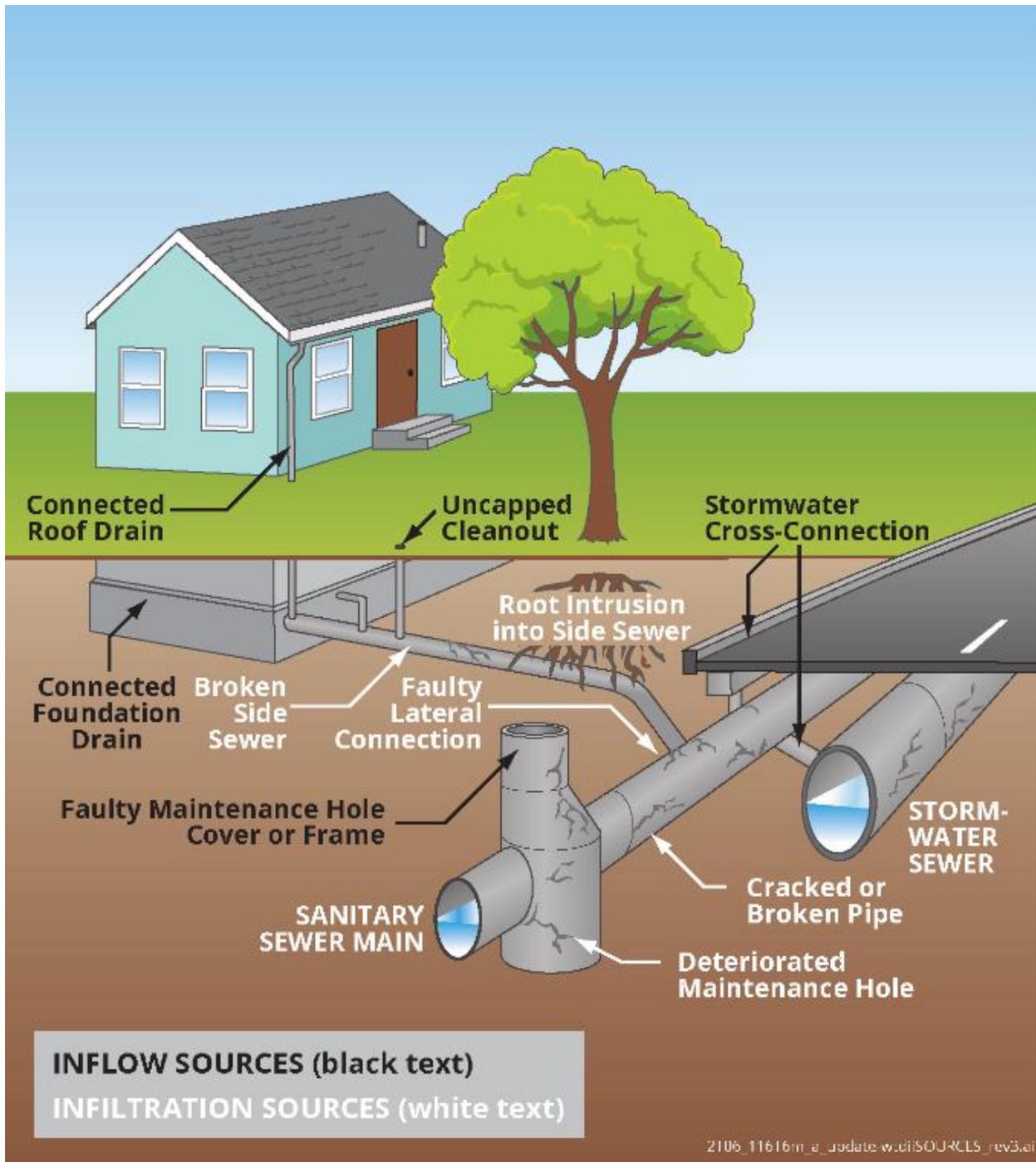
¹ King County has many examples of I/I source disconnection/redirection information on its “Do your part on rainy days” webpage. The website content template provided in this BMP was taken partially from this webpage. Other content has been extracted from the following King County webpages:

<https://kingcounty.gov/services/environment/wastewater/cso/about/help.aspx>

<https://kingcounty.gov/services/environment/wastewater/ii/problem.aspx>

<https://kingcounty.gov/services/environment/wastewater/ii/finding.aspx>

<https://kingcounty.gov/services/environment/wastewater/ii/fixing.aspx>



What is a sanitary sewer overflow?

When I/I enters the sewer system, it takes up space that would otherwise be used to convey wastewater. If the sewers become overloaded, raw sewage may overflow at various points throughout the sewer system before it reaches the treatment plant. When an overflow occurs in a separate sewer system, it is called a sanitary sewer overflow (SSO). These overflows may occur in a street from a manhole cover, in a yard from a cleanout cap, or in a basement of a residence or business. These unintentional overflows are illegal in separate sanitary sewer systems under the federal Clean Water Act.

What can I do to stop I/I from entering the sanitary sewer system from my property?

There are many ways to keep the rain that falls on your property out of the sanitary sewer system and thereby reduce the chances for SSOs and basement backups. Methods include disconnecting your downspouts, installing a rain garden, cistern, or rain barrel, and repairing leaky side sewers. Information on each of these methods is provided below.

One-inch of rain falling on a 1,200 square foot roof will generate approximately 750 gallons of water. Downspouts can discharge at a rate of 7 – 12 gallons per minute during a heavy storm. Runoff from only 80 square feet of roof area will fill a 50-gallon rain barrel during a 1-inch rain.

How do I disconnect my downspout?

Disconnecting your downspout from a side sewer and redirecting the flow to a grassy area, garden, or cistern is a simple process that can make a big difference to the environment. If your downspouts disappear into the ground through a standpipe rather than discharge into your yard, they may be directly connected to the sanitary sewer.

Before disconnecting your downspouts, you should carefully consider your yard layout and make a project plan. A short video produced by the City of Portland, Oregon, provides guidelines on how to disconnect your downspout (<https://www.portlandoregon.gov/bes/article/322320>).

Detailed information on necessary supplies, tools, , and instructions for completing the project is provided below. A diagram illustrating the general downspout layout is also provided.

Suggested Supply List

- Hacksaw
- Cordless drill
- Tape measure
- Pliers
- Sheet metal screws
- Downspout elbow
- Downspout extension
- Splash block (if needed)
- Standpipe cap²

² Standpipe caps come in a variety of types and sizes. Be sure to double check measurements before purchasing supplies. Capping the standpipe will prevent water from entering the side sewer and also keep pests and rodents out.

Instructions

1. Cut the existing downspout approximately 9 inches above the sewer standpipe with a hacksaw.
2. Cap the sewer standpipe.
3. Attach the elbow by crimping the downspout with pliers to ensure a good fit. Connect the elbow to the downspout using sheet metal screws.
4. Attach the elbow into the extension and secure with sheet metal screws. Water should drain at least 5 feet away from the house and not onto the driveway, walkway, or sidewalk. The end of the downspout extension should be at least 4 feet from the property line and possibly more if the yard slopes toward your neighbor's property.
5. A splash block may be used to help direct water away from the house and areas that may pond when it rains.

To find out more about drainage on your property, contact [LOCAL AGENCY] for more information. [LOCAL AGENCY] may also be able to help you determine if a downspout shouldn't be disconnected, and what is required to comply with local building codes.

How do I install a rain barrel, cistern, rain garden?

Disconnected downspouts can also be directed to a rain garden, rain barrel, or cistern (rain tank). A rain garden is a shallow planted depression designed to hold water until it soaks into the ground. Rain barrels capture water from a roof and hold it for later use, like watering lawns, gardens, or indoor plants. Cisterns are similar to rain barrels, but can be much larger and may be located above or below ground.

For rain barrel and cistern information and sources for the Pacific Northwest, see King County's webpage: <https://kingcounty.gov/services/environment/stewardship/nw-yard-and-garden/rain-barrels.aspx>

For information on installing a curbside rain garden or bioretention system, you may need to apply for a free permit from the Seattle Department of Transportation. For more information, see the website: <https://www.seattle.gov/transportation/permits-and-services/permits/planting-in-the-right-of-way>

How do I disconnect and redirect my sump pump?

Sump pumps that are directly connected to your side sewer can add up to 8 gallons per minute of flow to the sanitary sewer system during a 1-inch rainstorm. Proper sump pump discharges are directed to the outside of the house, not the side sewer. To redirect the sump pump discharge to the sanitary sewer system, the change could be as simple as redirecting the discharge outside the house through a hose.

Water should be discharged away from your house or it may seep back into your basement. The sump pump discharge water should flow to an area where it can seep into the ground or be stored for later use. The flow should be redirected to your lawn, a rain garden, or possibly a cistern.

In some cases, it may not be practical to redirect your sump pump discharge. If you have questions on how to proceed, contact a qualified plumbing professional or [LOCAL AGENCY] for more information.

Appendix B: I/I Task Force BMP Survey Results

Members of the I/I Task Force were asked to complete a web-based survey regarding the applicability and feasibility of implementing side sewer BMPs, as well as the preferences of their respective sewer districts. Survey results are presented on the following pages, and a summary is provided in Section 4.2 of this Technical Memorandum.

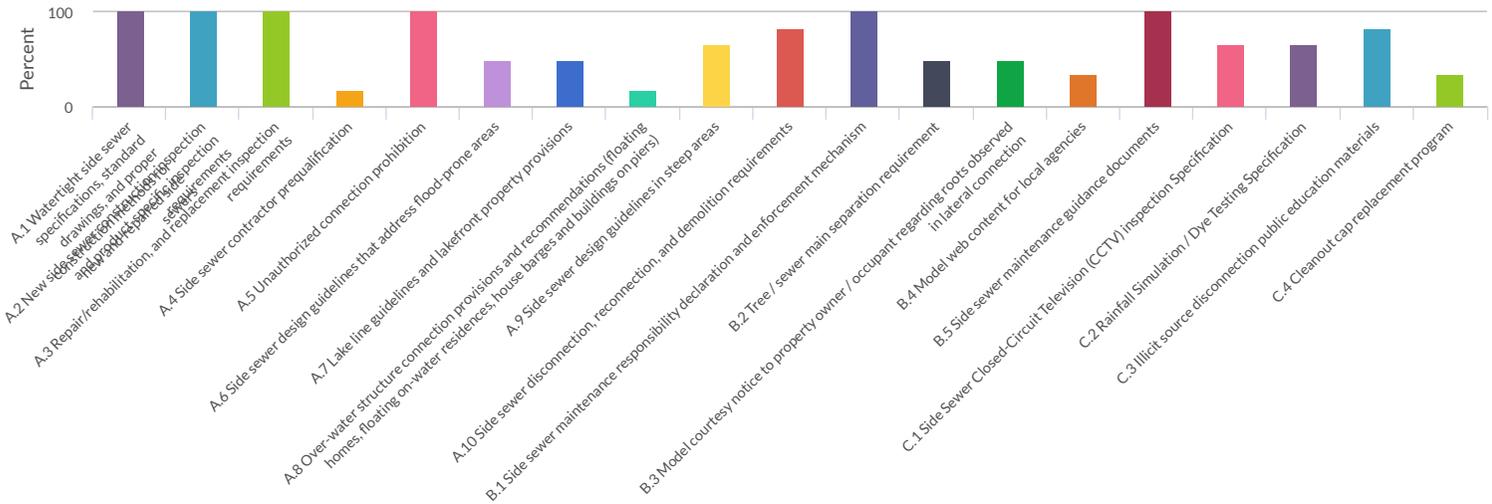
Report for MWPAAC I/I Task Force - Regional Side Sewer BMPs Survey

Response Counts

Completion Rate:	36.4%
Complete	4
Partial	7

Totals: 11

1. Which of these BMPs can your agency/utility implement? (Select all that apply)



Value	Percent	Responses
A.1 Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers	100.0%	6
A.2 New side sewer construction inspection and product-specific inspection requirements	100.0%	6
A.3 Repair/rehabilitation, and replacement inspection requirements	100.0%	6
A.4 Side sewer contractor prequalification	16.7%	1
A.5 Unauthorized connection prohibition	100.0%	6
A.6 Side sewer design guidelines that address flood-prone areas	50.0%	3
A.7 Lake line guidelines and lakefront property provisions	50.0%	3
A.8 Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)	16.7%	1
A.9 Side sewer design guidelines in steep areas	66.7%	4
A.10 Side sewer disconnection, reconnection, and demolition requirements	83.3%	5
B.1 Side sewer maintenance responsibility declaration and enforcement mechanism	100.0%	6
B.2 Tree / sewer main separation requirement	50.0%	3
B.3 Model courtesy notice to property owner / occupant regarding roots observed in lateral connection	50.0%	3
B.4 Model web content for local agencies	33.3%	2
B.5 Side sewer maintenance guidance documents	100.0%	6
C.1 Side Sewer Closed-Circuit Television (CCTV) inspection Specification	66.7%	4

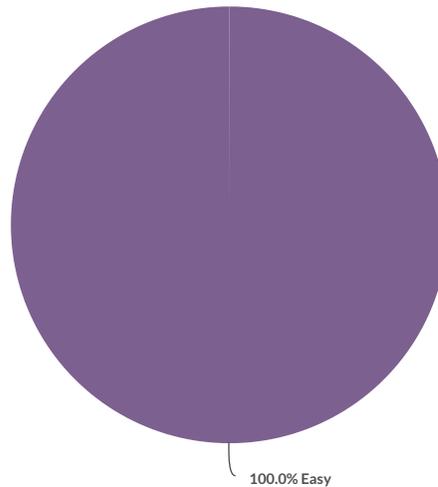
Value	Percent	Responses
C.2 Rainfall Simulation / Dye Testing Specification	66.7%	4
C.3 Illicit source disconnection public education materials	83.3%	5
C.4 Cleanout cap replacement program	33.3%	2

2. Any comments on the BMPs your agency can implement?

triggers
 implemented inspection owner
 differences enforced room
 observed activity bmp's repair
 application 0 e.g home
 replace agencies adopting
 facilities explicit existing
 transfer standards ownership

[Show Responses ▾](#)

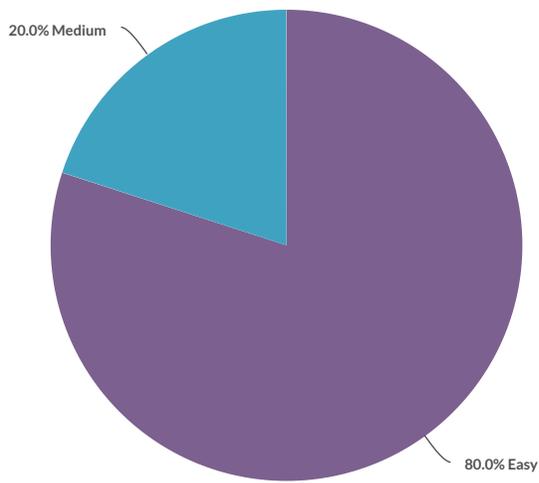
3. A.1 Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers?



Value	Percent	Responses
Easy	100.0%	5

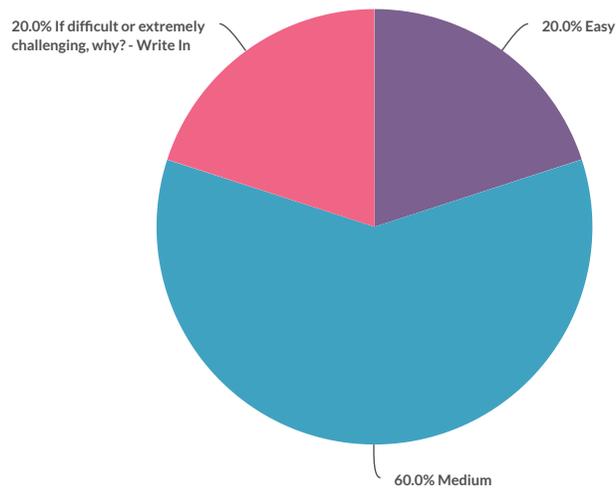
Totals: 5

4. A.2 New side sewer construction inspection and product-specific inspection requirements?



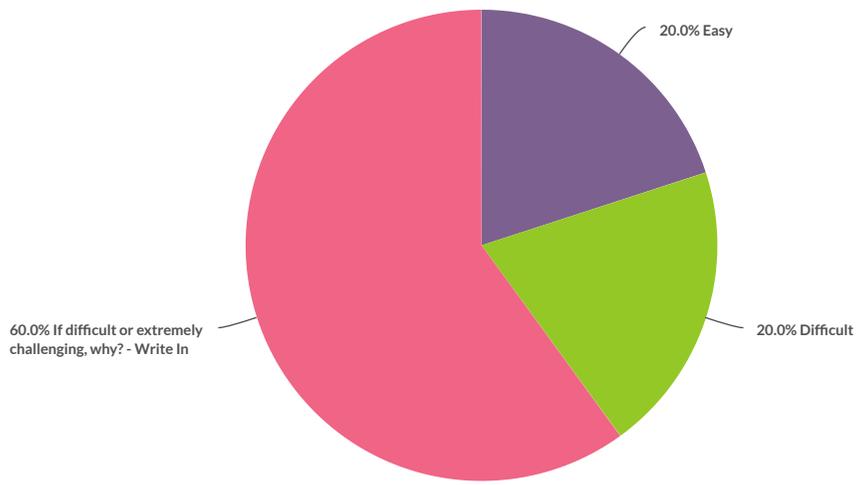
Value	Percent	Responses
Easy	80.0%	4
Medium	20.0%	1
		Totals: 5

5. A.3 Repair/rehabilitation, and replacement inspection requirements?



Value	Percent	Responses
Easy	20.0%	1
Medium	60.0%	3
If difficult or extremely challenging, why? - Write In (click to view)	20.0%	1
		Totals: 5

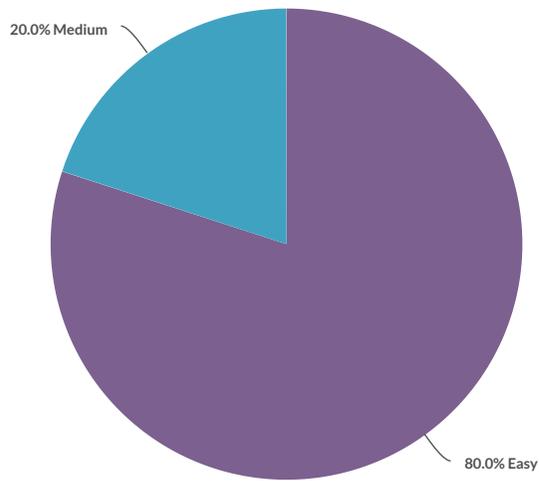
6. A.4 Side sewer contractor prequalification?



Value	Percent	Responses
Easy	20.0%	1
Difficult	20.0%	1
If difficult or extremely challenging, why? - Write In (click to view)	60.0%	3
		Totals: 5

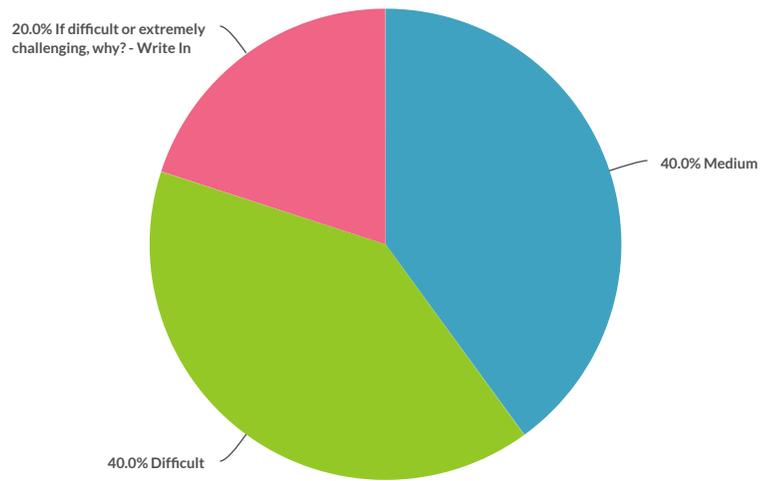
If difficult or extremely challenging, why? - Write In	Count
Difficult because we have nothing in place at this time.	1
Management of the system could be labor intensive, and may be considered to be non-customer friendly	1
We do not want to approve who a private home owner might want to hire for their property. We make sure contractor has a license.	1
Totals	3

7. A.5 Unauthorized connection prohibition?



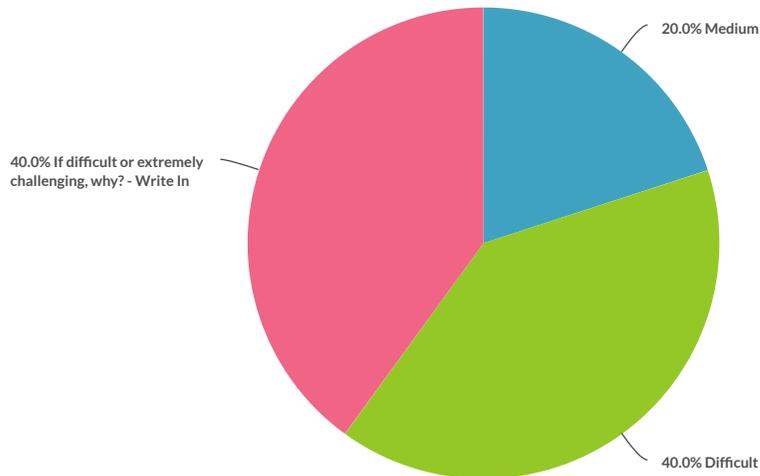
Value	Percent	Responses
Easy	80.0%	4
Medium	20.0%	1
		Totals: 5

8. A.6 Side sewer design guidelines that address flood-prone areas?



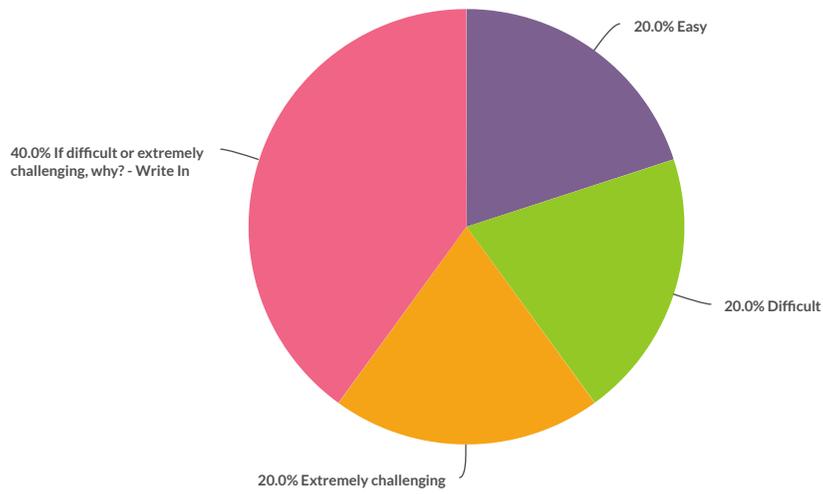
Value	Percent	Responses
Medium	40.0%	2
Difficult	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	20.0%	1
		Totals: 5

9. A.7 Lake line guidelines and lakefront property provisions?



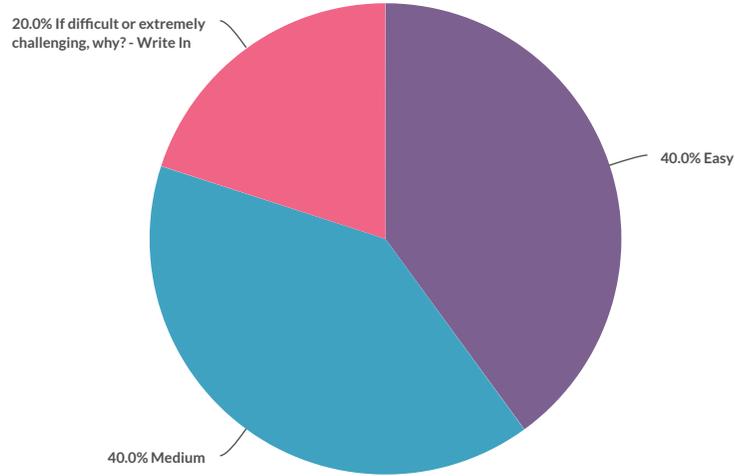
Value	Percent	Responses
Medium	20.0%	1
Difficult	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	40.0%	2
		Totals: 5

10. A.8 Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)?



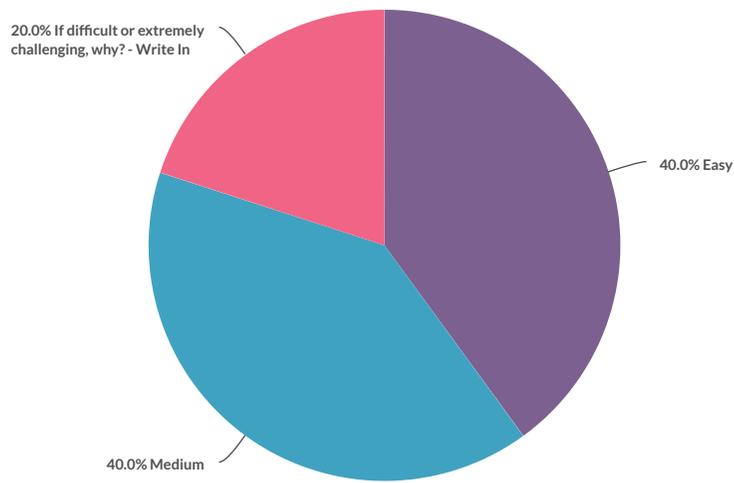
Value	Percent	Responses
Easy	20.0%	1
Difficult	20.0%	1
Extremely challenging	20.0%	1
If difficult or extremely challenging, why? - Write In (click to view)	40.0%	2
		Totals: 5

11. A.9 Side sewer design guidelines in steep areas?



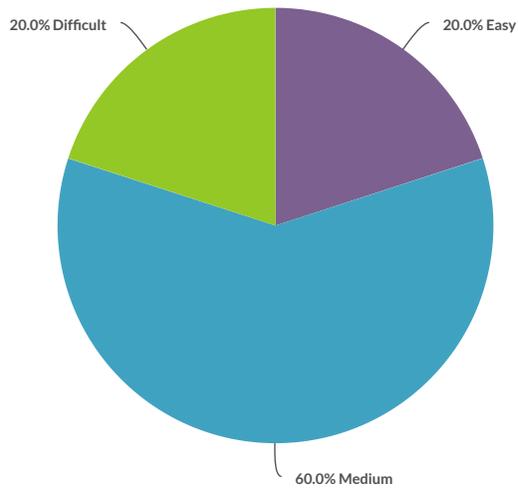
Value	Percent	Responses
Easy	40.0%	2
Medium	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	20.0%	1
		Totals: 5

12. A.10 Side sewer disconnection, reconnection, and demolition requirements?



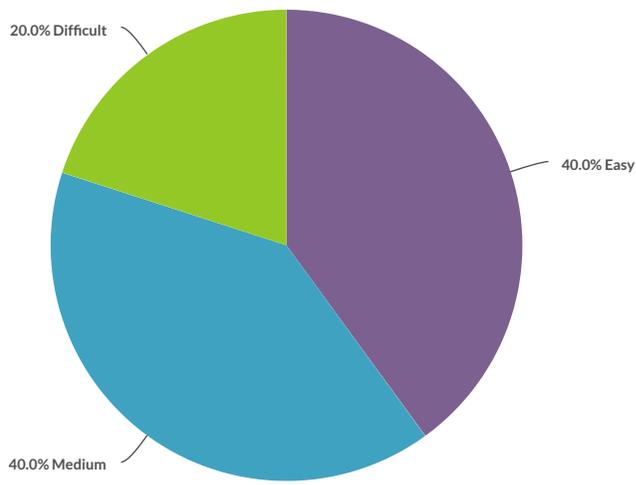
Value	Percent	Responses
Easy	40.0%	2
Medium	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	20.0%	1
		Totals: 5

13. B.1 Side sewer maintenance responsibility declaration and enforcement mechanism?



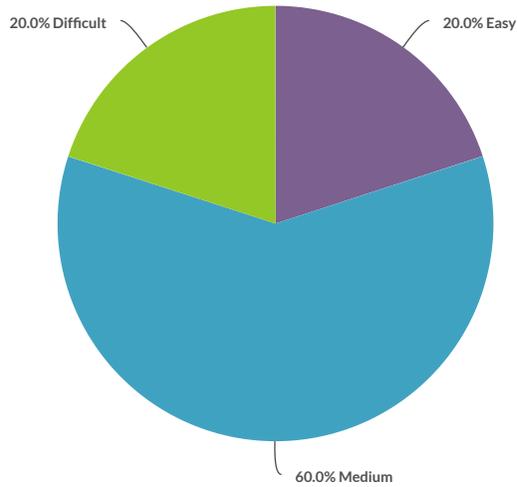
Value	Percent	Responses
Easy	20.0%	1
Medium	60.0%	3
Difficult	20.0%	1
		Totals: 5

14. B.2 Tree / sewer main separation requirement?



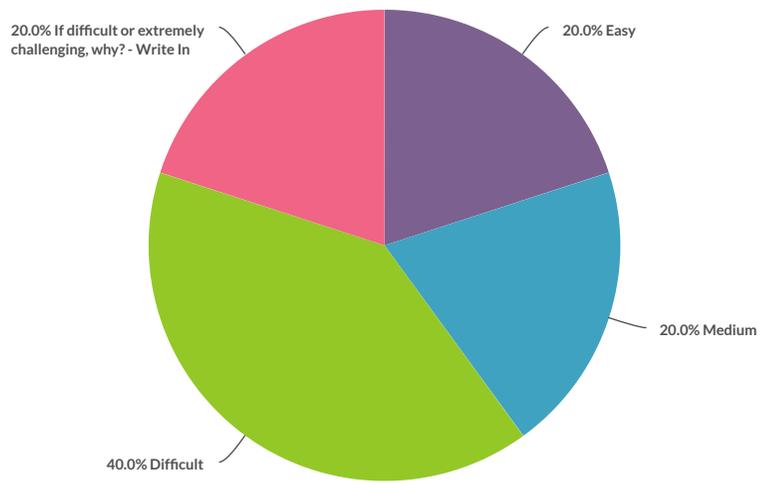
Value	Percent	Responses
Easy	40.0%	2
Medium	40.0%	2
Difficult	20.0%	1
		Totals: 5

15. B.3 Model courtesy notice to property owner / occupant regarding roots observed in lateral connection?



Value	Percent	Responses
Easy	20.0%	1
Medium	60.0%	3
Difficult	20.0%	1
		Totals: 5

16. B.4 Model web content for local agencies?

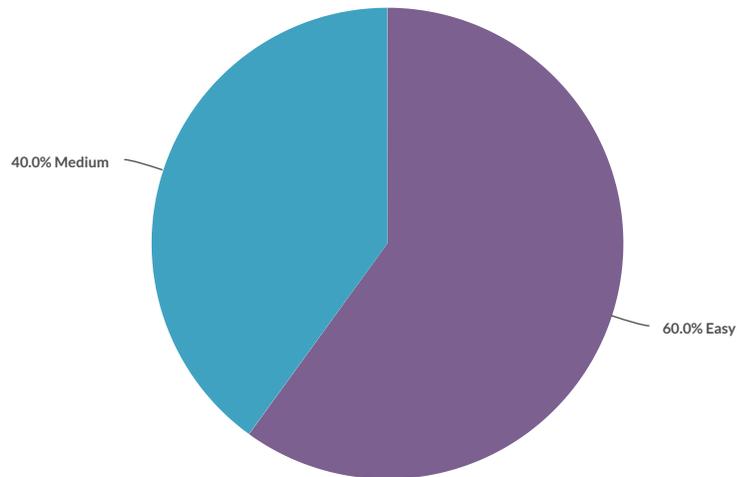


Value	Percent	Responses
Easy	20.0%	1
Medium	20.0%	1
Difficult	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	20.0%	1

Totals: 5

If difficult or extremely challenging, why? - Write In	Count
Not sure of the question	1
Totals	1

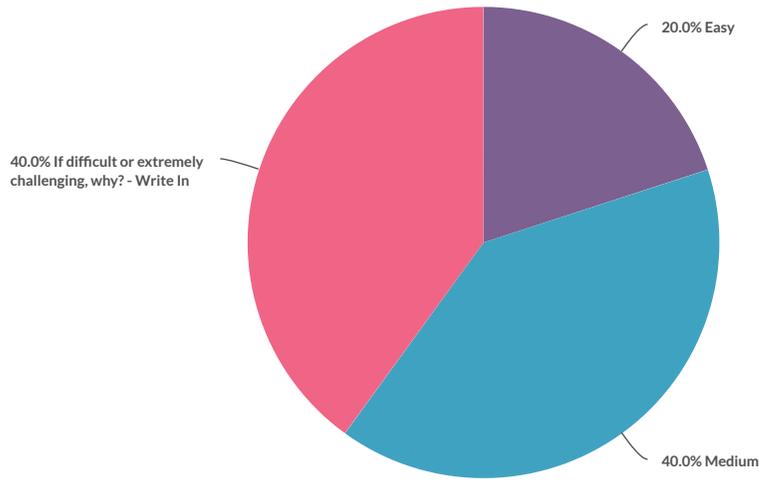
17. B.5 Side sewer maintenance guidance documents?



Value	Percent	Responses
Easy	60.0%	3
Medium	40.0%	2

Totals: 5

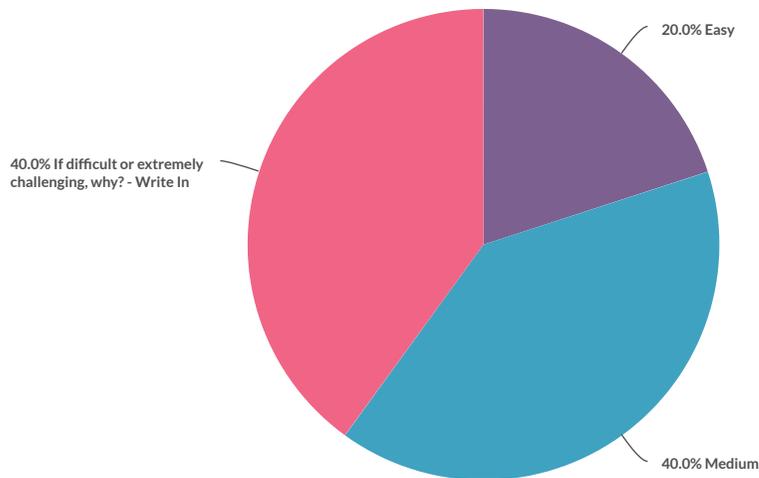
18. C.1 Side Sewer Closed-Circuit Television (CCTV) inspection Specification?



Value	Percent	Responses
Easy	20.0%	1
Medium	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	40.0%	2
		Totals: 5

If difficult or extremely challenging, why? - Write In	Count
Difficult because we have nothing in place at this time.	1
We only go to property line. Some hard to reach	1
Totals	2

19. C.2 Rainfall Simulation / Dye Testing Specification?



Value	Percent	Responses
Easy	20.0%	1
Medium	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	40.0%	2
		Totals: 5

If difficult or extremely challenging, why? - Write In

Count

Although adoption of the specs would fairly simple, specifying when we'd use or require one may be an issue.

1

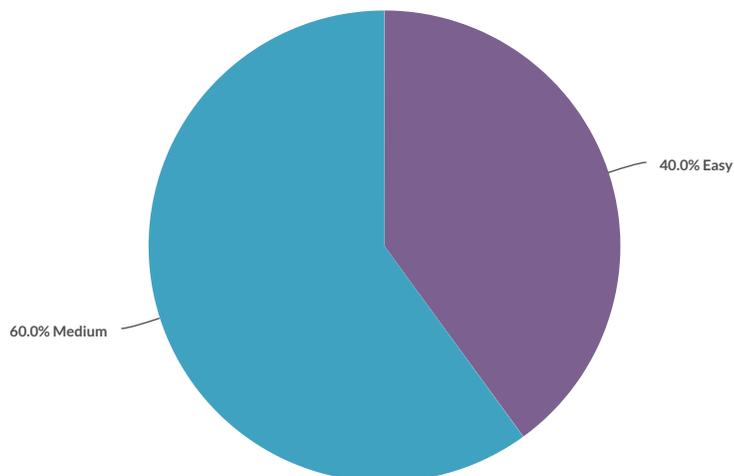
Difficult because we have nothing in place at this time.

1

Totals

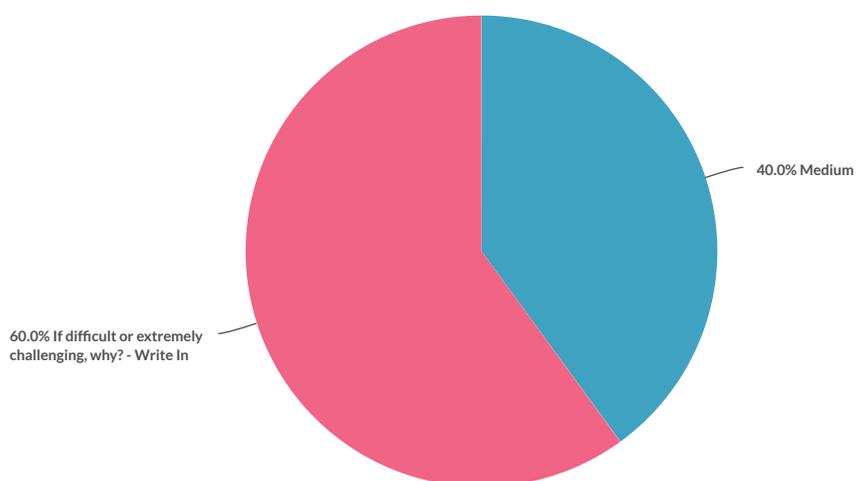
2

20. C.3 Illicit source disconnection public education materials?



Value	Percent	Responses
Easy	40.0%	2
Medium	60.0%	3
		Totals: 5

21. C.4 Cleanout cap replacement program?



Value	Percent	Responses
Medium	40.0%	2
If difficult or extremely challenging, why? - Write In (click to view)	60.0%	3
		Totals: 5

If difficult or extremely challenging, why? - Write In

Count

Depends if our agency would be required to replace v. inform	1
Difficult because we have nothing in place at this time.	1
We have not had much of a problem with drainage from yards into the sewer system.	1
Totals	3

22. Please add any additional thoughts on the BMPs your agency would find difficult or extremely challenging to implement.

relevant standard standards
 difficult lake lines
 analysis feel
 change adopt free
 applicable answers
 questions problem marked

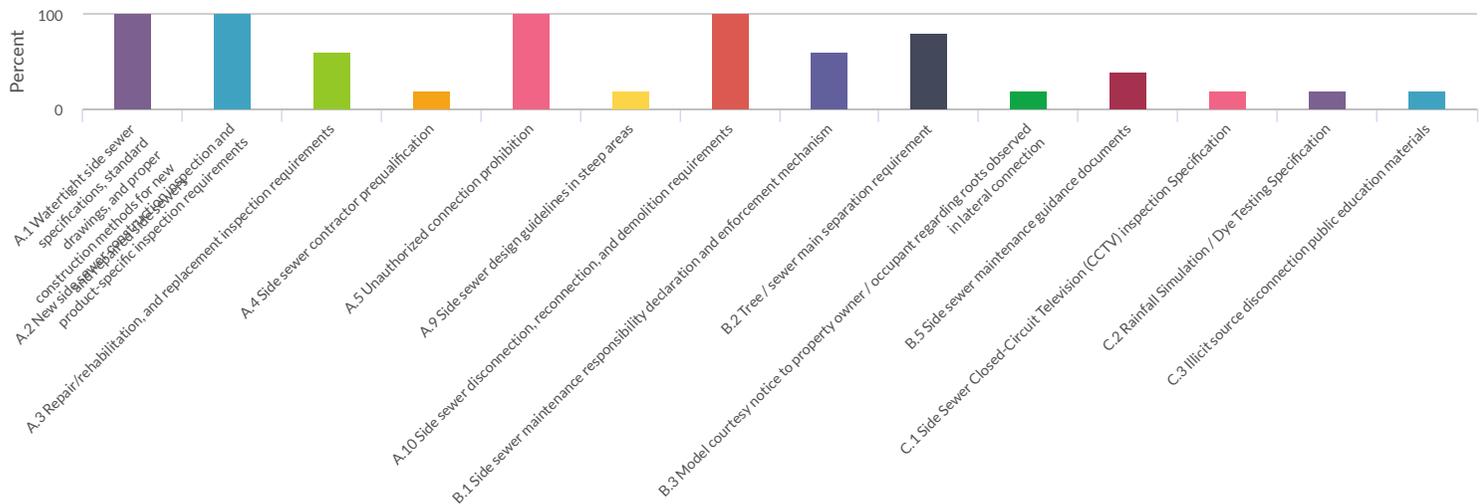
Hide Responses ▾

ResponseID Response

14 The non-applicable standards (i.e. lake lines) would not really be a problem for us, but we wouldn't adopt the standard, so I marked them as difficult. Feel free to change those answers to make any analysis of those questions more relevant.

◀ Previous Page Next Page ▶

23. Which of these BMPs (if any) are you currently implementing? (select all that apply)



Value	Percent	Responses
A.1 Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers	100.0%	5
A.2 New side sewer construction inspection and product-specific inspection requirements	100.0%	5
A.3 Repair/rehabilitation, and replacement inspection requirements	60.0%	3

Value	Percent	Responses
A.4 Side sewer contractor prequalification	20.0%	1
A.5 Unauthorized connection prohibition	100.0%	5
A.9 Side sewer design guidelines in steep areas	20.0%	1
A.10 Side sewer disconnection, reconnection, and demolition requirements	100.0%	5
B.1 Side sewer maintenance responsibility declaration and enforcement mechanism	60.0%	3
B.2 Tree / sewer main separation requirement	80.0%	4
B.3 Model courtesy notice to property owner / occupant regarding roots observed in lateral connection	20.0%	1
B.5 Side sewer maintenance guidance documents	40.0%	2
C.1 Side Sewer Closed-Circuit Television (CCTV) inspection Specification	20.0%	1
C.2 Rainfall Simulation / Dye Testing Specification	20.0%	1
C.3 Illicit source disconnection public education materials	20.0%	1

24. Any comments on BMPs your agency is currently implementing?

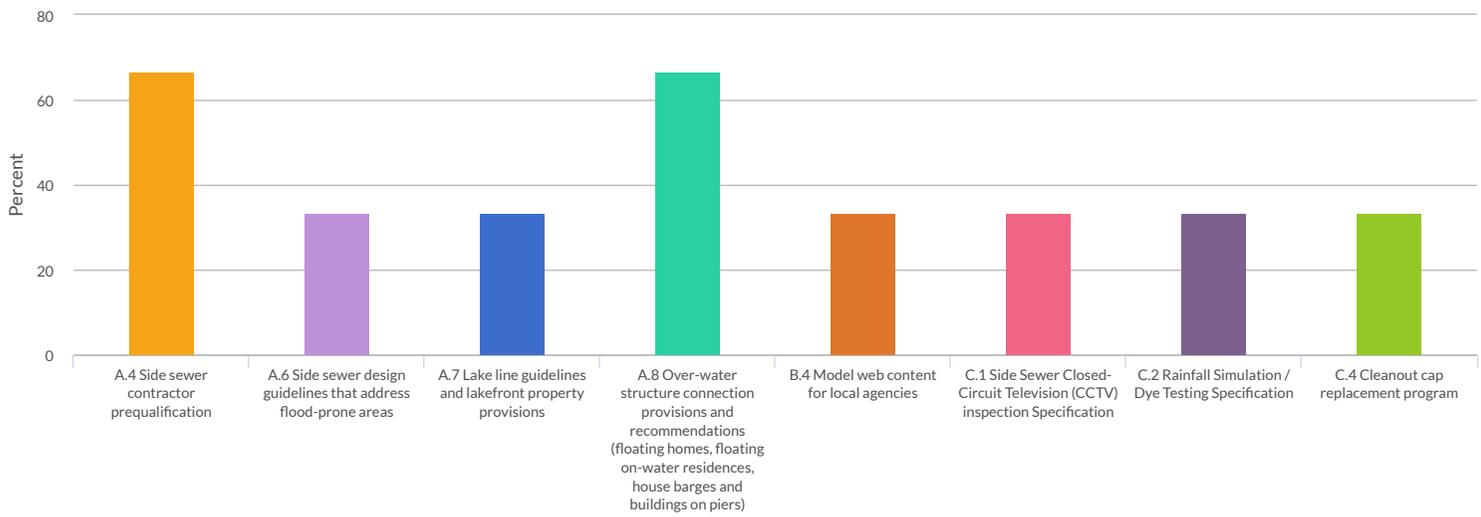
extensive intended
 barrier
 elements 0 list or
 easements conform
 root

[Hide Responses](#) ▼

ResponseID	Response
13	B.2 We do some elements of this. Root barrier within easements.
14	The ones we currently use may not be as extensive or thorough as intended by this list, so some changes may need to be made to conform if appropriate.

◀ Previous Page Next Page ▶

25. Which, if any, of these BMPs are not applicable to your agency? (select all that apply)



Value	Percent	Responses
A.4 Side sewer contractor prequalification	66.7%	2
A.6 Side sewer design guidelines that address flood-prone areas	33.3%	1
A.7 Lake line guidelines and lakefront property provisions	33.3%	1
A.8 Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)	66.7%	2
B.4 Model web content for local agencies	33.3%	1
C.1 Side Sewer Closed-Circuit Television (CCTV) inspection Specification	33.3%	1
C.2 Rainfall Simulation / Dye Testing Specification	33.3%	1
C.4 Cleanout cap replacement program	33.3%	1

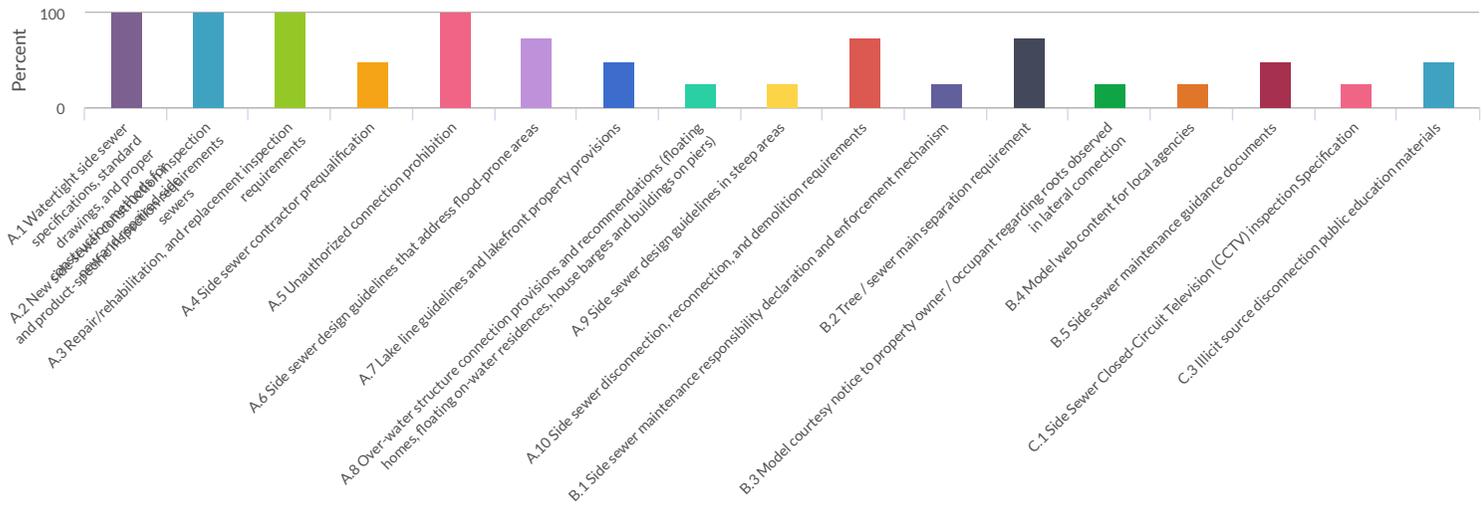
26. Please explain why each (if any) BMP you selected in Question 22 above is not applicable to your agency.

recommend structures
inspect lake lines owner
consent considered
require houses 2 or home property
water 10
private prequalification jurisdiction

[Hide Responses](#) ▾

ResponseID	Response
13	A.4 Not going to recommend who to use on private property A.8 No houses over water C.1 and C.4 - No jurisdiction on private property, do not want to inspect without home owner consent
14	We currently don't require prequalification, although that could be considered. We do not currently have lake lines or structures above water.

27. Which BMPs would you propose to include in a toolbox as best meeting the goals and objectives? (select all that apply)



Value	Percent	Responses
A.1 Watertight side sewer specifications, standard drawings, and proper construction methods for new and repaired side sewers	100.0%	4
A.2 New side sewer construction inspection and product-specific inspection requirements	100.0%	4
A.3 Repair/rehabilitation, and replacement inspection requirements	100.0%	4
A.4 Side sewer contractor prequalification	50.0%	2
A.5 Unauthorized connection prohibition	100.0%	4
A.6 Side sewer design guidelines that address flood-prone areas	75.0%	3
A.7 Lake line guidelines and lakefront property provisions	50.0%	2
A.8 Over-water structure connection provisions and recommendations (floating homes, floating on-water residences, house barges and buildings on piers)	25.0%	1
A.9 Side sewer design guidelines in steep areas	25.0%	1
A.10 Side sewer disconnection, reconnection, and demolition requirements	75.0%	3
B.1 Side sewer maintenance responsibility declaration and enforcement mechanism	25.0%	1
B.2 Tree / sewer main separation requirement	75.0%	3
B.3 Model courtesy notice to property owner / occupant regarding roots observed in lateral connection	25.0%	1
B.4 Model web content for local agencies	25.0%	1
B.5 Side sewer maintenance guidance documents	50.0%	2
C.1 Side Sewer Closed-Circuit Television (CCTV) inspection Specification	25.0%	1
C.3 Illicit source disconnection public education materials	50.0%	2

28. Any comments on the BMPs you selected to include in a tool box?

difficult prove
a10
b2 enforcement
standards

[Hide Responses](#) ▾

ResponseID	Response
13	With A10 and B2, enforcement of these standards could prove difficult

[◀ Previous Page](#) [Next Page ▶](#)

29. Based on your agency's input, do you see any opportunities/needs to revise the draft goals, objectives, and success factors? If yes, what do you suggest?

No data: No responses found for this question.

[Hide Responses](#) ▾

ResponseID	Response
13	N/a

[◀ Previous Page](#) [Next Page ▶](#)

30. If you consulted / coordinated / communicated with any other MWPAAC agencies before completing this survey, please indicate which one(s).

consult other
agencies

[Show Responses](#) ▶

Appendix C: MWPAAC Recommendation Letter to WTD

Engineering and Planning Subcommittee Recommendation to MWPAAC for Implementation of Regional Best Management Practices for Inflow and Infiltration Reduction

April 28, 2021

Introduction

In 2018, the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) in collaboration with King County Wastewater Treatment Division (WTD) recommended that three I/I reduction program concepts be further defined and evaluated for their ability to reduce inflow and infiltration (I/I) in the separated sewer portion of the regional wastewater system. I/I reduction could lead to downsized, deferred or eliminated future planned capital projects. The three program concepts include: 1) regional best management practices (BMPs), 2) an inspector training and certification program, and 3) a private side sewer inspection program with financial assistance. This document presents recommended regional BMPs to advance to implementation. Recommendations on the other two concepts will be addressed separately in the future.

Problem

- Over time, the degradation of private side sewers leads to higher I/I, which in turn will lead to increased costs for the conveyance system, treatment system, and operations.
- \$1.7 billion of new regional conveyance pipe projects are planned through 2060 to account for growth and I/I. These costs are primarily driven by peak I/I assumptions.
- I/I from private side sewers accounts for roughly up to 50-70% of all I/I. The nature of private ownership and private maintenance responsibility creates challenges for agencies interested in reducing I/I from those private sources.

Recommendation of Regional BMPs

The Engineering and Planning (E&P) Subcommittee requests that MWPAAC recommend the following side sewer BMPs to WTD to enhance the Regional I/I Reduction Program. MWPAAC can accept these recommendations without change, accept the recommendations with amendments, or reject the recommendations. Once adopted by WTD, each local agency would implement these BMPs **voluntarily** to prevent side sewer degradation and gradually reduce sources of I/I from within their own systems and thus reduce the regional I/I flows.

1. Strengthen existing regulations that prohibit unauthorized connections
2. Notify customers about roots in their side sewer
3. Provide side sewer maintenance information
4. Provide illicit source disconnection public education materials

Rationale for Recommendations

- Eliminating all degraded private side sewer systems would lead to significant I/I reductions and cost savings for property owners, local agencies, and the WTD over the next 40 years.
- Customer compliance with these side sewer BMPs will help slow I/I increases due to degradation and lessen the need for future conveyance and treatment capacity projects.
- The recommended BMPs are broadly applicable to most agencies, and reasonably implementable.
- Common regulations and messages support regional coordination and cohesion and reduces customer confusion.
- Local agencies are more successful communicating directly with their customers.
- I/I reduction can be achieved only through a combination of many measures, of which the customer's side sewer maintenance and proper connections are an important first step.

Description of Side Sewer BMPs

1. Strengthen regulations to prohibit unauthorized connections

Description: This BMP provides example code language for adoption of legal authority, which clearly states that unauthorized connections must be removed and provides appropriate enforcement mechanisms to accomplish proper disconnection on new construction or a substantial remodel. Additionally, the example language includes provisions to ensure only one side sewer connection from each structure is made to the main sewer in accordance with applicable regulations, and that the side sewer is directly connected to the appropriate draining fixtures within the structure. This BMP can cover townhouses, apartments, shared side sewers, houses with accessory dwelling units, or similar, depending upon the local agency.

Rationale: While most jurisdictions have legal authority through code language prohibiting unauthorized connections, it is assumed that uniformly stronger language would give jurisdictions the tools needed to minimize such connections.

To increase voluntary participation by agencies, the developed materials include examples of effective and "less effective" legal language.

2. Courtesy notice to property owner /occupant regarding roots in side sewer

Description: Roots in side sewer connections are commonly observed during routine sewer main CCTV inspections performed by many sewer utilities and their CCTV inspection contractors. When notifying property owner/residents of this finding, the property owner can also be made aware of their responsibility for maintaining the side sewer, including the need to hire a plumber to clear roots.

Rationale: Joint separation due to age, pipe integrity degradation, and damage caused by root intrusion allows groundwater to enter through cracks in side sewers.

This measure will alert the customer to potential blockages, sewage spills, and growth of the roots into the public sewer main.

3. Side sewer maintenance guideline documents

Description: Providing side sewer maintenance guidelines to educate property owners on their responsibilities for maintaining, inspecting, and repairing their side sewers. Also provide information on resources, means, and methods for maintaining the side sewer.

Rationale: Providing these guidelines to property owners makes it more likely that side sewers are repaired, replaced, or rehabilitated, thereby reducing I/I. The information will also reinforce the interests that agencies and individuals share in having well-maintained, reliable side sewers throughout their service area.

This measure can be provided in a cost-effective manner as a bill stuffer and on the agency's public website.

4. Illicit source disconnection public education materials

Description: Provide information to educate property owners on types of illicit connections and how to disconnect those sources. Utilities that experience excessive peak I/I flows will most likely opt to address both public and private property sources of I/I.

Rationale: Private property inflow sources (roof leaders, area drains, window well drains, foundation drains, etc.) can contribute significantly to peak flows that occur during wet weather events. Property owners may be unaware of the regulations surrounding sanitary and storm sewer systems. Providing these materials will encourage property owners to remove illicit connections, thereby reducing unpermitted inflow.

This measure can be provided in a cost-effective manner as a bill stuffer and on the agency's public website.

Implementation

If MWPAAC approves these recommended BMPs and WTD accepts the recommendation, the next phase will be voluntary implementation by local agencies.

1. King County will provide a regional toolkit through the King County website with the examples of code language and customer education materials (root notification, maintenance guidelines, illicit connection information). The local agencies can tailor these materials for their service area.
2. Each local agency should identify barriers or challenges and establish processes for implementation, including:
 - The agency's legal authority/responsibility and the private property/private system owners' legal responsibilities for side sewer inspection, maintenance, and repair.

- Staffing requirements, roles, and responsibilities (note: this may include resources from outside agencies, especially for sewer districts working with one or more cities).
- Customer education and communication plan, including notice of changes in legal authority, enforcement response plan, and resources available for proper unauthorized connection disconnection/redirection compliance procedures.
- Social equity and inclusion, which may involve translation/transcreation of the customer education materials into other languages applicable to each agency's service area.
- Budget and funding impacts
- Information management system to track appropriate data and gauge effectiveness
- Approval of the agency's legal counsel and governing body (e.g., General Manager, Chief Executive Officers, Board, Directors, etc.). If needed, a written policy may be drafted to clearly delineate the limits of each party's responsibilities.